



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 [2-98](#)
 MAC, displaying [2-378](#)
 matching for QoS classification [2-196](#)
access mode [2-522](#)
access ports [2-522](#)
ACEs [2-63](#), [2-228](#)
ACLs
 as match criteria for QoS classes [2-196](#)
 deny [2-61](#)
 displaying [2-286](#)
 for non-IP protocols [2-174](#)
 IP [2-98](#)
 on Layer 2 interfaces [2-98](#)
 permit [2-226](#)
action command [2-5](#)
address aliasing [2-215](#)
aggregate policers
 applying [2-233](#)
 creating [2-235](#)
 displaying [2-413](#)
 QoS [2-236](#)
aggregate-port learner [2-220](#)
allowed VLANs [2-538](#)

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 [2-268](#)
audience [xvii](#)
authorization state of controlled port [2-69](#)
autonegotiation of duplex mode [2-77](#)

B

backup interfaces
 configuring [2-516](#)
 displaying [2-334](#)
bandwidth, configuring for QoS [2-17](#)
bandwidth command [2-17](#)
boot (boot loader) command [A-2](#)
boot bootlpr command [2-20](#)
boot config-file command [2-21](#)
boot enable-break command [2-22](#)
boot helper command [2-23](#)
boot helper-config file command [2-24](#)
booting
 Cisco IOS image [2-27](#)
 displaying environment variables [2-291](#)
 interrupting [2-22](#)
 manually [2-25](#)
boot loader
 accessing [A-1](#)
 booting
 Cisco IOS image [A-2](#)
 helper image [2-23](#)

boot loader (continued)

- 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 [2-25](#)
- boot private-config-file command [2-26](#)
- boot system command [2-27](#)
- BPDU filtering, for spanning tree [2-462, 2-500](#)
- BPDU guard, for spanning tree [2-464, 2-500](#)
- broadcast storm control [2-509](#)
- bundling characteristics, UNI [2-83](#)
- burst bytes, in QoS policers [2-229, 2-235](#)

C

- cat (boot loader) command [A-4](#)
- caution, description [xviii](#)
- CBWFQ, configuring [2-17](#)
- CDP, enabling protocol tunneling for [2-158](#)
- CFM [2-219](#)
- CFM as OAM protocol [2-219](#)
- channel-group command [2-28](#)
- channel-protocol command [2-32](#)
- child policy maps [2-270](#)
- class-based traffic shaping [2-284](#)
- class-based weighted fair queuing
 - See CBWFQ
- class command [2-34](#)
- class-map command [2-36](#)
- class-map configuration mode [2-36](#)
- class maps
 - creating [2-36](#)
 - defining the match criteria [2-197](#)
 - displaying [2-295](#)
 - matching in [2-36](#)
- 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 statistics command [2-40](#)
- clear l2protocol-tunnel counters command [2-42](#)
- clear lacp command [2-43](#)
- clear mac address-table command [2-44, 2-45](#)
- clear pagp command [2-46](#)
- clear policer cpu uni counters command [2-47](#)
- clear port-security command [2-48](#)
- clear spanning-tree counters command [2-50](#)
- clear spanning-tree detected-protocols command [2-51](#)
- clear vmps statistics command [2-53](#)
- command modes defined [1-1](#)
- committed information rate in QoS policers [2-229, 2-235](#)

- configuration, initial
 - See also getting started guide and hardware installation guide
 - configuration files
 - password recovery disable considerations [A-1](#)
 - specifying the name [2-21, 2-26](#)
 - configuring multiple interfaces [2-94](#)
 - conform-action command [2-54](#)
 - control-plane policer [2-47](#)
 - control-plane policer information, displaying [2-414](#)
 - control-plane security [2-238](#)
 - control plane statistics, clearing [2-47](#)
 - conventions
 - command [xviii](#)
 - for examples [xviii](#)
 - publication [xviii](#)
 - text [xviii](#)
 - copy (boot loader) command [A-5](#)
 - CoS
 - as match criteria for QoS groups [2-197](#)
 - for QoS classification [2-273](#)
 - setting value in policy maps [2-273](#)
 - CoS value, assigning to Layer 2 protocol packets [2-161](#)
 - CPU ASIC statistics, displaying [2-296](#)
 - CPU protection policers, displaying [C-21](#)
-
- D**
- debug backup command [B-2](#)
 - debug dot1x command [B-3](#)
 - debug etherchannel command [B-4](#)
 - debug interface command [B-10](#)
 - debug ip dhcp snooping command [B-8](#)
 - debug ip igmp filter command [B-11](#)
 - debug ip igmp max-groups command [B-12](#)
 - debug ip igmp snooping command [B-13](#)
 - debug ip verify source packet command [B-9](#)
 - debug lacp command [B-14](#)
 - debug mac-notification command [B-15](#)
 - debug matm command [B-16](#)
 - debug matm move update command [B-17](#)
 - debug monitor command [B-18](#)
 - debug mvrdbg command [B-19](#)
 - debug nvram command [B-20](#)
 - debug pagp command [B-21](#)
 - debug platform acl command [B-22](#)
 - debug platform backup interface command [B-24](#)
 - debug platform cfm command [B-23](#)
 - debug platform cpu-queues command [B-25](#)
 - debug platform dot1x command [B-27](#)
 - debug platform etherchannel command [B-28](#)
 - debug platform forw-tcam command [B-29](#)
 - debug platform ip arp inspection command [B-30](#)
 - debug platform ipc command [B-38](#)
 - debug platform ip dhcp command [B-31](#)
 - debug platform ip igmp snooping command [B-32](#)
 - debug platform ip multicast command [B-34](#)
 - 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 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 resource-manager command [B-51](#)
 - debug platform snmp command [B-52](#)
 - debug platform span command [B-53](#)
 - debug platform supervisor-asic command [B-54](#)
 - debug platform sw-bridge command [B-55](#)
 - debug platform tcam command [B-56](#)
 - debug platform udd command [B-58](#)
 - debug platform vlan command [B-59](#)
 - debug pm command [B-60](#)
 - debug port-security command [B-62](#)
 - debug qos-manager command [B-63](#)

