



INDEX

ACLs

applying IPv6 ACLs to a Layer 3 interface **47-23**

Numerics

10/100 autonegotiation feature, forced **6-18**

10-Gigabit Ethernet or Gigabit Ethernet ports

 deploy on WS-X4606-10GE-E and Sup 6-E **6-13**

10-Gigabit Ethernet port

 deploy with Gigabit Ethernet SFP ports **6-12, 6-13**

1400 W DC Power supply

 special considerations **10-17**

1400 W DC SP Triple Input power supply

 special considerations **10-18**

802.10 SAID (default) **14-5**

802.1Q

 trunks **18-6**

 tunneling

 compatibility with other features **25-5**

 defaults **25-3**

 described **25-2**

 tunnel ports with other features **25-6**

802.1Q VLANs

 encapsulation **16-3**

 trunk restrictions **16-5**

802.1s

 See MST

802.1w

 See MST

802.1X

 See port-based authentication

802.1X authentication

for Critical Authentication **40-13**

for guest VLANs **40-10**

for MAC Authentication Bypass **40-11**

for Wake-on-LAN **40-14**

web-based authentication **40-13**

with port security **40-16**

with VLAN assignment **40-9**

with voice VLAN ports **40-19**

802.1X Host Mode **40-6**

multiauthentication mode **40-8**

multidomain authentication mode **40-7**

single-host **40-7**

802.1X Violation Mode **40-9**

802.3ad

 See LACP

A

AAA **44-1**

AAA (authentication, authorization, and accounting). See also port-based authentication. **42-2**

abbreviating commands **2-5**

access control entries

 See ACEs

access control entries and lists **44-1**

access-group mode, configuring on Layer 2 interface **47-35**

access-group mode, using PACL with **47-35**

access list filtering, SPAN enhancement **50-13**

access lists

 using with WCCP **61-7**

access ports

 and Layer 2 protocol tunneling **25-9**

 configure port security **43-7, 43-22**

- configuring **16-8**
- access VLANs **16-6**
- accounting
 - with TACACS+ **3-16, 3-21**
- ACEs
 - ACLs **47-2**
 - IP **47-3**
 - Layer 4 operation restrictions **47-15**
 - ACEs and ACLs **44-1**
 - ACL assignments, port-based authentication **40-17**
 - ACL assignments and redirect URLs, configure **40-34**
 - ACLs
 - ACEs **47-2**
 - and SPAN **50-5**
 - and TCAM programming for Sup 6-E **47-15**
 - and TCAM programming for Sup II-Plus thru V-10GE **47-6**
 - applying on routed packets **47-32**
 - applying on switched packets **47-31**
 - chaning the TCAM programming algorithm **47-9**
 - compatibility on the same switch **47-3**
 - configuring with VLAN maps **47-31**
 - CPU impact **47-17**
 - downloadable **42-7**
 - hardware and software support **47-5**
 - IP, matching criteria for port ACLs **47-4**
 - MAC extended **47-19**
 - matching criteria for router ACLs **47-3**
 - port
 - and voice VLAN **47-5**
 - defined **47-3**
 - limitations **47-5**
 - processing **47-17**
 - resize the TCAM regions **47-10**
 - selecting mode of capturing control packets **47-12**
 - TCAM programming algorithm **47-7**
 - troubleshooting high CPU **47-12**
 - types supported **47-3**
 - understanding **47-2**
 - VLAN maps **47-5**
 - ACLs and VLAN maps, examples **47-25**
 - acronyms, list of **A-1**
 - action drivers, marking **37-76**
 - active queue management **37-15**
 - active queue management via DBL, QoS on Sup 6-E **37-89**
 - active traffic monitoring, IP SLAs **58-1**
 - adding members to a community **13-8**
 - addresses
 - displaying the MAC address table **4-30**
 - dynamic
 - changing the aging time **4-21**
 - defined **4-19**
 - learning **4-20**
 - removing **4-22**
 - MAC, discovering **4-30**
 - See MAC addresses
 - static
 - adding and removing **4-27**
 - defined **4-19**
 - address resolution **4-30**
 - adjacency tables
 - description **31-2**
 - displaying statistics **31-9**
 - administrative VLAN
 - REP, configuring **20-8**
 - administrative VLAN, REP **20-8**
 - advertisements
 - LLDP **1-4, 27-2**
 - advertisements, VTP
 - See VTP advertisements
 - aggregation switch, enabling DHCP snooping **45-9**
 - aging time
 - MAC address table **4-21**
 - All Auth manager sessions, displaying summary **40-78**
 - All Auth manager sessions on the switch authorized for a specified authentication method **40-78**
 - ANCP client

- enabling and configuring **34-2**
 - guidelines and restrictions **34-5**
 - identify a port with DHCP option 82 **34-4**
 - identify a port with protocol **34-2**
 - overview **34-1**
 - ANCP protocol**
 - identifying a port with **34-2**
 - applying IPv6 ACLs to a Layer 3 interface **47-23**
 - AQM via DBL, QoS on Sup 6-E **37-89**
 - archiving crashfiles information **2-8**
 - ARP**
 - defined **4-30**
 - table
 - address resolution **4-30**
 - managing **4-30**
 - asymmetrical links, and 802.1Q tunneling **25-3**
 - authentication**
 - NTP associations **4-4**
 - See also port-based authentication
 - TACACS+**
 - defined **3-16**
 - key **3-18**
 - login **3-19**
 - Authentication, Authorization, and Accounting (AAA)** **44-1**
 - Authentication Failed VLAN assignment
 - configure with 802.1X **40-60**
 - Authentication methods registered with the Auth manager, determining **40-77**
 - authentication open command **40-8**
 - authentication proxy web pages **42-4**
 - authentication server
 - defined **40-3**
 - RADIUS server **40-3**
 - Auth manager session for an interface, verifying **40-78**
 - Auth manager summary, displaying **40-77**
 - authoritative time source, described **4-2**
 - authorization
 - with TACACS+ **3-16, 3-21**
 - authorized and unauthorized ports **40-5**
 - authorized ports with 802.1X **40-5**
 - autoconfiguration **3-2**
 - automatic discovery
 - considerations **13-7**
 - automatic QoS
 - See QoS
 - Auto-MDIX on a port**
 - configuring **6-28**
 - displaying the configuration **6-29**
 - overview **6-28**
 - autonegotiation feature
 - forced 10/100Mbps **6-18**
 - Auto-QoS**
 - configuring **37-61**
 - auto-sync command **8-9**
-

B

- Baby Giants**
 - interacting with **6-26**
- BackboneFast**
 - adding a switch (figure) **21-3**
 - and MST **18-23**
 - configuring **21-16**
 - link failure (figure) **21-14, 21-15**
 - not supported MST **18-23**
 - understanding **21-13**
 - See also STP
- banners**
 - configuring
 - login **4-19**
 - message-of-the-day login **4-18**
 - default configuration **4-18**
 - when displayed **4-17**
- b command** **62-3**
- b flash command** **62-3**
- BGP** **1-10**
 - routing session with multi-VRF CE **36-12**

- blocking packets **48-1**
 - blocking state (STP)
 - RSTP comparisons (table) **18-24**
 - boot bootldr command **3-31**
 - boot command **3-28**
 - boot commands **62-3**
 - boot fields
 - See configuration register boot fields
 - bootstrap program
 - See ROM monitor
 - boot system command **3-26, 3-31**
 - boot system flash command **3-28**
 - Border Gateway Protocol
 - See BGP
 - boundary ports
 - description **18-27**
 - BPDU Guard
 - and MST **18-23**
 - configuring **21-16**
 - overview **21-8**
 - BPDUs
 - and media speed **18-2**
 - pseudobridges and **18-25**
 - what they contain **18-3**
 - bridge ID
 - See STP bridge ID
 - bridge priority (STP) **18-16**
 - bridge protocol data units
 - See BPDUs
 - Broadcast Storm Control
 - disabling **49-6**
 - enabling **49-3**
 - burst rate **37-52**
 - burst size **37-28**
-
- C**
- cache engine clusters **61-1**
 - cache engines **61-1**
 - cache farms
 - See cache engine clusters
 - Call Home
 - description **1-16, 57-2**
 - message format options **57-2**
 - messages
 - format options **57-2**
 - call home **57-1**
 - alert groups **57-6**
 - configuring e-mail options **57-9**
 - contact information **57-4**
 - default settings **57-18**
 - destination profiles **57-5**
 - displaying information **57-13**
 - mail-server priority **57-10**
 - pattern matching **57-9**
 - periodic notification **57-8**
 - rate limit messages **57-9**
 - severity threshold **57-8**
 - smart call home feature **57-2**
 - SMTP server **57-9**
 - testing communications **57-10**
 - call home alert groups
 - configuring **57-6**
 - description **57-6**
 - subscribing **57-7**
 - call home contacts
 - assigning information **57-4**
 - call home destination profiles
 - attributes **57-5**
 - configuring **57-5**
 - description **57-5**
 - displaying **57-16**
 - call home notifications
 - full-txt format for syslog **57-25**
 - XML format for syslog **57-28**
 - candidates
 - automatic discovery **13-7**
 - candidate switch, cluster

- defined **13-12**
- requirements **13-12**
- Capturing control packets
 - selecting mode **47-12**
- cautions
 - Unicast RPF
 - BGP optional attributes **32-5**
 - cautions for passwords
 - encrypting **3-22**
- CDP
 - and trusted boundary **37-22**
 - automatic discovery in communities **13-7**
 - configuration **26-2**
 - defined with LLDP **27-1**
 - displaying configuration **26-3**
 - enabling on interfaces **26-3**
 - host presence detection **40-8**
 - Layer 2 protocol tunneling **25-7**
 - maintaining **26-3**
 - monitoring **26-3**
 - overview **1-2, 26-1**
- cdp enable command **26-3**
- CEF
 - adjacency tables **31-2**
 - and NSF with SSO **9-5**
 - configuring load balancing **31-7**
 - displaying statistics **31-8**
 - enabling **31-6, 60-2**
 - hardware switching **31-4**
 - load balancing **31-6**
 - overview **31-2**
 - software switching **31-4**
- certificate authority (CA) **57-3**
- CFM
 - and Ethernet OAM interaction **55-36**
 - configuration guidelines **55-9, 56-4**
 - configuring crosscheck for VLANs **55-12**
 - configuring over VLANs **55-10**
 - crosscheck **55-7**
- default configuration **55-8**
- defined **55-2**
- disabling on a port **55-9**
- EtherChannel support **55-9, 56-4**
- IP SLAs support for **55-8**
- IP SLAs with endpoint discover **55-15**
- maintenance domain **55-3**
- maintenance point **55-4**
- manually configuring IP SLAs ping or jitter **55-13**
- measuring network performance **55-8**
- monitoring **55-19**
- on EtherChannel port channels **55-9**
- sample configuration **55-17**
- SNMP traps **55-7**
- types of messages **55-7**
- CGMP
 - overview **23-1**
 - channel-group group command **22-8, 22-11**
- Cisco 7600 series Internet router
 - enabling SNMP **63-4, 63-5**
- Cisco Discovery Protocol
 - See CDP
- Cisco Express Forwarding
 - See CEF
- Cisco Group Management Protocol
 - See CGMP
- Cisco IOS IP SLAs **58-2**
- Cisco IOS NSF-aware
 - support **9-2**
- Cisco IOS NSF-capable support **9-2**
- Cisco IP Phones
 - configuring **38-3**
 - sound quality **38-1**
- CiscoWorks 2000 **53-4**
- CIST
 - description **18-22**
- civic location **27-3**
- class level, configure in a service policy **37-86**
- class-map command **37-29**

- class of service
 - See CoS
- clear cdp counters command **26-4**
- clear cdp table command **26-3**
- clear counters command **6-31**
- clearing
 - IP multicast table entries **33-28**
- clear ip eigrp neighbors command **30-17**
- clear ip flow stats command **54-10**
- CLI
 - accessing **2-2**
 - backing out one level **2-5**
 - getting commands **2-5**
 - history substitution **2-4**
 - managing clusters **13-12**
 - modes **2-5**
 - monitoring environments **50-1**
 - ROM monitor **2-7**
 - software basics **2-4**
- clients
 - in 802.1X authentication **40-3**
- clock
 - See system clock
- clustering switches
 - command switch characteristics **13-11, 13-12**
 - and VTY **13-11**
 - convert to a community **13-9**
 - managing
 - through CLI **13-12**
 - overview **13-10**
 - planning considerations
 - CLI **13-12**
 - passwords **13-8**
- command-line processing **2-3**
- command modes **2-5**
- commands
 - b **62-3**
 - b flash **62-3**
 - boot **62-3**
 - confreg **62-3**
 - dev **62-3**
 - dir device **62-3**
 - frame **62-5**
 - i **62-3**
 - listing **2-5**
 - meminfo **62-5**
 - reset **62-3**
 - ROM monitor **62-2 to 62-3**
 - ROM monitor debugging **62-5**
 - SNMP **63-4**
 - sysret **62-5**
- command switch, cluster
 - requirements **13-11**
- common and internal spanning tree
 - See CIST
- common spanning tree
 - See CST
- community of switches
 - access modes in Network Assistant **13-8**
 - adding devices **13-8**
 - candidate characteriscts **13-6**
 - communication protocols **13-8**
 - community name **13-7**
 - configuration information **13-8**
 - converting from a cluster **13-9**
 - host name **13-7**
 - passwords **13-8**
 - community ports **39-4**
 - community strings
 - configuring **53-7**
 - overview **53-4**
 - community VLANs **39-3, 39-4**
 - and SPAN features **39-12**
 - configure as a PVLAN **39-13**
 - compiling MIBs **63-4**
 - config-register command **3-29**
 - config terminal command **3-9**
 - configurable leave timer,IGMP **23-4**

configuration examples
 SNMP **53-16**

configuration files
 limiting TFTP server access **53-15**
 obtaining with DHCP **3-6**
 saving **3-10**
 system contact and location information **53-15**

configuration guidelines
 CFM **55-9, 56-4**
 Ethernet OAM **55-22**
 REP **20-7**
 SNMP **53-6**

configuration register
 boot fields
 listing value **3-29**
 modifying **3-28**
 changing from ROM monitor **62-3**
 changing settings **3-28 to 3-29**
 configuring **3-26**
 settings at startup **3-27**

configure class-level queue-limit in a service policy **37-86**

configure terminal command **3-29, 6-2**

configuring access-group mode on Layer 2 interface **47-35**

configuring flow control **6-21**

configuring interface link and trunk status events **6-32**

configuring named IPv6 ACLs **47-22**

configuring named MAC extended ACLs **47-19, 47-21**

configuring unicast MAC address filtering **47-19**

configuring VLAN maps **47-23**

confreg command **62-3**

Connectivity Fault Management
 See CFM

console configuration mode **2-5**

console download **62-4 to 62-5**

console port
 disconnecting user sessions **7-6**
 monitoring user sessions **7-6**

contact information

assigning for call home **57-4**

control plane policing
 See CoPP

control protocol, IP SLAs **58-4**

convergence
 REP **20-3**

CoPP
 applying QoS service policy to control plane **44-4**
 configuring
 ACLs to match traffic **44-4**
 enabling MLS QoS **44-4**
 packet classification criteria **44-4**
 service-policy map **44-4**
 control plane configuration mode
 entering **44-4**
 displaying
 dynamic information **44-8**
 number of conforming bytes and packets **44-8**
 rate information **44-8**
 entering control plane configuration mode **44-4**
 monitoring statistics **44-8**
 overview **44-2**

copy running-config startup-config command **3-10**

copy system:running-config nvram:startup-config command **3-31**

CoS
 definition **37-4**
 figure **37-2**
 overriding on Cisco IP Phones **38-5**
 priority **38-5**

CoS Mutation
 configuring **37-37**

CoS-to-DSCP maps **37-54**

CoS value, configuring for an interface **37-49**

counters
 clearing MFIB **33-28**
 clearing on interfaces **6-31**

CPU, impact of ACL processing **47-17**

CPU port sniffing **50-10**

crashfiles information, archiving **2-8**

Critical Authentication

 configure with 802.1X **40-55**

crosscheck, CFM **55-7, 55-12**

CST

 description **18-25**

 IST and **18-22**

 MST and **18-22**

customer edge devices **36-2**

D

database agent

 configuration examples **45-15**

 enabling the DHCP Snooping **45-12**

daylight saving time **4-13**

debug commands, ROM monitor **62-5**

default configuration

 802.1X **40-23**

 auto-QoS **37-62**

 banners **4-18**

 CFM **55-8**

 DNS **4-16**

 Ethernet OAM **55-21**

 IGMP filtering **23-21**

 IGMP snooping **24-5, 24-6**

 IP SLAs **58-7**

 Layer 2 protocol tunneling **25-9**

 LLDP **27-4**

 MAC address table **4-21**

 multi-VRF CE **36-4**

 NTP **4-4**

 private VLANs **39-11**

 REP **20-6**

 resetting the interface **6-35**

 RMON **59-3**

 SNMP **53-5**

 SPAN and RSPAN **50-6**

 system message logging **51-3**

TACACS+ **3-18**

default gateway

 configuring **3-11**

 verifying configuration **3-11**

default settings, erase command **3-31**

default web-based authentication configuration

 802.1X **42-6**

denial-of-service attacks

 IP address spoofing, mitigating **32-5**

 Unicast RPF, deploying **32-5**

denying access to a server on another VLAN **47-29**

deploying 10-Gigabit Ethernet and a Gigabit Ethernet SFP ports **6-12, 6-13**

deploying 10-Gigabit Ethernet and a Gigabit Ethernet SFP ports on WS-X4606-10GE-E and Sup 6-E **6-13**

description command **6-20**

detecting unidirectional links **28-1**

dev command **62-3**

device discovery protocol **27-1**

device IDs

 call home format **57-21, 57-22**

DHCP

 configuring

 rate limit for incoming packets **45-13**

 denial-of-service attacks, preventing **45-13**

 rate limiting of packets

 configuring **45-13**

DHCP-based autoconfiguration

 client request message exchange **3-3**

 configuring

 client side **3-3**

 DNS **3-5**

 relay device **3-5**

 server-side **3-4**

 TFTP server **3-4**

 example **3-7**

 lease options

 for IP address information **3-4**

 for receiving the configuration file **3-4**

- overview **3-2**
- relationship to BOOTP **3-3**
- DHCP option 82
 - identifying a port with **34-4**
 - overview **45-4**
- DHCP Snooping
 - enabling, and Option 82 **45-10**
- DHCP snooping
 - accepting untrusted packets from edge switch **45-10**
 - configuring **45-6**
 - default configuration **45-7**
 - displaying binding tables **45-18**
 - displaying configuration **45-19**
 - displaying information **45-18**
 - enabling **45-7**
 - enabling on private VLAN **45-11**
 - enabling on the aggregation switch **45-9**
 - enabling the database agent **45-12**
 - message exchange process **45-4**
 - monitoring **45-23**
 - option 82 data insertion **45-4**
 - overview **45-1**
 - Snooping database agent **45-2**
- DHCP Snooping Database Agent
 - adding to the database (example) **45-18**
 - enabling (example) **45-15**
 - overview **45-2**
 - reading from a TFTP file (example) **45-16**
- Diagnostics
 - online **60-1**
 - troubleshooting **60-7**
- Power-On-Self-Test
 - causes of failure **60-19**
 - how it works **60-8**
 - overview **60-8**
- Power-On-Self-Test for Supervisor Engine V-10GE **60-13**
- Differentiated Services Code Point values
 - See DSCP values
- DiffServ architecture, QoS **37-2**
- Digital optical monitoring transceiver support **6-17**
- dir device command **62-3**
- disabled state
 - RSTP comparisons (table) **18-24**
- disabling
 - broadcast storm control **49-6**
 - disabling multicast storm control **49-7**
 - disconnect command **7-6**
 - discovery, clusters
 - See automatic discovery
 - discovery, Ethernet OAM **55-20**
 - displaying
 - Auth Manager summary for an interface **40-77**
 - MAB details **40-80**
 - summary of all Auth manager sessions **40-78**
 - summary of all Auth manager sessions on the switch authorized for a specified authentication method **40-78**
 - displaying EtherChannel to a Virtual Switch System **22-15**
 - displaying storm control **49-8**
 - display PoE consumed by a module **11-7**
- DNS
 - and DHCP-based autoconfiguration **3-5**
 - default configuration **4-16**
 - displaying the configuration **4-17**
 - overview **4-15**
 - setting up **4-16**
- domain names
 - DNS **4-15**
- Domain Name System
 - See DNS
- double-tagged packets
 - 802.1Q tunneling **25-2**
 - Layer 2 protocol tunneling **25-9**
- downloading MIBs **63-2, 63-3, 63-4**
- drop threshold for Layer 2 protocol packets **25-9**
- DSCP maps **37-53**
- DSCP-to-CoS maps

- configuring **37-55**
- DSCP values
 - configuring maps **37-53**
 - definition **37-4**
 - IP precedence **37-2**
 - mapping markdown **37-19**
 - mapping to transmit queues **37-51**
- DSCP values, configuring port value **37-50**
- DTP
 - VLAN trunks and **16-3**
- duplex command **6-19**
- duplex mode
 - configuring interface **6-18**
- dynamic ARP inspection
 - ARP cache poisoning **46-2**
 - configuring
 - ACLs for non-DHCP environments **46-11**
 - in DHCP environments **46-5**
 - log buffer **46-14**
 - rate limit for incoming ARP packets **46-16**
 - denial-of-service attacks, preventing **46-16**
 - interface trust state, security coverage **46-3**
 - log buffer
 - configuring **46-14**
 - logging of dropped packets **46-4**
 - overview **46-1**
 - port channels, their behavior **46-5**
 - priority of static bindings **46-4**
 - purpose of **46-2**
 - rate limiting of ARP packets **46-4**
 - configuring **46-16**
 - validation checks, performing **46-19**
 - dynamic buffer limiting
 - globally **37-24**
 - on specific CoS values **37-26**
 - on specific IP DSCP values **37-25**
 - Dynamic Host Configuration Protocol snooping
 - See DHCP snooping
 - dynamic port VLAN membership
 - example **14-30**
 - limit on hosts **14-30**
 - reconfirming **14-27**
 - troubleshooting **14-30**
 - Dynamic Trunking Protocol
 - See DTP