- debug spanning-tree bpdu command [B-66](#)
- debug spanning-tree bpdu-opt command [B-67](#)
- debug spanning-tree command [B-64](#)
- debug spanning-tree mstp command [B-68](#)
- debug spanning-tree switch command [B-70](#)
- debug sw-vlan command [B-72](#)
- debug sw-vlan ifs command [B-74](#)
- debug sw-vlan notification command [B-75](#)
- debug udd command [B-77](#)
- debug vqpc command [B-79](#)
- define interface-range command [2-56](#)
- delete (boot loader) command [A-6](#)
- delete command [2-58](#)
- deny (ARP access-list configuration) command [2-59](#)
- deny command [2-61](#)
- detect mechanism, causes [2-78](#)
- DHCP snooping
 - accepting untrusted packets from edge switch [2-123](#)
 - enabling
 - on a VLAN [2-129](#)
 - option 82 [2-121, 2-123](#)
 - trust on an interface [2-127](#)
 - error recovery timer [2-80](#)
 - rate limiting [2-126](#)
- DHCP snooping binding database
 - binding file, configuring [2-119](#)
 - bindings
 - adding [2-117](#)
 - deleting [2-117](#)
 - displaying [2-349](#)
 - clearing database agent statistics [2-40](#)
 - database agent, configuring [2-119](#)
 - displaying
 - binding entries [2-349](#)
 - database agent status [2-351](#)
 - renewing [2-259](#)
- differentiated service code point
 - See DSCP
- dir (boot loader) command [A-7](#)
- directories, deleting [2-58](#)
- documentation, related [xviii](#)
- document conventions [xviii](#)
- domains, CFM [2-219](#)
- dot1x default command [2-64](#)
- dot1x host-mode command [2-65](#)
- dot1x initialize command [2-66](#)
- dot1x max-req command [2-67, 2-68](#)
- dot1x port-control command [2-69](#)
- dot1x re-authenticate command [2-71](#)
- dot1x reauthentication command [2-72](#)
- dot1x system-auth-control command [2-73](#)
- dot1x timeout command [2-74](#)
- dropping packets, with ACL matches [2-5](#)
- drop threshold, Layer 2 protocol tunneling [2-158](#)
- DSCP
 - as match criteria for QoS groups [2-198, 2-204](#)
 - for QoS traffic marking [2-275](#)
 - setting in policy maps [2-275](#)
- duplex command [2-76](#)
- dynamic-access ports
 - configuring [2-514](#)
 - restrictions [2-515](#)
- dynamic ARP inspection
 - ARP ACLs
 - apply to a VLAN [2-103](#)
 - define [2-15](#)
 - deny packets [2-59](#)
 - display [2-290](#)
 - permit packets [2-224](#)
 - clear
 - log buffer [2-38](#)
 - statistics [2-39](#)
 - display
 - ARP ACLs [2-290](#)
 - configuration and operating state [2-345](#)
 - log buffer [2-345](#)
 - statistics [2-345](#)
 - trust state and rate limit [2-345](#)

dynamic ARP inspection (continued)

- enable per VLAN [2-113](#)
 - error detection for [2-78](#)
 - error recovery timer [2-80](#)
 - log buffer
 - clear [2-38](#)
 - configure [2-107](#)
 - display [2-345](#)
 - rate-limit incoming ARP packets [2-105](#)
 - statistics
 - clear [2-39](#)
 - display [2-345](#)
 - trusted interface state [2-109](#)
 - type of packet logged [2-114](#)
 - validation checks [2-111](#)
- Dynamic Host Configuration Protocol (DHCP)
- See DHCP snooping

E

- EAP-request/identity frame
 - maximum number to send [2-68](#)
 - response time before retransmitting [2-74](#)
- E-LMI mapping [2-83](#)
- environment variables, displaying [2-291](#)
- errdisable detect cause command [2-78](#)
- errdisable recovery command [2-80](#)
- error conditions, displaying [2-317](#)
- error disable detection [2-78](#)
- error-disabled interfaces, displaying [2-334](#)
- EtherChannel
 - assigning Ethernet interface to channel group [2-28](#)
 - creating port-channel logical interface [2-92](#)
 - debug EtherChannel/PAgP, display [B-4](#)
 - debug platform-specific events, display [B-28](#)
 - displaying [2-321](#)

EtherChannel (continued)

- enabling Layer 2 protocol tunneling for
 - LACP [2-159](#)
 - PAgP [2-159](#)
 - UDLD [2-159](#)
- interface information, displaying [2-334](#)
- LACP
 - clearing channel-group information [2-43](#)
 - debug messages, display [B-14](#)
 - displaying [2-372](#)
 - modes [2-28](#)
 - port priority for hot-standby ports [2-162](#)
 - restricting a protocol [2-32](#)
 - system priority [2-164](#)
- load-distribution methods [2-242](#)
- PAgP
 - aggregate-port learner [2-220](#)
 - clearing channel-group information [2-46](#)
 - debug messages, display [B-21](#)
 - displaying [2-409](#)
 - error detection for [2-78](#)
 - error recovery timer [2-80](#)
 - learn method [2-220](#)
 - modes [2-28](#)
 - physical-port learner [2-220](#)
 - priority of interface for transmitted traffic [2-222](#)
- Ethernet controller, internal register display [2-298](#)
- ethernet evc command [2-82](#)
- ethernet lmi ce-vlan map command [2-83](#)
- Ethernet Local Management Interface
 - See E-LMI
- Ethernet service
 - debugging [B-6](#)
 - displaying [2-324](#)
- Ethernet service instance [2-264](#)
- Ethernet service interfaces [2-328](#)
- Ethernet statistics, collecting [2-261](#)
- Ethernet UNI configuration [2-85](#)
- ethernet uni id command [2-87](#)

Ethernet virtual connections

See EVCs

EVC configuration mode [2-82](#)

EVCs [2-82](#)

and VLANs [2-85](#)

service instances [2-264](#)

UNI counts [2-556](#)

EVC service

point-to-multipoint [2-556](#)

point-to-point [2-556](#)

examples, conventions for [xviii](#)

exceed-action command [2-88](#)

extended-range VLANs

and allowed VLAN list [2-538](#)

configuring [2-560](#)

extended system ID for STP [2-470](#)

F

fan information, displaying [2-314](#)

files, deleting [2-58](#)

flash_init (boot loader) command [A-9](#)

Flex Links

configuring [2-516](#)

displaying [2-334](#)

flowcontrol command [2-90](#)

format (boot loader) command [A-10](#)

forwarding packets, with ACL matches [2-5](#)

forwarding results, display [C-6](#)

frame forwarding information, displaying [C-6](#)

fsck (boot loader) command [A-11](#)

G

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

H

hardware ACL statistics [2-286](#)

help (boot loader) command [A-12](#)

host connection, port configuration [2-521](#)

host ports, private VLANs [2-525](#)

I

IEEE 802.1ag Connectivity Fault Management

See CFM

IEEE 802.1Q trunk ports and native VLANs [2-565](#)

IEEE 802.1Q tunnel ports

configuring [2-522](#)

displaying [2-309](#)

limitations [2-523](#)

IEEE 802.1x

and switchport modes [2-523](#)

violation error recovery [2-80](#)

See also port-based authentication

IGMP filters

applying [2-132](#)

debug messages, display [B-11](#)

IGMP groups, setting maximum [2-133](#)

IGMP maximum groups, debugging [B-12](#)

IGMP profiles

creating [2-135](#)

displaying [2-353](#)

IGMP snooping

adding ports as a static member of a group [2-150](#)

displaying [2-354, 2-358, 2-360](#)

enabling [2-137](#)

enabling the configurable-leave timer [2-139](#)

enabling the Immediate-Leave feature [2-147](#)

flooding query count [2-145](#)

interface topology change notification behavior [2-146](#)

multicast table [2-356](#)

querier [2-141](#)

query solicitation [2-145](#)

IGMP snooping (continued)

- report suppression [2-143](#)
- switch topology change notification behavior [2-145](#)
- images
 - See software images
- Immediate-Leave feature, MVR [2-217](#)
- immediate-leave processing [2-147](#)
- initial configuration
 - See also getting started guide and hardware installation guide
- input policy maps
 - and ACL classification [2-196](#)
 - and aggregate policers [2-236](#)
 - commands not supported in [2-240](#)
 - configuration guidelines [2-240](#)
- interface command [2-96](#)
- interface configuration mode [1-2, 1-4](#)
- interface port-channel command [2-92](#)
- interface range command [2-94](#)
- interface-range macros [2-56](#)
- interfaces
 - assigning Ethernet interface to channel group [2-28](#)
 - configuring [2-76](#)
 - configuring multiple [2-94](#)
 - creating port-channel logical [2-92](#)
 - debug messages, display [B-10](#)
 - disabling [2-451](#)
 - displaying the MAC address table [2-390](#)
 - restarting [2-451](#)
- interface speed, configuring [2-507](#)
- internal registers, displaying [2-298, 2-305](#)
- Internet Group Management Protocol
 - See IGMP
- invalid GBIC
 - error detection for [2-78](#)
 - error recovery timer [2-80](#)
- ip address command [2-101](#)
- IP addresses, setting [2-101](#)
- IP address matching [2-194](#)
- ip arp inspection filter vlan command [2-103](#)
- ip arp inspection limit command [2-105](#)
- ip arp inspection log-buffer command [2-107](#)
- ip arp inspection trust command [2-109](#)
- ip arp inspection validate command [2-111](#)
- ip arp inspection vlan command [2-113](#)
- ip arp inspection vlan logging command [2-114](#)
- IP DHCP snooping
 - See DHCP snooping
 - ip dhcp snooping binding command [2-117](#)
 - ip dhcp snooping command [2-116](#)
 - ip dhcp snooping database command [2-119](#)
 - ip dhcp snooping information option allow-untrusted command [2-123](#)
 - ip dhcp snooping information option command [2-121](#)
 - ip dhcp snooping information option format remote-id command [2-125](#)
 - ip dhcp snooping limit rate command [2-126](#)
 - ip dhcp snooping trust command [2-127](#)
 - ip dhcp snooping verify command [2-128](#)
 - ip dhcp snooping vlan command [2-129](#)
 - ip dhcp snooping vlan information option format-type circuit-id string command [2-130](#)
 - ip igmp filter command [2-132](#)
 - ip igmp max-groups command [2-133](#)
 - ip igmp profile command [2-135](#)
 - ip igmp snooping command [2-137](#)
 - ip igmp snooping last-member-query-interval command [2-139](#)
 - ip igmp snooping querier command [2-141](#)
 - ip igmp snooping report-suppression command [2-143](#)
 - ip igmp snooping tcn command [2-145](#)
 - ip igmp snooping tcn flood command [2-146](#)
 - ip igmp snooping vlan immediate-leave command [2-147](#)
 - ip igmp snooping vlan mrouter command [2-148](#)
 - ip igmp snooping vlan static command [2-150](#)
- IP multicast addresses [2-214](#)
- IP precedence, as match criteria for QoS groups [2-200](#)
- ip source binding command [2-152](#)