E

 - EAP frames
 - changing retransmission time **40-73**
 - exchanging (figure) **40-4, 40-6, 40-12**
 - request/identity **40-4**
 - response/identity **40-4**
 - setting retransmission number **40-74**
 - EAPOL frames
 - 802.1X authentication and **40-3**
 - OTP authentication, example (figure) **40-4, 40-12**
 - start **40-4**
 - edge ports
 - description **18-27**
 - EGP
 - overview **1-10**
 - EIGRP
 - configuration examples **30-18**
 - monitoring and maintaining **30-17**
 - EIGRP (Enhanced IGRP)
 - stub routing
 - benefits **30-16**
 - configuration tasks **30-16**
 - configuring **30-12**
 - overview **30-12**
 - restrictions **30-16**
 - verifying **30-17**
 - EIGRP (enhanced IGRP)
 - overview **1-10**
 - eigrp stub command **30-17**
 - EIGRP stub routing, configuring **30-11**
 - ELIN location **27-3**

e-mail addresses
 assigning for call home **57-4**

e-mail notifications
 Call Home **1-16, 57-2**

Embedded CiscoView
 displaying information **4-33**
 installing and configuring **4-31**
 overview **4-31**

emergency alarms on Sup Engine 6-E systems **10-3**

enable command **3-9, 3-28**

enable mode **2-5**

enabling or disabling QOS on an interface **37-46**

enabling SNMP **63-4, 63-5**

encapsulation types **16-3**

Enhanced Interior Gateway Routing Protocol
 See EIGRP

Enhanced PoE support on E-series **11-15**

environmental conditions
 Sup Engine 6-E **10-3**
 Sup Engines II-Plus to V-10GE **10-2**

environmental monitoring
 using CLI commands **10-1**

EPM logging **40-80**

EtherChannel
 channel-group group command **22-8, 22-11**
 configuration guidelines **22-5**
 configuring **22-6 to 22-15**
 configuring Layer 2 **22-10**
 configuring Layer 3 **22-6**
 displaying to a virtual switch system **22-15**
 interface port-channel command **22-8**
 lacp system-priority
 command example **22-13**
 modes **22-3**
 overview **22-1**

PAgP
 Understanding **22-3**

physical interface configuration **22-8**

port-channel interfaces **22-2**

port-channel load-balance command **22-14**

removing **22-15**

removing interfaces **22-14**

EtherChannel guard
 disabling **21-7**
 enabling **21-6**
 overview **21-6**

Ethernet infrastructure **55-1**

Ethernet management port
 and routing **6-7**
 and routing protocols **6-7**
 configuring **6-11**
 default setting **6-7**
 described **1-17, 6-7**
 for network management **1-17, 6-7**
 specifying **6-11**
 supported features **6-10**
 unsupported features **6-11**

Ethernet management port, internal
 and routing protocols **6-7**

Ethernet Management Port, using **6-6**

Ethernet OAM **55-21**
 and CFM interaction **55-36**
 configuration guidelines **55-22**
 default configuration **55-21**
 discovery **55-20**
 enabling **55-22**
 link monitoring **55-21, 55-25**
 manager **55-1**
 messages **55-21**
 protocol
 defined **55-20**
 monitoring **55-34**
 remote failure indications **55-21**
 remote loopback **55-21, 55-24**
 templates **55-30**

Ethernet OAM protocol CFM notifications **55-36**

Ethernet operation, administration, and maintenance
 See Ethernet OAM

- explicit host tracking
enabling [23-11](#)
- extended range VLANs
See VLANs
- Extensible Authentication Protocol over LAN [40-2](#)
- Exterior Gateway Protocol
See EGP
-
- F**
- Fa0 port
See Ethernet management port
- Fallback Authentication
configure with 802.1X [40-65](#)
- FastDrop
overview [33-11](#)
- fastethernet0 port
See Ethernet management port
- FIB
description [31-2](#)
See also MFIB
- Filter-ID ACL and Per-User ACL, configure report-based authentication
configure Per-User ACL and Filter-ID ACL [40-40](#)
- filtering
in a VLAN [47-24](#)
non-IP traffic [47-19, 47-21](#)
- flags [33-12](#)
- Flash memory
configuring router to boot from [3-30](#)
loading system images from [3-30](#)
security precautions [3-30](#)
- Flex Links
configuration guidelines [19-5](#)
configuring [19-6, 19-7](#)
configuring preferred VLAN [19-9](#)
configuring VLAN load balancing [19-8](#)
monitoring [19-11](#)
- flooded traffic, blocking [48-2](#)
- flowchart, traffic marking procedure [37-76](#)
- flow control, configuring [6-21](#)
- For [11-13](#)
- forward-delay time (STP)
configuring [18-18](#)
- forwarding information base
See FIB
- frame command [62-5](#)
-
- G**
- gateway
See default gateway
- get-bulk-request operation [53-3](#)
- get-next-request operation [53-3, 53-4](#)
- get-request operation [53-3, 53-4](#)
- get-response operation [53-3](#)
- Gigabit Ethernet SFP ports
deploy with 10-Gigabit Ethernet [6-12, 6-13](#)
- global configuration mode [2-5](#)
- Guest-VLANs
configure with 802.1X [40-49, 40-62](#)
-
- H**
- hardware and software ACL support [47-5](#)
- hardware switching [31-5](#)
- hello time (STP)
configuring [18-17](#)
- hierarchical policers, configuring [37-42](#)
- high CPU due to ACLs, troubleshooting [47-12](#)
- history
CLI [2-4](#)
history table, level and number of syslog messages [51-9](#)
hop counts
configuring MST bridges [18-28](#)
- host
limit on dynamic port [14-30](#)

- host ports
 - kinds of **39-4**
 - host presence CDP message **40-8**
 - Hot Standby Routing Protocol
 - See HSRP
 - HSRP
 - description **1-9**
 - http
 - //www.cisco.com/en/US/docs/ios/12_4/ip_sla/configuration/guide/hsla_c.html **58-4, 58-6, 58-7**
 - hw-module module num power command **10-21**
-
- I**
 - ICMP
 - enabling **7-12**
 - ping **7-7**
 - running IP traceroute **7-8**
 - time exceeded messages **7-8**
 - ICMP Echo operation
 - configuring **58-12**
 - IP SLAs **58-11**
 - i command **62-3**
 - IDS
 - using with SPAN and RSPAN **50-2**
 - IEEE 802.1ag **55-2**
 - IEEE 802.1s
 - See MST
 - IEEE 802.1w
 - See MST
 - IEEE 802.3ad
 - See LACP
 - IEEE 802.3ah Ethernet OAM discovery **55-1**
 - IGMP
 - configurable-leave timer **23-4**
 - description **33-3**
 - enabling **33-14**
 - explicit host tracking **23-4**
 - immediate-leave processing **23-3**
 - leave processing, enabling **24-8**
 - overview **23-1**
 - report suppression
 - disabling **24-10**
 - IGMP filtering
 - configuring **23-21**
 - default configuration **23-21**
 - described **23-20**
 - monitoring **23-24**
 - IGMP groups
 - setting the maximum number **23-23**
 - IGMP Immediate Leave
 - configuration guidelines **23-9**
 - IGMP profile
 - applying **23-22**
 - configuration mode **23-21**
 - configuring **23-21**
 - IGMP Snooping
 - configure
 - leave timer **23-9**
 - configuring
 - Learning Methods **23-7**
 - static connection to a multicast router **23-8**
 - configuring host statically **23-12**
 - enabling
 - Immediate-Leave processing
 - explicit host tracking **23-11**
 - suppressing multicast flooding **23-12**
 - IGMP snooping
 - configuration guidelines **23-5**
 - default configuration **24-5, 24-6**
 - enabling
 - globally **23-6**
 - on a VLAN **23-6**
 - enabling and disabling **24-6**
 - IP multicast and **33-4**
 - monitoring **23-15, 24-11**
 - overview **23-1**
 - IGMP Snooping, displaying

- group **23-16**
- hot membership **23-15**
- how to **23-15**
- MAC address entries **23-18**
- multicast router interfaces **23-18**
- on a VLAN interface **23-19**
- Querier information **23-19**
- IGMP Snooping Querier, configuring **23-10**
- IGRP**
 - description **1-11**
- Immediate Leave, IGMP**
 - enabling **24-8**
- immediate-leave processing
 - enabling **23-8**
- IGMP**
 - See fast-leave processing
- ingress packets, SPAN enhancement **50-12**
- inline power
 - configuring on Cisco IP phones **38-5**
- insufficient inline power handling for Supervisor Engine II-TS **10-19**
- Intelligent Power Management** **11-4**
- interacting with Baby Giants **6-26**
- interface command **3-9, 6-2**
- interface configuration
 - REP **20-9**
- interface link and trunk status events
 - configuring **6-32**
- interface port-channel command **22-8**
- interface range command **6-4**
- interface range macro command **6-11**
- interfaces
 - adding descriptive name **6-20**
 - clearing counters **6-31**
 - configuring **6-2**
 - configuring ranges **6-4**
 - displaying information about **6-31**
 - Layer 2 modes **16-4**
 - maintaining **6-30**
- monitoring **6-30**
- naming **6-20**
- numbers **6-2**
- overview **6-2**
- restarting **6-32**
- See also Layer 2 interfaces
- using the Ethernet Management Port **6-6**
- Interior Gateway Routing Protocol**
 - See IGRP
- Internet Control Message Protocol**
 - See ICMP
- Internet Group Management Protocol**
 - See IGMP
- Inter-Switch Link encapsulation**
 - See ISL encapsulation
- Intrusion Detection System**
 - See IDS
- inventory management TLV** **27-2, 27-8**
- IP**
 - configuring default gateway **3-11**
 - configuring static routes **3-11**
 - displaying statistics **31-8**
 - flow switching cache **54-9**
- IP addresses
 - cluster candidate or member **13-12**
 - cluster command switch **13-11**
 - discovering **4-30**
- ip cef command **31-6, 60-2**
- IP Enhanced IGRP**
 - interfaces, displaying **30-17**
- ip flow-aggregation cache destination-prefix command **54-12**
- ip flow-aggregation cache prefix command **54-11**
- ip flow-aggregation cache source-prefix command **54-12**
- ip flow-export command **54-9**
- ip icmp rate-limit unreachable command **7-12**
- ip igmp profile command **23-21**
- ip igmp snooping tcn flood command **23-13**
- ip igmp snooping tcn flood query count command **23-14**