IP source guard

- disabling [2-156](#)
- displaying
 - binding entries [2-362](#)
 - configuration [2-364](#)
- enabling [2-156](#)
- static IP source bindings [2-152](#)

IP source guard, displaying

- dynamic binding entries [2-349](#)

ip ssh command [2-154](#)

ip verify source command [2-156](#)

J

jumbo frames

- See MTU

L

l2protocol-tunnel command [2-158](#)

l2protocol-tunnel cos command [2-161](#)

LACP

- See EtherChannel

lacp port-priority command [2-162](#)

lacp system-priority command [2-164](#)

Layer 2 mode, enabling [2-512](#)

Layer 2 protocol ports, displaying [2-370](#)

Layer 2 protocol-tunnel

- error detection for [2-78](#)
- error recovery timer [2-80](#)

Layer 2 protocol tunnel counters [2-42](#)

Layer 2 protocol tunneling error recovery [2-159](#)

Layer 2 traceroute

- IP addresses [2-549](#)
- MAC addresses [2-546](#)

Layer 3 mode, enabling [2-512](#)

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

Link Aggregation Control Protocol

- See EtherChannel

link flap

- error detection for [2-78](#)
- error recovery timer [2-80](#)

link state group command [2-166](#)

link state track command [2-168](#)

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

load-distribution methods for EtherChannel [2-242](#)

logging event command [2-169](#)

logging file command [2-170](#)

logical interface [2-92](#)

loopback error

- detection for [2-78](#)
- recovery timer [2-80](#)

loop guard, for spanning tree [2-472, 2-476](#)

M

mac access-group command [2-172](#)

MAC access-groups, displaying [2-378](#)

MAC access list configuration mode [2-174](#)

mac access-list extended command [2-174](#)

MAC access lists [2-61](#)

MAC addresses

- disabling MAC address learning per VLAN [2-177](#)
- displaying
 - aging time [2-384](#)
 - all [2-382](#)
 - dynamic [2-388](#)
 - MAC address-table move updates [2-393](#)
 - notification settings [2-392, 2-395](#)
 - number of addresses in a VLAN [2-386](#)
 - per interface [2-390](#)
 - per VLAN [2-399](#)
 - static [2-397](#)
 - static and dynamic entries [2-380](#)

MAC addresses (continued)

- dynamic
 - aging time [2-176](#)
 - deleting [2-44](#)
 - displaying [2-388](#)
- enabling MAC address notification [2-181](#)
- enabling MAC address-table move update [2-179](#)
- matching [2-194](#)
- static
 - adding and removing [2-183](#)
 - displaying [2-397](#)
 - dropping on an interface [2-184](#)
- tables [2-382](#)

MAC address notification, debugging [B-15](#)

mac address-table aging-time [2-172, 2-194](#)

mac address-table aging-time command [2-176](#)

mac address-table learning command [2-177](#)

mac address-table move update command [2-179](#)

mac address-table notification command [2-181](#)

mac address-table static command [2-183](#)

mac address-table static drop command [2-184](#)

macro description command [2-188](#)

macro global command [2-189](#)

macro global description command [2-191](#)

macro name command [2-192](#)

macros

- adding a description [2-188](#)
- adding a global description [2-191](#)
- applying [2-189](#)
- creating [2-192](#)
- displaying [2-411](#)
- interface range [2-56, 2-94](#)
- specifying parameter values [2-189](#)
- tracing [2-189](#)

maintenance end points [2-556](#)

manual

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

mapping tables, QoS [2-543](#)

maps

- class
 - creating [2-36](#)
- VLAN
 - creating [2-563](#)
 - defining [2-194](#)
 - displaying [2-447](#)

match access-group command [2-196](#)

match cos command [2-197](#)

match ip dscp command [2-198](#)

match ip precedence command [2-200](#)

match qos-group command [2-202](#)

match vlan command [2-204](#)

maximum transmission unit

- See MTU

mdix auto command [2-207](#)

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

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

mode, MVR [2-214](#)

modes, commands [1-1](#)

monitor session command [2-209](#)

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

MSTP

- displaying [2-428](#)
- interoperability [2-51](#)
- link type [2-474](#)

MST region

- aborting changes [2-480](#)
- applying changes [2-480](#)
- configuration name [2-480](#)
- configuration revision number [2-480](#)
- current or pending display [2-480](#)
- displaying [2-428](#)
- MST configuration mode [2-480](#)
- VLANs-to-instance mapping [2-480](#)

path cost [2-482](#)

protocol mode [2-478](#)

restart protocol migration process [2-51](#)

MSTP (continued)

- root port
 - loop guard [2-472](#)
 - preventing from becoming designated [2-472](#)
 - restricting which can be root [2-472](#)
 - root guard [2-472](#)
 - root switch
 - affects of extended system ID [2-470](#)
 - hello-time [2-485, 2-496](#)
 - interval between BPDU messages [2-487](#)
 - interval between hello BPDU messages [2-485, 2-496](#)
 - max-age [2-487](#)
 - maximum hop count before discarding BPDU [2-489](#)
 - port priority for selection of [2-491](#)
 - primary or secondary [2-496](#)
 - switch priority [2-494](#)
 - state changes
 - blocking to forwarding state [2-502](#)
 - enabling BPDU filtering [2-462, 2-500](#)
 - enabling BPDU guard [2-464, 2-500](#)
 - enabling Port Fast [2-500, 2-502](#)
 - forward-delay time [2-484](#)
 - length of listening and learning states [2-484](#)
 - rapid transition to forwarding [2-474](#)
 - shutting down Port Fast-enabled ports [2-500](#)
 - state information display [2-427](#)
- MTU**
- configuring size [2-541](#)
 - displaying global setting [2-435](#)
- multicast group address, MVR [2-217](#)
- multicast groups, MVR [2-215](#)
- multicast router learning method [2-148](#)
- multicast router ports, configuring [2-148](#)
- multicast storm control [2-509](#)
- multicast VLAN, MVR [2-214](#)
- multicast VLAN registration
- See MVR
- multiple hosts on authorized port [2-65](#)

Multiple Spanning Tree Protocol

- See MSTP
- multiplexing, UNI [2-85](#)
- MVR**
- and address aliasing [2-215](#)
 - configuring [2-214](#)
 - configuring interfaces [2-217](#)
 - debug messages, display [B-19](#)
 - displaying [2-403](#)
 - displaying interface information [2-405](#)
 - members, displaying [2-407](#)
- mvr (global configuration) command [2-214](#)
- mvr (interface configuration) command [2-217](#)
- mvr vlan group command [2-218](#)

N

- native VLANs [2-538](#)
- native VLAN tagging [2-565](#)
- network node interface [2-244](#)
- nonegotiate, speed [2-507, 2-508](#)
- non-IP protocols
 - denying [2-61](#)
 - forwarding [2-226](#)
- non-IP traffic access lists [2-174](#)
- non-IP traffic forwarding
 - denying [2-61](#)
 - permitting [2-226](#)
- normal-range VLANs [2-560](#)
- note, description [xviii](#)
- no vlan command [2-560](#)

O

- OAM protocol [2-219](#)
- oam protocol cfm svlan command [2-219](#)
- operation, administration, and maintenance protocol
 - See OAM

output policy maps
 and QoS group classification [2-202](#)
 and traffic shaping [2-284](#)
 commands not supported in [2-240](#)
 configuration guidelines [2-240](#)
 priority in [2-247](#)
 queue limit in [2-254](#)

P

PAGP

See EtherChannel

pagp learn-method command [2-220](#)
 pagp port-priority command [2-222](#)
 parent policy maps [2-271](#)
 password-recovery mechanism, enabling and
 disabling [2-266](#)
 permit (ARP access-list configuration) command [2-224](#)
 permit command [2-226](#)
 per-VLAN spanning-tree plus
 See STP
 physical-port learner [2-220](#)
 PID, displaying [2-344](#)
 PIM-DVMRP, as multicast router learning method [2-148](#)
 police
 multiple conform actions for a class [2-54](#)
 multiple exceed actions for a class [2-88](#)
 with priority [2-229](#)
 police aggregate command [2-233](#)
 police command [2-229](#)
 policer aggregate command [2-235](#)
 policer cpu uni command [2-238](#)
 policers
 aggregate [2-233, 2-235](#)
 for CPU protection [2-238](#)
 individual [2-229](#)
 policy-map class, configuring multiple actions [2-54, 2-88](#)
 policy-map class configuration mode [2-34](#)
 policy-map class police configuration mode [2-54, 2-231](#)

policy-map command [2-239](#)
 policy-map configuration mode [2-239](#)
 policy maps
 and CoS classification [2-197](#)
 and DSCP classification [2-198](#)
 and IP precedence classification [2-200](#)
 and policing [2-231](#)
 applying [2-268](#)
 applying to an interface [2-240, 2-268, 2-281](#)
 child [2-270](#)
 creating [2-239](#)
 displaying [2-416](#)
 hierarchical [2-270](#)
 parent [2-271](#)
 policers
 for a single class [2-229](#)
 for multiple classes [2-233, 2-235, 2-238, 2-270](#)
 setting priority [2-246](#)
 setting QoS group identifier [2-279](#)
 traffic classification, defining [2-34](#)
 traffic marking
 setting CoS values [2-273](#)
 setting DSCP values [2-275](#)
 setting IP precedence values [2-277](#)
 Port Aggregation Protocol
 See EtherChannel
 port-based authentication
 AAA method list [2-3](#)
 debug messages, display [B-3](#)
 enabling 802.1x
 globally [2-73](#)
 per interface [2-69](#)
 host modes [2-65](#)
 IEEE 802.1x AAA accounting methods [2-1](#)
 initialize an interface [2-66](#)
 manual control of authorization state [2-69](#)
 multiple hosts on authorized port [2-65](#)

port-based authentication (continued)

- periodic re-authentication
 - enabling [2-72](#)
 - time between attempts [2-74](#)
- quiet period between failed authentication exchanges [2-74](#)
- re-authenticating 802.1x-enabled ports [2-71](#)
- resetting configurable 802.1x parameters [2-64](#)
- switch-to-authentication server retransmission time [2-74](#)
- switch-to-client frame-retransmission number [2-67 to 2-68](#)
- switch-to-client retransmission time [2-74](#)
- port-channel load-balance command [2-242](#)
- Port Fast, for spanning tree [2-502](#)
- port ranges, defining [2-56](#)
- ports, debugging [B-60](#)
- ports, protected [2-536](#)
- port security
 - aging [2-532](#)
 - debug messages, display [B-62](#)
 - enabling [2-528](#)
 - violation error recovery [2-80](#)
- port shaping [2-285](#)
- port-type command [2-244](#)
- port types, MVR [2-217](#)
- power information, displaying [2-314](#)
- precedence
 - for QoS traffic marking [2-277](#)
 - setting in policy maps [2-277](#)
- priority command [2-246](#)
- priority queuing, QoS [2-246](#)
- priority with police, QoS [2-246](#)
- private-vlan command [2-249](#)
- private-vlan mapping command [2-252](#)