- ip igmp snooping tcn query solicit command **23-14**
- IP information
 assigned
 through DHCP-based autoconfiguration **3-2**
- ip load-sharing per-destination command **31-7**
- ip local policy route-map command **35-5**
- ip mask-reply command **7-13**
- IP MTU sizes, configuring **30-8**
- IP MTU sizes, configuring **30-8**
- IP multicast
 clearing table entries **33-28**
 configuring **33-13**
 default configuration **33-13**
 displaying PIM information **33-23**
 displaying the routing table information **33-23**
 enabling dense-mode PIM **33-15**
 enabling sparse-mode **33-15**
 features not supported **33-13**
 hardware forwarding **33-9**
 IGMP snooping and **23-5, 33-4**
 overview **33-1**
 routing protocols **33-2**
 software forwarding **33-9**
 See also Auto-RP; IGMP; PIM; RP; RPF
- IP multicast routing
 enabling **33-14**
 monitoring and maintaining **33-23**
- ip multicast-routing command **33-14**
- IP multicast traffic, load splitting **33-22**
- IP phones
 automatic classification and queueing **37-62**
 configuring voice ports **38-3**
 See Cisco IP Phones **38-1**
 trusted boundary for QoS **37-22**
- ip pim command **33-15**
- ip pim dense-mode command **33-15**
- ip pim sparse-dense-mode command **33-16**
- ip policy route-map command **35-5**
- IP Port Security for Static Hosts
- on a Layer 2 access port **45-24**
on a PVLAN host port **45-28**
overview **45-24**
- ip redirects command **7-13**
- ip route-cache flow command **54-8**
- IP routing tables
 deleting entries **33-28**
- IP Service Level Agreements
 See IP SLAs
- IP service levels, analyzing **58-1**
- IP SLAs
 benefits **58-3**
 CFM endpoint discovery **55-15**
 Control Protocol **58-4**
 default configuration **58-7**
 definition **58-1**
 ICMP echo operation **58-11**
 manually configuring CFM ping or jitter **55-13**
 measuring network performance **58-3**
 monitoring **58-13**
 multioperations scheduling **58-6**
 operation **58-3**
 responder
 described **58-4**
 enabling **58-8**
 response time **58-5**
 scheduling **58-6**
 SNMP support **58-3**
 supported metrics **58-2**
 threshold monitoring **58-6**
 UDP jitter operation **58-9**
- IP Source Guard
 configuring **45-20**
 configuring on private VLANs **45-22**
 displaying **45-22, 45-23**
 overview **45-19**
- IP statistics
 displaying **31-8**
- IP traceroute

- executing **7-9**
 overview **7-8**
- IP unicast
 displaying statistics **31-8**
- IP Unnumbered support
 configuring on a range of Ethernet VLANs **15-6**
 configuring on LAN and VLAN interfaces **15-5**
 configuring with connected host polling **15-7**
- DHCP Option 82 **15-3**
 displaying settings **15-8**
 format of agent remote ID suboptions **15-3**
 troubleshooting **15-9**
 with connected host polling **15-4**
 with DHCP server and Relay agent **15-2**
- ip unreachable command **7-12**
- IPX
 redistribution of route information with EIGRP **1-11**
- ISL
 encapsulation **16-3**
 trunking with 802.1Q tunneling **25-4**
- isolated port **39-4**
 isolated VLANs **39-3, 39-4**
- ISSU
 compatibility matrix **5-12**
 compatibility verification using Cisco Feature Navigator **5-13**
 description **1-13**
 NSF overview **5-3**
 perform the process
 aborting a software upgrade **5-24**
 configuring the rollback timer as a safeguard **5-25**
 displaying a compatibility matrix **5-26**
 loading the new software on the new standby **5-22**
 stopping the rollback timer **5-21**
 switching to the standby **5-19**
 verify the ISSU state **5-16**
 verify the redundancy mode **5-14**
 verify the software installation **5-14**
- vload the new software on standby **5-16**
- prerequisites **5-2**
 process overview **5-6**
 restrictions **5-2**
 SNMP support **5-13**
 SSO overview **5-3**
 versioning capability in software to support **5-11**
- IST
 and MST regions **18-22**
 description **18-22**
 master **18-27**
-
- J**
- jumbo frames
 and ethernet ports **6-25**
 configuring MTU sizes for **6-25**
 ports and linecards that support **6-23**
 understanding MTUs **6-24**
 understanding support **6-24**
 VLAN interfaces **6-25**
-
- K**
- keyboard shortcuts **2-3**
-
- L**
- l2protocol-tunnel command **25-11**
 labels, definition **37-4**
 LACP
 system ID **22-4**
 Layer 2 access ports **16-8**
 Layer 2 Control Packet QoS
 feature interaction **37-60**
 overview **37-56**
 usage guidelines **37-60**
 Layer 2 frames
 classification with CoS **37-2**

- Layer 2 interface, configuring access-mode mode on **47-35**
- Layer 2 interfaces
- assigning VLANs **14-8**
 - configuring **16-5**
 - configuring as PVLAN host ports **39-17**
 - configuring as PVLAN promiscuous ports **39-16**
 - configuring as PVLAN trunk ports **39-18**
 - defaults **16-5**
 - disabling configuration **16-9**
 - modes **16-4**
 - show interfaces command **16-7**
- Layer 2 interface type
- resetting **39-22**
 - setting **39-22**
- Layer 2 protocol tunneling
- default configuration **25-9**
 - guidelines **25-10**
- Layer 2 switching
- overview **16-1**
- Layer 2 Traceroute
- and ARP **7-10**
 - and CDP **7-10**
 - host-to-host paths **7-9**
 - IP addresses and subnets **7-10**
 - MAC addresses and VLANs **7-10**
 - multicast traffic **7-10**
 - multiple devices on a port **7-10**
 - unicast traffic **1-26, 7-9**
 - usage guidelines **7-10**
- Layer 2 trunks
- configuring **16-6**
 - overview **16-3**
- Layer 3 interface, applying IPv6 ACLs **47-23**
- Layer 3 interface counters, configuring **30-9**
- Layer 3 interface counters, understanding **30-3**
- Layer 3 interfaces
- changing from Layer 2 mode **36-8**
 - configuration guidelines **30-4**
- overview **30-1**
- logical **30-2**
 - physical **30-2**
- VLANs as interfaces **30-6**
- Layer 3 packets
- classification methods **37-2**
- Layer 4 port operations
- configuration guidelines **47-16**
 - restrictions **47-15**
- Leave timer, enabling **23-9**
- limitations on using a TwinGig Convertor **6-14**
- link and trunk status events
- configuring interface **6-32**
- link integrity, verifying with REP **20-3**
- Link Layer Discovery Protocol
- See CDP
- link monitoring, Ethernet OAM **55-21, 55-25**
- listening state (STP)
- RSTP comparisons (table) **18-24**
- LLDP
- configuring **27-4**
 - characteristics **27-5**
 - default configuration **27-4**
 - disabling and enabling
 - globally **27-6**
 - on an interface **27-7**
 - monitoring and maintaining **27-11**
 - overview **27-1**
 - transmission timer and holdtime, setting **27-5**
- LLDP-MED
- configuring
 - procedures **27-4**
 - TLVs **27-8**
 - monitoring and maintaining **27-11**
 - overview **27-1**
 - supported TLVs **27-2**
- LLDP Media Endpoint Discovery
- See LLDP-MED
- load balancing

configuring for CEF **31-7**
 configuring for EtherChannel **22-13**
 overview **22-5, 31-6**
 per-destination **31-7**
 load splitting IP multicast traffic **33-22**

Location Service
 overview **27-1**

location service
 configuring **27-9**
 understanding **27-3**

location TLV **27-3, 27-8**

logging, EPM **40-80**

Logical Layer 3 interfaces
 configuring **30-5**

login authentication
 with TACACS+ **3-19**

login banners **4-17**

login timer
 changing **7-6**

logout warning command **7-6**

loop guard
 and MST **18-23**
 configuring **21-5**
 overview **21-3**

M

MAC/PHY configuration status TLV **27-2**

MAC addresses
 aging time **4-21**
 allocating **18-5**
 and VLAN association **4-20**
 building tables **4-20, 16-2**
 convert dynamic to sticky secure **43-5**
 default configuration **4-21**
 discovering **4-30**
 displaying **4-30, 7-3**
 displaying in DHCP snooping binding table **45-19**
 dynamic learning **4-20**
 removing **4-22**
 in ACLs **47-19**
 static
 adding **4-28**
 allowing **4-29**
 characteristics of **4-27**
 dropping **4-29**
 removing **4-28**
 sticky **43-4**
 sticky secure, adding **43-5**

MAC address-table move update
 configuration guidelines **19-6**
 configuring **19-9**
 description **19-3**
 monitoring **19-11**

MAC Authentication Bypass
 configure with 802.1X **40-53**

MAC details, displaying **40-80**

MAC extended access lists **47-19**

macros
 See Smartports macros

main-cpu command **8-9**

Maintenance end points
 See MEPs

Maintenance intermediate points
 See MIPs

management address TLV **27-2**

management options
 SNMP **53-1**

Management Port, Ethernet **6-6**

manual preemption, REP, configuring **20-12**

mapping
 DSCP markdown values **37-19**
 DSCP values to transmit queues **37-51**

mapping tables
 configuring DSCP **37-53**
 described **37-15**

marking

- hardware capabilities **37-78**
- marking action drivers **37-76**
- marking network traffic **37-73**
- marking support, multi-attribute **37-77**
- mask destination command **54-11, 54-12**
- mask source command **54-11, 54-12**
- Match CoS for non-IPV4 traffic
 - configuring **37-31**
- match ip address command **35-4**
- maximum aging time (STP)
 - configuring **18-18**
- MDA
 - configuration guidelines **40-20 to 40-21**
 - described **40-20**
- members
 - automatic discovery **13-7**
- member switch
 - managing **13-12**
- member switch, cluster
 - defined **13-11**
 - requirements **13-12**
- meminfo command **62-5**
- MEPs
 - defined **55-4**
- messages, Ethernet OAM **55-21**
- messages, to users through banners **4-17**
- Metro features
 - Ethernet CFM, introduction **1-3**
 - Ethernet OAM Protocol, introduction **1-3**
 - Flex Link and MAC Address-Table Move Update, introduction **1-3**
 - Y.1731 (AIS and RDI), introduction **1-8**
- metro tags **25-2**
- MFIB
 - CEF **33-6**
 - overview **33-12**
- MFIB, IP
 - displaying **33-26**
- MIBs
 - compiling **63-4**
 - downloading **63-2, 63-3, 63-4**
 - overview **53-1**
 - related information **63-3**
 - SNMP interaction with **53-4**
 - MIBs
 - defined **55-5**
 - MLD Done messages and Immediate-leave **24-4**
 - MLD messages **24-2**
 - MLD queries **24-3**
 - MLD reports **24-4**
 - MLD Snooping
 - MLD Done messages and Immediate-leave **24-4**
 - MLD messages **24-2**
 - MLD queries **24-3**
 - MLD reports **24-4**
 - Multicast client aging robustness **24-3**
 - Multicast router discovery **24-3**
 - overview **24-1**
 - Mode of capturing control packets, selecting **47-12**
 - modules
 - checking status **7-2**
 - powering down **10-20**
 - monitoring
 - 802.1Q tunneling **25-12**
 - ACL information **47-39**
 - Ethernet CFM **55-19**
 - Ethernet OAM **55-34**
 - Ethernet OAM protocol **55-34**
 - Flex Links **19-11**
 - IGMP
 - snooping **24-11**
 - IGMP filters **23-24**
 - IGMP snooping **23-15**
 - IP SLAs operations **58-13**
 - Layer 2 protocol tunneling **25-12**
 - MAC address-table move update **19-11**
 - multicast router interfaces **24-11**
 - multi-VRF CE **36-17**

- REP **20-13**
- traffic flowing among switches **59-1**
- tunneling **25-12**
- VLAN filters **47-30**
- VLAN maps **47-30**
- M-record **18-22**
- MST
 - and multiple spanning trees **1-4, 18-22**
 - boundary ports **18-27**
 - BPDUs **18-22**
 - configuration parameters **18-26**
 - configuring **18-29**
 - displaying configurations **18-33**
 - edge ports **18-27**
 - enabling **18-29**
 - hop count **18-28**
 - instances
 - configuring parameters **18-32**
 - description **18-22**
 - number supported **18-26**
 - interoperability with PVST+ **18-23**
 - link type **18-28**
 - master **18-27**
 - message age **18-28**
 - regions **18-26**
 - restrictions **18-29**
 - to-SST interoperability **18-24**
- MSTP
 - EtherChannel guard
 - enabling **21-6**
 - M-record **18-22**
 - M-tree **18-22**
- M-tree **18-22**
- MTU size
 - understanding **6-24**
- MTUS
 - configuring **6-25, 6-27, 6-33**
 - default **14-5**
- multiauthentication mode **40-8**
- multicast
 - See IP multicast
- Multicast client aging robustness **24-3**
- multicast groups
 - static joins **24-7**
- multicast packets
 - blocking **48-2**
- Multicast router discovery **24-3**
- multicast router interfaces, displaying **23-18**
- multicast router interfaces, monitoring **24-11**
- multicast router ports, adding **24-7**
- multicast routers
 - flood suppression **23-12**
- multicast router table
 - displaying **33-23**
- Multicast Storm Control
 - enabling **49-4**
 - disabling **49-7**
 - suppression on Sup 6-E **49-4**
 - suppression on WS-X4014 **49-5**
 - suppression on WS-X4016 **49-5**
 - WS-X4515, WS-X4014, and WS-X4013+ Sup Engs **49-5**
 - WS-X4516 Sup Eng **49-5**
- multidomain authentication
 - See MDA
- multidomain authentication mode **40-7**
- multioperations scheduling, IP SLAs **58-6**
- Multiple Authentication
 - described **40-20**
- Multiple AuthorizationAuthentication
 - configuring **40-30**
- Multiple Domain Authentication **40-30**
- multiple forwarding paths **1-4, 18-22**
- multiple-hosts mode **40-7**
- Multiple Spanning Tree
 - See MST
- multiple VPN routing/forwarding

- See multi-VRF CE
- multi-VRF CE
- components **36-4**
 - configuration example **36-13**
 - default configuration **36-4**
 - defined **36-1**
 - displaying **36-17**
 - monitoring **36-17**
 - network components **36-4**
 - packet-forwarding process **36-4**
-
- N**
- named aggregate policers, creating **37-27**
- named IPv6 ACLs, configuring
- ACLs
 - configuring named IPv6 ACLs **47-22**
- named MAC extended ACLs
- ACLs
 - configuring named MAC extended **47-19, 47-21**
- native VLAN
- and 802.1Q tunneling **25-4**
 - specifying **16-6**
- neighbor offset numbers, REP **20-4**
- NetFlow
- aggregation
 - minimum mask, default value **54-11**
 - destination-prefix aggregation
 - configuration (example) **54-16**
 - minimum mask, configuring **54-11**
 - IP
 - flow switching cache **54-9**
 - prefix aggregation
 - configuration (example) **54-14**
 - minimum mask, configuring **54-11**
 - source-prefix aggregation
 - minimum mask, configuring **54-11**
 - switching
 - checking for required hardware **54-6**
- NetFlow statistics
- configuration (example) **54-13**
 - configuring switched IP flows **54-8**
 - enabling Collection **54-7**
 - exporting cache entries **54-9**
 - statistics **54-9**
- Network Assistant
- and VTY **13-11**
- configure
- enable communication with switch **13-13, 13-17**
 - default configuration **13-2**
 - overview of CLI commands **13-2**
- network fault tolerance **1-4, 18-22**
- network management
- configuring **26-1**
 - RMON **59-1**
 - SNMP **53-1**
- network performance, measuring with IP SLAs **58-3**
- network policy TLV **27-2, 27-8**
- Network Time Protocol
- See NTP
- network traffic, marking **37-73**
- New Software Features in Release 7.7
- TDR **7-3**
- Next Hop Resolution Protocol
- See NHRP
- NHRP
- support **1-11**
- non-IP traffic filtering **47-19, 47-21**
- non-RPF traffic
- description **33-10**
 - in redundant configurations (figure) **33-11**

- Nonstop Forwarding
See NSF
- nonvolatile random-access memory
See NVRAM
- normal-range VLANs
See VLANs
- NSF
defined **9-1**
guidelines and restrictions **9-9**
operation **9-5**
- NSF-aware
supervisor engines **9-3**
support **9-2**
- NSF-capable
supervisor engines **9-3**
support **9-2**
- NSF with SSO supervisor engine redundancy
and CEF **9-5**
overview **9-4**
SSO operation **9-4**
- NTP
associations
authenticating **4-4**
defined **4-2**
enabling broadcast messages **4-7**
peer **4-6**
server **4-6**
default configuration **4-4**
displaying the configuration **4-11**
overview **4-2**
restricting access
creating an access group **4-9**
disabling NTP services per interface **4-10**
source IP address, configuring **4-10**
stratum **4-2**
synchronizing devices **4-6**
time
services **4-2**
synchronizing **4-2**
- NVRAM
saving settings **3-10**
-
- O**
- OAM
client **55-20**
features **55-20**
sublayer **55-20**
- OAM manager
with CFM and Ethernet OAM **55-36**
- OAM PDUs **55-22**
- OAM protocol data units **55-20**
- OIR
overview **6-30**
- Online Diagnostics **60-1**
- online insertion and removal
See OIR
- Open Shortest Path First
See OSPF
- operating system images
See system images
- Option 82
enabling DHCP Snooping **45-10**
- OSPF
area concept **1-12**
description **1-12**
-
- P**
- packets
modifying **37-17**
software processed
and QoS **37-17**
- packet type filtering
overview **50-15**
SPAN enhancement **50-15**
- PACL, using with access-group mode **47-35**
- PACL with VLAN maps and router ACLs **47-37**

PAgP
 understanding **22-3**

passwords
 configuring enable password **3-14**
 configuring enable secret password **3-14**
 encrypting **3-22**
 in clusters **13-8**
 recovering lost enable password **3-25**
 setting line password **3-15**

PBR (policy-based routing)
 configuration (example) **35-5**
 enabling **35-3**
 features **35-2**
 overview **35-1**
 route maps **35-2**
 when to use **35-3**

per-port and VLAN Access Control List **45-19**

per-port per-VLAN QoS
 enabling **37-44**
 overview **37-17**

Per-User ACL and Filter-ID ACL, configure **40-40**

Per-VLAN Rapid Spanning Tree **18-6**
 enabling **18-20**
 overview **18-6**

PE to CE routing, configuring **36-12**

Physical Layer 3 interfaces, configuring **30-10**

PIM
 configuring dense mode **33-15**
 configuring sparse mode **33-15**
 displaying information **33-23**
 displaying statistics **33-27**
 enabling sparse-dense mode **33-15, 33-16**
 overview **33-3**

PIM-DM **33-3**

PIM on an interface, enabling **33-14**

PIM-SM **33-4**

PIM-SSM mapping, enabling **33-17**

ping
 executing **7-7**

overview **7-7**

ping command **7-7, 33-23**

PoE **11-7**
 configuring power consumption for single device **11-5**
 Enhanced PoE support on E-series **11-15**
 policing and monitoring **11-11**
 power consumption for powered devices
 Intelligent Power Management **11-4**
 powering down a module **10-20**
 power management modes **11-2**
 show interface status **11-6**

PoE policing
 configuring errdisable recovery **11-14**
 configuring on an interface **11-12**
 displaying on an interface **11-13**
 power modes **11-12**

point-to-point
 in 802.1X authentication (figure) **40-3**

police command **37-34**

policed-DSCP map **37-54**

policers
 description **37-5**
 types of **37-10**

policies
 See QoS policies

policing
 how to implement **37-73**
 See QoS policing

policing, PoE **11-11**

policy associations, QoS on Sup 6-E **37-90**

policy-map command **37-29, 37-32**

policy map marking action, configuring **37-78**

policy maps
 attaching to interfaces **37-36**
 configuring **37-31**

port ACLs
 and voice VLAN **47-5**
 defined **47-3**

- limitations **47-5**
- Port Aggregation Protocol
 - see PAgP
- port-based authentication
 - 802.1X with voice VLAN **40-19**
 - authentication server
 - defined **42-2**
 - changing the quiet period **40-72**
 - client, defined **40-3, 42-2**
 - configuration guidelines **40-24, 42-6**
 - configure ACL assignments and redirect URLs **40-34**
 - configure switch-to-RADIUS server communication **40-28**
 - configure violation action **40-49**
 - configure with Authentication Failed VLAN assignment **40-60**
 - configure with Critical Authentication **40-55**
 - configure with Guest-VLANs **40-49, 40-62**
 - configure with MAC Authentication Bypass **40-53**
 - configure with Wake-on-LAN **40-58**
 - configuring
 - Multiple Domain Authentication and Multiple Authorization **40-30**
 - RADIUS server **42-10**
 - RADIUS server parameters on the switch **42-9**
 - configuring Fallback Authentication **40-65**
 - configuring Guest-VLAN **40-28**
 - configuring manual re-authentication of a client **40-76**
 - controlling authorization state **40-5**
 - default configuration **40-23, 42-6**
 - described **40-1**
 - device roles **40-2, 42-2**
 - displaying statistics **40-77, 42-14**
 - enabling **40-24**
 - 802.1X authentication **42-9**
 - enabling multiple hosts **40-70**
 - enabling periodic re-authentication **40-69**
 - encapsulation **40-3**
 - host mode **40-6**
 - how 802.1X fails on a port **40-21**
 - initiation and message exchange **40-4**
 - method lists **40-24**
 - modes **40-6**
 - multidomain authentication **40-20**
 - multiple-hosts mode, described **40-7**
 - port security
 - multiple-hosts mode **40-7**
 - ports not supported **40-5**
 - pre-authentication open access **40-8**
 - resetting to default values **40-76**
 - setting retransmission number **40-74**
 - setting retransmission time **40-73**
 - switch
 - as proxy **42-2**
 - topologies, supported **40-21**
 - using with ACL assignments and redirect URLs **40-17**
 - using with port security **40-16**
 - violation mode **40-9**
 - with Critical Authentication **40-13**
 - with Guest VLANs **40-10**
 - with MAC Authentication Bypass **40-11**
 - with VLAN assignment **40-9**
 - port-based QoS features
 - See QoS
 - port-channel interfaces
 - See also EtherChannel
 - creating **22-7**
 - overview **22-2**
 - port-channel load-balance
 - command **22-13**
 - command example **22-13**
 - port-channel load-balance command **22-14**
 - port cost (STP)
 - configuring **18-15**
 - port description TLV **27-2**
 - PortFast
 - and MST **18-23**