- private VLANs
 - association [2-534](#)
 - configuring [2-249](#)
 - configuring ports [2-525](#)
 - displaying [2-442](#)
 - host ports [2-525](#)
 - mapping
 - configuring [2-534](#)
 - displaying [2-334](#)
 - promiscuous ports [2-525](#)
- privileged EXEC mode [1-2, 1-3](#)
- product identification information, displaying [2-344](#)
- promiscuous ports, private VLANs [2-525](#)
- PVST+
 - See STP

Q**QoS**

- aggregate policers
 - applying [2-233](#)
 - creating [2-235](#)
 - displaying [2-413](#)
- class maps
 - creating [2-36](#)
 - defining the match criteria [2-197](#)
 - displaying [2-295](#)
- displaying statistics for [2-416, C-30](#)
- policy maps
 - applying an aggregate policer [2-233, 2-235, 2-238, 2-270](#)
 - applying to an interface [2-268, 2-281](#)
 - creating [2-239](#)
 - defining policers [2-229](#)
 - displaying policy maps [2-416](#)
 - setting CoS values [2-273](#)
 - setting DSCP values [2-275](#)
 - setting IP precedence values [2-277](#)
 - setting QoS group identifier [2-279](#)
 - traffic classifications [2-34](#)

QoS (continued)

- table maps
 - configuring [2-543](#)
 - displaying [2-436](#)
- QoS groups
 - as match criteria [2-202](#)
 - for QoS traffic classification [2-279](#)
 - setting in policy maps [2-279](#)
- QoS match criteria
 - ACLs [2-196](#)
 - CoS value [2-197](#)
 - DSCP value [2-198, 2-204](#)
 - precedence value [2-200](#)
 - QoS group number [2-202](#)
- quality of service
 - See QoS
- querytime, MVR [2-214](#)
- queue-limit command [2-254](#)

- renew ip dhcp snooping database command [2-259](#)
- reset (boot loader) command [A-18](#)
- resource templates, displaying [2-425](#)
- rmdir (boot loader) command [A-19](#)
- rmon collection stats command [2-261](#)
- root guard, for spanning tree [2-472](#)
- routed ports
 - IP addresses on [2-102](#)
 - number supported [2-102](#)
- RSPAN
 - configuring [2-209](#)
 - displaying [2-401](#)
 - filter RSPAN traffic [2-209](#)
 - remote-span command [2-257](#)
 - sessions
 - add interfaces to [2-209](#)
 - displaying [2-401](#)
 - start new [2-209](#)

R

- rapid per-VLAN spanning-tree plus
 - See STP
- rapid PVST+
 - See STP
- re-authenticating 802.1x-enabled ports [2-71](#)
- re-authentication
 - periodic [2-72](#)
 - time between attempts [2-74](#)
- receiver ports, MVR [2-217](#)
- receiving flow-control packets [2-90](#)
- recovery mechanism
 - causes [2-80](#)
 - display [2-293, 2-315, 2-319](#)
 - timer interval [2-80](#)
- remote-span command [2-257](#)
- Remote Switched Port Analyzer
 - See RSPAN
- rename (boot loader) command [A-17](#)

S

- sdm prefer command [2-262](#)
- SDM templates
 - allowed resources [2-262](#)
 - displaying [2-425](#)
- secure ports, limitations [2-530](#)
- sending flow-control packets [2-90](#)
- service instance command [2-264](#)
- service instances, displaying [2-326](#)
- service password-recovery command [2-266](#)
- service policy (policy-map class configuration)
 - command [2-270](#)
- service-policy interface configuration command [2-268](#)
- service-policy policy-map class configuration
 - command [2-270](#)
- set (boot loader) command [A-20](#)
- set cos command [2-273](#)
- set dscp command [2-275](#)
- set precedence command [2-277](#)

- set qos-group command [2-279](#)
- setup command [2-281](#)
- SFPs, displaying information about [2-344](#)
- shape average command [2-284](#)
- show access-lists command [2-286](#)
- show aggregate-policer command [2-436](#)
- show archive status command [2-289](#)
- show arp access-list command [2-290](#)
- show boot command [2-291](#)
- show class-map command [2-295](#)
- show controllers cpu-interface command [2-296](#)
- show controllers ethernet-controller command [2-298](#)
- show controllers tcam command [2-305](#)
- show controllers utilization command [2-307](#)
- show controller utilization command [2-307](#)
- show dot1q-tunnel command [2-309](#)
- show dot1x command [2-311](#)
- show env command [2-314](#)
- show errdisable detect command [2-315](#)
- show errdisable flap-values command [2-317](#)
- show errdisable recovery command [2-319](#)
- show etherchannel command [2-321](#)
- show ethernet service evc command [2-324](#)
- show ethernet service instance command [2-326](#)
- show ethernet service interface command [2-328](#)
- show flowcontrol command [2-330](#)
- show idprom command [2-332](#)
- show interfaces command [2-334](#)
- show interfaces counters command [2-342](#)
- show inventory command [2-344](#)
- show ip arp inspection command [2-345](#)
- show ipc command [2-366](#)
- show ip dhcp snooping binding command [2-349](#)
- show ip dhcp snooping command [2-348](#)
- show ip dhcp snooping database command [2-351](#)
- show ip igmp profile command [2-353](#)
- show ip igmp snooping command [2-354](#)
- show ip igmp snooping command querier detail [2-360](#)
- show ip igmp snooping groups command [2-356](#)
- show ip igmp snooping mrouter command [2-358](#)
- show ip igmp snooping querier command [2-360](#)
- show ip igmp snooping querier detail command [2-360](#)
- show ip source binding command [2-362](#)
- show ip verify source command [2-364](#)
- show l2protocol-tunnel command [2-370](#)
- show lacp command [2-372](#)
- show link state group command [2-376](#)
- 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 learning command [2-392](#)
- show mac address-table move update command [2-393](#)
- show mac address-table notification command [2-45, 2-395, B-17](#)
- show mac address-table static command [2-397](#)
- show mac address-table vlan command [2-399](#)
- show monitor command [2-401](#)
- show mvr command [2-403](#)
- show mvr interface command [2-405](#)
- show mvr members command [2-407](#)
- show pagp command [2-409](#)
- show parser macro command [2-411](#)
- show platform acl command [C-2](#)
- show platform cfm command [C-3](#)
- show platform configuration command [C-4](#)
- show platform etherchannel command [C-5](#)
- show platform forward command [C-6](#)
- show platform igmp snooping command [C-8](#)
- show platform ipc trace command [C-13](#)
- show platform ip multicast command [C-10](#)
- show platform ip unicast command [C-11](#)
- show platform layer4op command [C-14](#)
- show platform mac-address-table command [C-15](#)
- show platform messaging command [C-16](#)

- show platform monitor command [C-17](#)
- show platform mvr table command [C-18](#)
- show platform pm command [C-19](#)
- show platform policer cpu command [C-21](#)
- show platform port-asic command [C-24](#)
- show platform port-security command [C-29](#)
- show platform qos command [C-30](#)
- show platform resource-manager command [C-33](#)
- show platform snmp counters command [C-35](#)
- show platform spanning-tree synchronization command [C-36](#)
- show platform stp-instance command [C-37](#)
- show platform team command [C-38](#)
- show platform vlan command [C-41](#)
- show policer aggregate command [2-413](#)
- show policer cpu uni command [2-414](#)
- show policy-map command [2-416](#)
- show policy-map interface output fields [2-419](#)
- show port security command [2-420](#)
- show port-type command [2-423](#)
- show sdm prefer command [2-425](#)
- show spanning-tree command [2-427](#)
- show storm-control command [2-433](#)
- show system mtu command [2-435](#)
- show udd command [2-438](#)
- show version command [2-440](#)
- show vlan access-map command [2-447](#)
- show vlan command [2-442](#)
- show vlan command, fields [2-444](#)
- show vlan filter command [2-448](#)
- show vmpls command [2-449](#)
- shutdown command [2-451](#)
- shutdown threshold, Layer 2 protocol tunneling [2-158](#)
- shutdown vlan command [2-452](#)
- SNMP host, specifying [2-456](#)
- SNMP informs, enabling the sending of [2-453](#)
- snmp-server enable traps command [2-453](#)
- snmp-server host command [2-456](#)
- snmp trap mac-notification command [2-460](#)
- SNMP traps
 - enabling MAC address notification trap [2-460](#)
 - enabling the MAC address notification feature [2-181](#)
 - enabling the sending of [2-453](#)
- software images
 - deleting [2-58](#)
 - downloading [2-7](#)
 - upgrading [2-7](#)
 - uploading [2-13](#)
- software version, displaying [2-440](#)
- source ports, MVR [2-217](#)
- SPAN
 - configuring [2-209](#)
 - debug messages, display [B-18](#)
 - displaying [2-401](#)
 - filter SPAN traffic [2-209](#)
 - sessions
 - add interfaces to [2-209](#)
 - displaying [2-401](#)
 - start new [2-209](#)
- spanning-tree bpdudfilter command [2-462](#)
- spanning-tree bpduguard command [2-464](#)
- spanning-tree cost command [2-466](#)
- spanning-tree etherchannel command [2-468](#)
- spanning-tree extend system-id command [2-470](#)
- spanning-tree guard command [2-472](#)
- spanning-tree link-type command [2-474](#)
- spanning-tree loopguard default command [2-476](#)
- spanning-tree mode command [2-478](#)
- spanning-tree mst configuration command [2-480](#)
- spanning-tree mst cost command [2-482](#)
- spanning-tree mst forward-time command [2-484](#)
- spanning-tree mst hello-time command [2-485](#)
- spanning-tree mst max-age command [2-487](#)
- spanning-tree mst max-hops command [2-489](#)
- spanning-tree mst port-priority command [2-491](#)
- spanning-tree mst pre-standard command [2-493](#)
- spanning-tree mst priority command [2-494](#)
- spanning-tree mst root command [2-496](#)