- BPDUs
 - filter, configuring **21-10**
 - configuring or enabling **21-16**
 - overview **21-7**
- PortFast BPDU filtering
 - and MST **18-23**
 - enabling **21-10**
 - overview **21-9**
- port numbering with TwinGig Convertors **6-14**
- port priority
 - configuring MST instances **18-32**
 - configuring STP **18-13**
- ports
 - blocking **48-1**
 - checking status **7-2**
 - dynamic VLAN membership
 - example **14-30**
 - reconfirming **14-27**
 - forwarding, resuming **48-3**
 - REP **20-5**
 - See also interfaces
- port security
 - aging **43-5**
 - and QoS trusted boundary **37-22**
 - configuring **43-7**
 - displaying **43-28**
 - guidelines and restrictions **43-33**
 - on access ports **43-7, 43-22**
 - on private VLAN **43-14**
 - host **43-14**
 - over Layer 2 EtherChannel **43-33**
 - promiscuous **43-16**
 - topology **43-15, 43-18, 43-33**
 - on trunk port **43-17**
 - guidelines and restrictions **43-15, 43-18, 43-21, 43-33**
 - port mode changes **43-22**
 - on voice ports **43-22**
 - sticky learning **43-5**
 - using with 802.1X **40-16**
 - violations **43-6**
- power
 - with 802.1X Authentication **43-32**
 - with DHCP and IP Source Guard **43-31**
 - with other features **43-33**
- port states
 - description **18-5**
- port trust state
 - See trust states
- port VLAN ID TLV **27-2**
- power
 - inline **38-5**
 - power dc input command **10-18**
 - power handling for Supervisor Engine II-TS **11-11**
 - power inline command **11-3**
 - power inline consumption command **11-5**
 - power management
 - Catalyst 4500 series **10-6**
 - Catalyst 4500 Switch power supplies **10-13**
 - Catalyst 4948 series **10-21**
 - configuring combined mode **10-12**
 - configuring redundant mode **10-11**
 - redundancy **10-6**
 - power management for Catalyst 4500 Switch
 - combined mode **10-8**
 - redundant mode **10-8**
 - power management limitations in Catalyst 4500 Switch **10-9**
 - power management mode
 - selecting **10-8**
 - power management TLV **27-2, 27-8**
 - Power-On-Self-Test diagnostics **60-8, 60-19**
 - Power-On-Self-Test for Supervisor Engine V-10GE **60-13**
 - power redundancy-mode command **10-11**
 - power supplies
 - available power for Catalyst 4500 Switch **10-13**
 - fixed **10-7**
 - variable **10-7, 10-21**
 - pre-authentication open access **40-8**
 - pre-authentication open access. See port-based authentication.

- preempt delay time, REP [20-5](#)
 - primary edge port, REP [20-4](#)
 - primary VLANs [39-3, 39-5](#)
 - associating with secondary VLANs [39-14](#)
 - configuring as a PVLAN [39-13](#)
 - priority
 - overriding CoS of incoming frames [38-5](#)
 - priority queuing, QoS on Sup 6-E [37-85](#)
 - private VLAN
 - configure port security [43-14, 43-15](#)
 - enabling DHCP Snooping [45-11](#)
 - private VLANs
 - across multiple switches [39-5](#)
 - and SVIs [39-10](#)
 - benefits of [39-3](#)
 - community ports [39-4](#)
 - community VLANs [39-3, 39-4](#)
 - default configuration [39-11](#)
 - end station access to [39-3](#)
 - isolated port [39-4](#)
 - isolated VLANs [39-3, 39-4](#)
 - ports
 - community [39-4](#)
 - isolated [39-4](#)
 - promiscuous [39-5](#)
 - primary VLANs [39-3, 39-5](#)
 - promiscuous ports [39-5](#)
 - secondary VLANs [39-3](#)
 - subdomains [39-3](#)
 - traffic in [39-9](#)
 - privileged EXEC mode [2-5](#)
 - privileges
 - changing default [3-23](#)
 - configuring levels [3-23](#)
 - exiting [3-24](#)
 - logging in [3-24](#)
 - promiscuous ports
 - configuring PVLAN [39-16](#)
 - defined [39-5](#)
 - setting mode [39-22](#)
 - protocol timers [18-4](#)
 - provider edge devices [36-2](#)
 - pruning, VTP
 - See VTP pruning
 - pseudobridges
 - description [18-25](#)
 - PVACL [45-19](#)
 - PVID (port VLAN ID)
 - and 802.1X with voice VLAN ports [40-19](#)
 - PVLAN promiscuous trunk port
 - configuring [39-2, 39-16, 39-19](#)
 - PVLANS
 - 802.1q support [39-13](#)
 - across multiple switches [39-5](#)
 - configuration guidelines [39-11](#)
 - configure port security [43-14, 43-16, 43-18](#)
 - configure port security in a wireless setting [43-33](#)
 - configure port security over Layer 2 EtherChannel [43-33](#)
 - configuring [39-10](#)
 - configuring a VLAN [39-13](#)
 - configuring promiscuous ports [39-16](#)
 - host ports
 - configuring a Layer 2 interface [39-17](#)
 - setting [39-22](#)
 - overview [39-1](#)
 - permitting routing, example [39-21](#)
 - promiscuous mode
 - setting [39-22](#)
 - setting
 - interface mode [39-22](#)
-

Q

QoS

- allocating bandwidth [37-52](#)
- and software processed packets [37-17](#)
- auto-QoS

- configuration and defaults display [37-65](#)
- configuration guidelines [37-63](#)
- described [37-61](#)
- displaying [37-65](#)
- effects on NVRAM configuration [37-63](#)
- enabling for VoIP [37-64](#)
- basic model [37-5](#)
- burst size [37-28](#)
- classification [37-6 to 37-10](#)
- configuration guidelines [37-20](#)
 - auto-QoS [37-63](#)
- configuring
 - auto-QoS [37-61](#)
 - DSCP maps [37-53](#)
 - dynamic buffer limiting [37-23](#)
 - traffic shaping [37-52](#)
 - trusted boundary [37-22](#)
- configuring Layer 2 Control Packet QoS, feature interaction [37-60](#)
- configuring Layer 2 Control Packet QoS, guidelines [37-60](#)
- configuring Layer 2 Control Packet QoS, overview [37-56](#)
- configuring UBRL [37-38](#)
- configuring VLAN-based on Layer 2 interfaces [37-47](#)
- creating named aggregate policers [37-27](#)
- creating policing rules [37-29](#)
- default auto configuration [37-62](#)
- default configuration [37-19](#)
- definitions [37-3](#)
- disabling on interfaces [37-36](#)
- enabling and disabling [37-46](#)
- enabling hierarchical policers [37-42](#)
- enabling on interfaces [37-36](#)
- enabling per-port per-VLAN [37-44](#)
- flowcharts [37-8, 37-13](#)
- IP phones
 - automatic classification and queueing [37-62](#)
 - detection and trusted settings [37-22, 37-62](#)
- overview [37-2](#)
- overview of per-port per-VLAN [37-17](#)
- packet modification [37-17](#)
- port-based [37-47](#)
- priority [37-16](#)
- traffic shaping [37-17](#)
- transmit rate [37-52](#)
- trust states
 - trusted device [37-22](#)
- VLAN-based [37-47](#)
- See also COS; DSCP values; transmit queues
- QoS active queue management
 - tracking queue length [37-15](#)
- QoS labels
 - definition [37-4](#)
- QoS mapping tables
 - CoS-to-DSCP [37-54](#)
 - DSCP-to-CoS [37-55](#)
 - policed-DSCP [37-54](#)
 - types [37-15](#)
- QoS marking
 - description [37-5](#)
- QoS on Sup 6-E
 - Active Queue management via DBL [37-89](#)
 - active queue management via DBL [37-82, 37-89](#)
 - classification [37-71](#)
 - configuring [37-68](#)
 - configuring CoS mutation [37-93](#)
 - configuring the policy map marking action [37-78](#)
 - hardware capabilities for marking [37-78](#)
 - how to implement policing [37-73](#)
 - marking action drivers [37-76](#)
 - marking network traffic [37-73](#)
 - MQC-based QoS configuration [37-68](#)
 - multi-attribute marking support [37-77](#)
 - platform hardware capabilities [37-71](#)
 - platform restrictions [37-73](#)
 - platform-supported classification criteria and QoS features [37-68, 37-70](#)
 - policing [37-72](#)

policy associations **37-90**
 prerequisites for applying a service policy **37-71**
 priority queuing **37-85**
 queue-limiting **37-86**
 restrictions for applying a service policy **37-71**
 shaping **37-80**
 sharing(bandwidth) **37-82**
 sharing(bandwidth), shaping, and priority queuing **37-80**
 software QoS **37-92**
 traffic marking procedure flowchart **37-76**

QoS policers
 burst size **37-28**
 types of **37-10**

QoS policing
 definition **37-5**
 described **37-5, 37-10**

QoS policy
 attaching to interfaces **37-12**
 overview of configuration **37-29**

QoS service policy
 prerequisites **37-71**
 restrictions for applying **37-71**

QoS transmit queues
 allocating bandwidth **37-52**
 burst **37-17**
 configuring traffic shaping **37-52**
 mapping DHCP values to **37-51**
 maximum rate **37-17**
 overview **37-15**
 sharing link bandwidth **37-16**