- spanning-tree portfast (global configuration)
 - command [2-500](#)
- spanning-tree portfast (interface configuration)
 - command [2-502](#)
- spanning-tree port-priority command [2-498](#)
- Spanning Tree Protocol
 - See STP
- spanning-tree vlan command [2-504](#)
- speed command [2-507](#)
- SSH, configuring version [2-154](#)
- static-access ports, configuring [2-514](#)
- statistics, Ethernet group [2-261](#)
- sticky learning, enabling [2-528](#)
- storm-control command [2-509](#)
- STP
 - counters, clearing [2-50](#)
 - debug messages, display
 - MSTP [B-68](#)
 - optimized BPDUs handling [B-67](#)
 - spanning-tree activity [B-64](#)
 - switch shim [B-70](#)
 - transmitted and received BPDUs [B-66](#)
 - enabling protocol tunneling for [2-158](#)
 - EtherChannel misconfiguration [2-468](#)
 - extended system ID [2-470](#)
 - path cost [2-466](#)
 - protocol modes [2-478](#)
 - root port
 - loop guard [2-472](#)
 - preventing from becoming designated [2-472](#)
 - restricting which can be root [2-472](#)
 - root guard [2-472](#)
 - root switch
 - affects of extended system ID [2-470, 2-505](#)
 - hello-time [2-504](#)
 - interval between BPDU messages [2-504](#)
 - interval between hello BPDU messages [2-504](#)
 - max-age [2-504](#)
 - port priority for selection of [2-498](#)
- STP (continued)
 - root switch (continued)
 - primary or secondary [2-504](#)
 - switch priority [2-504](#)
 - state changes
 - blocking to forwarding state [2-502](#)
 - enabling BPDU filtering [2-462, 2-500](#)
 - enabling BPDU guard [2-464, 2-500](#)
 - enabling Port Fast [2-500, 2-502](#)
 - enabling timer to recover from error state [2-80](#)
 - forward-delay time [2-504](#)
 - length of listening and learning states [2-504](#)
 - shutting down Port Fast-enabled ports [2-500](#)
 - state information display [2-427](#)
 - VLAN options [2-494, 2-504](#)
- SVIs, creating [2-96](#)
- Switched Port Analyzer
 - See SPAN
- switching characteristics
 - modifying [2-512](#)
 - returning to interfaces [2-512](#)
- switchport access command [2-514](#)
- switchport backup interface command [2-516](#)
- switchport block command [2-519](#)
- switchport command [2-512](#)
- switchport host command [2-521](#)
- switchport mode command [2-522](#)
- switchport mode private-vlan command [2-525](#)
- switchport port-security aging command [2-532](#)
- switchport port-security command [2-528](#)
- switchport private-vlan command [2-534](#)
- switchport protected command [2-536](#)
- switchports, displaying [2-334](#)
- switchport trunk command [2-538](#)
- system env temperature threshold yellow command [2-540](#)
- system message logging, save message to flash [2-170](#)
- system mtu command [2-541](#)
- system resource templates [2-262](#)

T

table-map command [2-543](#)
 table-map configuration mode [2-543](#)
 table maps
 configuring [2-543](#)
 displaying [2-436](#)
 QoS [2-543](#)
 tar files, creating, listing, and extracting [2-10](#)
 TDR, running [2-545](#)
 temperature information, displaying [2-314](#)
 templates, system resources [2-262](#)
 test cable-diagnostics tdr command [2-545](#)
 traceroute mac command [2-546](#)
 traceroute mac ip command [2-549](#)
 traffic shaping, QoS [2-284](#)
 trunking, VLAN mode [2-522](#)
 trunk mode [2-522](#)
 trunk ports [2-522](#)
 tunnel ports, Layer 2 protocol, displaying [2-370](#)
 type (boot loader) command [A-23](#)

U

UDLD
 aggressive mode [2-551, 2-553](#)
 debug messages, display [B-77](#)
 enable globally [2-551](#)
 enable per interface [2-553](#)
 error recovery timer [2-80](#)
 message timer [2-551](#)
 normal mode [2-551, 2-553](#)
 reset a shutdown interface [2-555](#)
 status [2-438](#)
 udd command [2-551](#)
 udd port command [2-553](#)
 udd reset command [2-555](#)

UNI

 bundling and multiplexing [2-85](#)
 Ethernet [2-85](#)
 unicast storm control [2-509](#)
 uni count command [2-556](#)
 UniDirectional Link Detection
 See UDLD
 UNI ID, Ethernet [2-87](#)
 uni-vlan command [2-558](#)
 unknown multicast traffic, preventing [2-519](#)
 unknown unicast traffic, preventing [2-519](#)
 unset (boot loader) command [A-24](#)
 upgrading
 software images [2-7](#)
 monitoring status of [2-289](#)
 upgrading information
 See release notes
 user EXEC mode [1-2](#)
 user network interface [2-244](#)

V

version (boot loader) command [A-26](#)
 vlan access-map command [2-563](#)
 VLAN access map configuration mode [2-563](#)
 VLAN access maps
 actions [2-5](#)
 displaying [2-447](#)
 vlan command [2-560](#)
 VLAN configuration mode
 commands [2-560](#)
 description [1-4](#)
 entering [2-560](#)
 summary [1-2](#)
 vlan dot1q tag native command [2-565](#)
 vlan filter command [2-567](#)
 VLAN filters, displaying [2-448](#)
 VLAN ID range [2-560](#)

VLAN maps

- applying [2-567](#)
- creating [2-563](#)
- defining [2-194](#)
- displaying [2-447](#)

VLAN Query Protocol

See VQP

VLANs

- adding [2-560](#)
- configuring [2-560](#)
- debug messages, display
 - activation of [B-75](#)
 - VLAN IOS file system error tests [B-74](#)
 - VLAN manager activity [B-72](#)
- displaying configurations [2-442](#)
- extended-range [2-560](#)
- MAC addresses
 - displaying [2-399](#)
 - number of [2-386](#)
- normal-range [2-560](#)
- private [2-525](#)
 - configuring [2-249](#)
 - displaying [2-442](#)
 - See also private VLANs
- restarting [2-452](#)
- saving the configuration [2-560](#)
- shutting down [2-452](#)
- suspending [2-452](#)

VMPS

- configuring servers [2-572](#)
- displaying [2-449](#)
- error recovery timer [2-80](#)
- reconfirming dynamic VLAN assignments [2-569](#)
- vmmps reconfirm (global configuration) command [2-570](#)
- vmmps reconfirm (privileged EXEC) command [2-569](#)
- vmmps retry command [2-571](#)
- vmmps server command [2-572](#)

VQP

- and dynamic-access ports [2-515](#)
- clearing client statistics [2-53](#)
- displaying information [2-449](#)
- per-server retry count [2-571](#)
- reconfirmation interval [2-570](#)
- reconfirming dynamic VLAN assignments [2-569](#)
- VTP, enabling tunneling for [2-158](#)

W

Weighted Tail Drop

See WTD

- WTD, queue-limit command [2-254](#)