QoS transmit queues, configuring **37-50**

Quality of service
 See QoS

queueing **37-6, 37-15**
 queue-limiting, QoS on Sup 6-E **37-86**

R

RADIUS server
 configure to-Switch communication **40-28**
 configuring settings **40-30**
 parameters on the switch **40-28**

range command **6-4**

range macros
 defining **6-11**

ranges of interfaces
 configuring **6-4**

Rapid Spanning Tree
 See RSTP

rcommand command **13-12**

re-authentication of a client
 configuring manual **40-76**
 enabling periodic **40-69**

redirect URLs, port-based authentication **40-17**

reduced MAC address **18-2**

redundancy
 configuring **8-8**
 guidelines and restrictions **8-6**
 changes made through SNMP **8-12**
 NSF-aware support **9-2**
 NSF-capable support **9-2**
 overview **8-2**
 redundancy command **8-9**
 understanding synchronization **8-5**

redundancy (NSF) **9-1**
 configuring
 BGP **9-12**
 CEF **9-11**
 EIGRP **9-17**
 IS-IS **9-14**
 OSPF **9-13**
 routing protocols **9-5**

redundancy (RPR)
 route processor redundancy **8-3**
 synchronization **8-5**

redundancy (SSO)
 redundancy command **9-10**
 route processor redundancy **8-3**
 synchronization **8-6**
 reload command **3-28, 3-29**
 remote failure indications **55-21**
 remote loopback, Ethernet OAM **55-21, 55-24**
 Remote Network Monitoring
 See RMON
 rendezvous point, configuring **33-17**
 rendezvous point, configuring single static **33-20**
 REP
 administrative VLAN **20-8**
 administrative VLAN, configuring **20-8**
 and STP **20-5**
 configuration guidelines **20-7**
 configuring interfaces **20-9**
 convergence **20-3**
 default configuration **20-6**
 manual preemption, configuring **20-12**
 monitoring **20-13**
 neighbor offset numbers **20-4**
 open segment **20-2**
 ports **20-5**
 preempt delay time **20-5**
 primary edge port **20-4**
 ring segment **20-2**
 secondary edge port **20-4**
 segments **20-1**
 characteristics **20-2**
 SNMP traps, configuring **20-13**
 supported interfaces **20-1**
 triggering VLAN load balancing **20-5**
 verifying link integrity **20-3**
 VLAN blocking **20-12**
 VLAN load balancing **20-4**
 replication
 description **33-9**
 report suppression, IGMP
 disabling **24-10**
 reserved-range VLANs
 See VLANs
 reset command **62-3**
 resetting an interface to default configuration **6-35**
 resetting a switch to defaults **3-31**
 Resilient Ethernet ProtocolSee REP
 responder, IP SLAs
 described **58-4**
 enabling **58-8**
 response time, measuring with IP SLAs **58-5**
 restricting access
 NTP services **4-8**
 TACACS+ **3-15**
 retransmission number
 setting in 802.1X authentication **40-74**
 retransmission time
 changing in 802.1X authentication **40-73**
 RFC
 1157, SNMPv1 **53-2**
 1305, NTP **4-2**
 1757, RMON **59-2**
 1901, SNMPv2C **53-2**
 1902 to 1907, SNMPv2 **53-2**
 2273-2275, SNMPv3 **53-2**
 RIP
 description **1-12**
 RMON
 default configuration **59-3**
 displaying status **59-6**
 enabling alarms and events **59-3**
 groups supported **59-2**
 overview **59-1**
 ROM monitor
 boot process and **3-26**
 CLI **2-7**
 commands **62-2 to 62-3**
 debug commands **62-5**
 entering **62-1**

- existing **62-5**
- overview **62-1**
- root bridge
 - configuring **18-9**
 - selecting in MST **18-22**
- root guard
 - and MST **18-23**
 - enabling **21-2**
 - overview **21-2**
- routed packets
 - ACLs **47-32**
- route-map (IP) command **35-4**
- route maps
 - defining **35-4**
 - PBR **35-2**
- router ACLs
 - description **47-3**
 - using with VLAN maps **47-31**
- router ACLs, using PACL with VLAN maps **47-37**
- route targets
 - VPN **36-4**
- Routing Information Protocol
 - See RIP
- RPF
 - <Emphasis>See Unicast RPF
- RSPAN
 - configuration guidelines **50-16**
 - destination ports **50-5**
 - IDS **50-2**
 - monitored ports **50-4**
 - monitoring ports **50-5**
 - received traffic **50-3**
 - sessions
 - creating **50-17**
 - defined **50-3**
 - limiting source traffic to specific VLANs **50-23**
 - monitoring VLANs **50-22**
 - removing source (monitored) ports **50-21**
 - specifying monitored ports **50-17**
 - source ports **50-4**
 - transmitted traffic **50-4**
 - VLAN-based **50-5**
- RSTP
 - compatibility **18-23**
 - description **18-22**
 - port roles **18-23**
 - port states **18-24**

- S**
- SAID
 - See 802.10 SAID
- scheduling **37-15**
 - defined **37-5**
 - overview **37-6**
- scheduling, IP SLAs operations **58-6**
- secondary edge port, REP **20-4**
- secondary root switch **18-12**
- secondary VLANs **39-3**
 - associating with primary **39-14**
 - permitting routing **39-21**
- security
 - configuring **44-1**
- Security Association Identifier
 - See 802.10 SAID
- selecting a power management mode **10-8**
- selecting X2/TwinGig Convertor Mode **6-15**
- sequence numbers in log messages **51-7**
- server IDs
 - description **57-23**
- service policy, configure class-level queue-limit **37-86**
- service-policy command **37-29**
- service-policy input command **29-2, 37-36**
- service-provider networks
 - and customer VLANs **25-2**
- set default interface command **35-4**
- set interface command **35-4**
- set ip default next-hop command **35-4**

set ip next-hop command **35-4**
 set-request operation **53-4**
 severity levels, defining in system messages **51-8**
 shaping, QoS on Sup 6-E **37-80**
 sharing(bandwidth), QoS on Sup 6-E **37-82**
 show adjacency command **31-9**
 show boot command **3-31**
 show catalyst4000 chassis-mac-address command **18-3**
 show cdp command **26-2, 26-3**
 show cdp entry command **26-4**
 show cdp interface command **26-3**
 show cdp neighbors command **26-4**
 show cdp traffic command **26-4**
 show ciscoview package command **4-33**
 show ciscoview version command **4-33**
 show cluster members command **13-12**
 show configuration command **6-20**
 show debugging command **26-4**
 show environment command **10-2**
 show history command **2-4**
 show interfaces command **6-25, 6-27, 6-31, 6-33**
 show interfaces status command **7-2**
 show ip cache flow aggregation destination-prefix command **54-12**
 show ip cache flow aggregation prefix command **54-12**
 show ip cache flow aggregation source-prefix command **54-12**
 show ip cache flow command **54-10**
 show ip cef command **31-8**
 show ip eigrp interfaces command **30-17**
 show ip eigrp neighbors command **30-17**
 show ip eigrp topology command **30-17**
 show ip eigrp traffic command **30-17**
 show ip interface command **33-23**
 show ip local policy command **35-5**
 show ip mroute command **33-23**
 show ip pim interface command **33-23**
 show l2protocol command **25-12**
 show lldp traffic command **27-11**

show mac-address-table address command **7-3**
 show mac-address-table interface command **7-3**
 show mls entry command **31-8**
 show module command **7-2, 18-5**
 show PoE consumed **11-7**
 show power inline command **11-6**
 show power supplies command **10-12**
 show protocols command **6-31**
 show running-config command
 adding description for an interface **6-20**
 checking your settings **3-9**
 displaying ACLs **47-25, 47-27, 47-34, 47-35**
 show startup-config command **3-10**
 show users command **7-6**
 show version command **3-29**
 shutdown, command **6-32**
 shutdown threshold for Layer 2 protocol packets **25-9**
 shutting down
 interfaces **6-32**
 Simple Network Management Protocol
 See SNMP
 single-host mode **40-7**
 single spanning tree
 See SST
 single static RP, configuring **33-20**
 slot numbers, description **6-2**
 smart call home **57-1**
 description **57-2**
 destination profile (note) **57-5**
 registration requirements **57-3**
 service contract requirements **57-3**
 Transport Gateway (TG) aggregation point **57-2**
 SMARTnet
 smart call home registration **57-3**
 Smartports macros
 applying global parameter values **17-8**
 applying macros **17-8**
 applying parameter values **17-8**
 configuration guidelines **17-6**

- configuring **17-2**
- creating **17-7**
- default configuration **17-3**
- defined **17-1**
- displaying **17-13**
- tracing **17-6**
- SMNP traps, and CFM **55-7**
- SNMP
 - accessing MIB variables with **53-4**
 - agent
 - described **53-4**
 - disabling **53-7**
 - and IP SLAs **58-3**
 - authentication level **53-10**
 - community strings
 - configuring **53-7**
 - overview **53-4**
 - configuration examples **53-16**
 - configuration guidelines **53-6**
 - default configuration **53-5**
 - enabling **63-4, 63-5**
 - engine ID **53-6**
 - groups **53-6, 53-9**
 - host **53-6**
 - informs
 - and trap keyword **53-11**
 - described **53-5**
 - differences from traps **53-5**
 - enabling **53-14**
 - limiting access by TFTP servers **53-15**
 - limiting system log messages to NMS **51-9**
 - manager functions **53-3**
 - notifications **53-5**
 - overview **53-1, 53-4**
 - status, displaying **53-17**
 - system contact and location **53-15**
 - trap manager, configuring **53-13**
 - traps
 - described **53-3, 53-5**
 - differences from informs **53-5**
 - enabling **53-11**
 - enabling MAC address notification **4-22**
 - enabling MAC move notification **4-24**
 - enabling MAC threshold notification **4-26**
 - overview **53-1, 53-4**
 - types of **53-11**
 - users **53-6, 53-9**
 - versions supported **53-2**
 - SNMP commands **63-4**
 - SNMP traps
 - REP **20-13**
 - SNMPv1 **53-2**
 - SNMPv2C **53-2**
 - SNMPv3 **53-2**
 - software
 - upgrading **8-14**
 - software configuration register **3-26**
 - software QoS, on Sup 6-E **37-92**
 - software switching
 - description **31-5**
 - interfaces **31-6**
 - key data structures used **33-8**
 - source IDs
 - call home event format **57-22**
 - SPAN
 - and ACLs **50-5**
 - configuration guidelines **50-7**
 - configuring **50-7 to 50-10**
 - destination ports **50-5**
 - IDS **50-2**
 - monitored port, defined **50-4**
 - monitoring port, defined **50-5**
 - received traffic **50-3**
 - sessions
 - defined **50-3**
 - source ports **50-4**
 - transmitted traffic **50-4**
 - VLAN-based **50-5**

- SPAN and RSPAN
 concepts and terminology **50-3**
 default configuration **50-6**
 displaying status **50-25**
 overview **50-1**
 session limits **50-6**
- SPAN enhancements
 access list filtering **50-13**
 configuration example **50-16**
 CPU port sniffing **50-10**
 encapsulation configuration **50-12**
 ingress packets **50-12**
 packet type filtering **50-15**
 spanning-tree backbonefast command **21-16**
 spanning-tree cost command **18-15**
 spanning-tree guard root command **21-2**
 spanning-tree portfast bpdu-guard command **21-8**
 spanning-tree portfast command **21-7**
 spanning-tree port-priority command **18-13**
 spanning-tree uplinkfast command **21-13**
 spanning-tree vlan
 command **18-9**
 command example **18-9**
 spanning-tree vlan command **18-8**
 spanning-tree vlan cost command **18-15**
 spanning-tree vlan forward-time command **18-19**
 spanning-tree vlan hello-time command **18-17**
 spanning-tree vlan max-age command **18-18**
 spanning-tree vlan port-priority command **18-13**
 spanning-tree vlan priority command **18-17**
 spanning-tree vlan root primary command **18-10**
 spanning-tree vlan root secondary command **18-12**
 speed
 configuring interface **6-18**
 speed command **6-18**
 SSO
 configuring **9-10**
 SSO operation **9-4**
 SST
- description **18-22**
 interoperability **18-24**
 static addresses
 See addresses
 static routes
 configuring **3-11**
 verifying **3-12**
 statistics
 802.1X **42-14**
 displaying 802.1X **40-77**
 displaying PIM **33-27**
 LLDP **27-11**
 LLDP-MED **27-11**
 NetFlow accounting **54-9**
 SNMP input and output **53-17**
 sticky learning
 configuration file **43-5**
 defined **43-5**
 disabling **43-5**
 enabling **43-5**
 saving addresses **43-5**
 sticky MAC addresses
 configuring **43-7**
 defined **43-4**
 Storm Control
 displaying **49-8**
 enabling Broadcast **49-3**
 enabling Multicast **49-4**
 hardware-based, implementing **49-2**
 overview **49-1**
 software-based, implementing **49-3**
 STP
 and REP **20-5**
 bridge ID **18-2**
 configuring **18-7 to 18-20**
 creating topology **18-4**
 defaults **18-6**
 disabling **18-19**
 enabling **18-7**

- enabling extended system ID **18-8**
- enabling Per-VLAN Rapid Spanning Tree **18-20**
- EtherChannel guard
 - disabling **21-7**
- forward-delay time **18-18**
- hello time **18-17**
- Layer 2 protocol tunneling **25-7**
- maximum aging time **18-18**
- overview **18-1, 18-3**
- per-VLAN rapid spanning tree **18-6**
- port cost **18-15**
- port priority **18-13**
- root bridge **18-9**
- stratum, NTP **4-2**
- stub routing (EIGRP)
 - benefits **30-16**
 - configuration tasks **30-16**
 - configuring **30-12**
 - overview **30-12**
 - restrictions **30-16**
 - verifying **30-17**
- subdomains, private VLAN **39-3**
- summer time **4-13**
- supervisor engine
 - accessing the redundant **8-15**
 - configuring **3-8 to 3-13**
 - copying files to standby **8-15**
 - default configuration **3-1**
 - default gateways **3-11**
 - environmental monitoring **10-1**
 - redundancy **9-1**
 - ROM monitor **3-26**
 - startup configuration **3-25**
 - static routes **3-11**
 - synchronizing configurations **8-12**
- Supervisor Engine II-TS
 - insufficient inline power handling **10-19, 11-11**
- SVI Autostate Exclude
 - understanding **30-3**
- SVI Autostate exclude
 - configuring **30-6**
- switched packets
 - and ACLs **47-31**
- Switched Port Analyzer
 - See SPAN
- switching, NetFlow
 - checking for required hardware **54-6**
 - configuration (example) **54-13**
 - configuring switched IP flows **54-8**
 - enabling Collection **54-7**
 - exporting cache entries **54-9**
- switchport
 - show interfaces **6-25, 6-27, 6-33**
- switchport access vlan command **16-6, 16-8**
- switchport block multicast command **48-2**
- switchport block unicast command **48-2**
- switchport mode access command **16-8**
- switchport mode dot1q-tunnel command **25-6**
- switchport mode dynamic command **16-6**
- switchport mode trunk command **16-6**
- switch ports
 - See access ports
- switchport trunk allowed vlan command **16-6**
- switchport trunk encapsulation command **16-6**
- switchport trunk encapsulation dot1q command **16-3**
- switchport trunk encapsulation isl command **16-3**
- switchport trunk encapsulation negotiate command **16-3**
- switchport trunk native vlan command **16-6**
- switchport trunk pruning vlan command **16-7**
- switch-to-RADIUS server communication
 - configuring **40-28**
- sysret command **62-5**
- system
 - reviewing configuration **3-10**
 - settings at startup **3-27**
- system alarms
 - on Sup 2+ to V-10GE **10-5**
 - on Sup 6-E **10-5**

- overview **10-4**
- system and network statistics, displaying **33-23**
- system capabilities TLV **27-2**
- system clock
- configuring
 - daylight saving time **4-13**
 - manually **4-11**
 - summer time **4-13**
 - time zones **4-12**
 - displaying the time and date **4-12**
 - overview **4-2**
 - See also NTP
- system description TLV **27-2**
- system images
- loading from Flash memory **3-30**
 - modifying boot field **3-27**
 - specifying **3-30**
- system message logging
- default configuration **51-3**
 - defining error message severity levels **51-8**
 - disabling **51-4**
 - displaying the configuration **51-12**
 - enabling **51-4**
 - facility keywords, described **51-12**
 - level keywords, described **51-9**
 - limiting messages **51-9**
 - message format **51-2**
 - overview **51-1**
 - sequence numbers, enabling and disabling **51-7**
 - setting the display destination device **51-5**
 - synchronizing log messages **51-6**
 - timestamps, enabling and disabling **51-7**
 - UNIX syslog servers
 - configuring the daemon **51-10**
 - configuring the logging facility **51-11**
 - facilities supported **51-12**
- system MTU
- 802.1Q tunneling **25-5**
 - maximums **25-5**
- system name
- manual configuration **4-15**
 - See also DNS
- system name TLV **27-2**
- system prompt, default setting **4-14**
-
- T**
- TACACS+ **44-1**
- accounting, defined **3-16**
 - authentication, defined **3-16**
 - authorization, defined **3-16**
 - configuring
 - accounting **3-21**
 - authentication key **3-18**
 - authorization **3-21**
 - login authentication **3-19**
 - default configuration **3-18**
 - displaying the configuration **3-22**
 - identifying the server **3-18**
 - limiting the services to the user **3-21**
 - operation of **3-17**
 - overview **3-15**
 - tracking services accessed by user **3-21**
- tagged packets
- 802.1Q **25-3**
 - Layer 2 protocol **25-7**
- TCAM programming algorithm
- changing **47-9**
- TCAM programming algorithm, overview **47-7**
- TCAM programming and ACLs **47-10, 47-12**
- for Sup II-Plus thru V-10GE **47-6**
- TCAM programming and ACLs for Sup 6-E **47-15**
- TCAM region, changing the algorithm **47-9**
- TCAM region, resizing **47-10**
- TDR
- checking cable connectivity **7-3**
 - enabling and disabling test **7-3**
 - guidelines **7-3**

Telnet
 accessing CLI **2-2**
 disconnecting user sessions **7-6**
 executing **7-5**
 monitoring user sessions **7-6**
 telnet command **7-5**
 templates, Ethernet OAM **55-30**
 Terminal Access Controller Access Control System Plus
 See TACACS+

TFTP
 configuration files in base directory **3-5**
 configuring for autoconfiguration **3-4**
 limiting access by servers **53-15**
 TFTP download
 See also console download
 threshold monitoring, IP SLAs **58-6**
 time
 See NTP and system clock
 Time Domain Reflectometer
 See TDR
 time exceeded messages **7-8**
 timer
 See login timer
 timestamps in log messages **51-7**
 time zones **4-12**
 TLV
 host presence detection **40-8**
 TLVs
 defined **1-4, 27-2**
 LLDP-MED **27-2**
 Token Ring
 media not supported (note) **14-5, 14-10**
 Topology change notification processing
 MLD Snooping
 Topology change notification processing **24-4**
 TOS
 description **37-4**
 trace command **7-9**
 traceroute
 See IP traceroute
 See Layer 2 Traceroute
 traceroute mac command **7-11**
 traceroute mac ip command **7-11**
 traffic
 blocking flooded **48-2**
 traffic control
 using ACLs (figure) **47-4**
 using VLAN maps (figure) **47-5**
 traffic marking procedure flowchart **37-76**
 traffic shaping **37-17**
 translational bridge numbers (defaults) **14-5**
 transmit queues
 See QoS transmit queues
 transmit rate **37-52**
 traps
 configuring MAC address notification **4-22**
 configuring MAC move notification **4-24**
 configuring MAC threshold notification **4-26**
 configuring managers **53-11**
 defined **53-3**
 enabling **4-22, 4-24, 4-26, 53-11**
 notification types **53-11**
 overview **53-1, 53-4**
 troubleshooting
 with CiscoWorks **53-4**
 with system message logging **51-1**
 with traceroute **7-8**
 troubleshooting high CPU due to ACLs **47-12**
 trunk ports
 configure port security **43-17**
 configuring PVLAN **39-18 to 39-19**
 trunks
 802.1Q restrictions **16-5**
 configuring **16-6**
 configuring access VLANs **16-6**
 configuring allowed VLANs **16-6**
 default interface configuration **16-6**
 different VTP domains **16-3**

- enabling to non-DTP device **16-4**
- encapsulation **16-3**
- specifying native VLAN **16-6**
- understanding **16-3**
- trusted boundary for QoS **37-22**
- trustpoint **57-3**
- Trust State of interfaces, configuring
- trust states
 - configuring **37-48**
- tunneling
 - defined **25-1**
- tunnel ports
 - 802.1Q, configuring **25-6**
 - described **25-2**
 - incompatibilities with other features **25-5**
- TwinGig Convertors
 - limitations on using **6-14**
 - port numbering **6-14**
 - selecting X2/TwinGig Convertor mode **6-15**
- type length value
 - See TLV
- type of service
 - See TOS

- U**
- UDLD
 - default configuration **28-2**
 - disabling **28-4, 28-5**
 - enabling **28-4**
 - overview **28-1**
- UDP jitter, configuring **58-9**
- UDP jitter operation, IP SLAs **58-9**
- unauthorized ports with 802.1X **40-5**
- unicast
 - See IP unicast
- unicast flood blocking
 - configuring **48-1**
- unicast MAC address filtering
 - and adding static addresses **4-29**
 - and broadcast MAC addresses **4-28**
 - and CPU packets **4-28**
 - and multicast addresses **4-28**
 - and router MAC addresses **4-28**
 - configuration guidelines **4-28**
 - described **4-28**
 - unicast MAC address filtering, configuring
 - ACLs
 - configuring unicast MAC address filtering **47-19**
 - Unicast RPF (Unicast Reverse Path Forwarding)
 - applying **32-5**
 - BGP attributes
 - caution **32-5**
 - CEF
 - requirement **32-2**
 - tables **32-7**
 - configuring **32-9**
 - (examples) **?? to 32-12**
 - BOOTP **32-8**
 - DHCP **32-8**
 - enterprise network (figure) **32-6**
 - prerequisites **32-9**
 - routing table requirements **32-7**
 - tasks **32-9**
 - verifying **32-10**
 - deploying **32-5**
 - description **32-2**
 - disabling **32-11**
 - enterprise network (figure) **32-6**
 - FIB **32-2**
 - implementing **32-4**
 - maintaining **32-10**
 - monitoring **32-10**
 - packets, dropping (figure) **32-4**
 - prerequisites **32-9**
 - restrictions
 - basic **32-8**
 - routing asymmetry **32-7**

- routing asymmetry (figure) [32-8](#)
 - routing table requirements [32-7](#)
 - security policy
 - applying [32-5](#)
 - attacks, mitigating [32-5](#)
 - deploying [32-5](#)
 - tunneling [32-5](#)
 - source addresses, validating
 - (figure) [32-3, 32-4](#)
 - failure [32-4](#)
 - traffic filtering [32-6](#)
 - tunneling [32-5](#)
 - validation
 - failure [32-4](#)
 - packets, dropping [32-4](#)
 - source addresses [32-4](#)
 - verifying [32-10](#)
 - unicast traffic
 - blocking [48-2](#)
 - unidirectional ethernet
 - enabling [29-2](#)
 - example of setting [29-2](#)
 - overview [29-1](#)
 - UniDirectional Link Detection Protocol
 - See UDLD
 - UNIX syslog servers
 - daemon configuration [51-10](#)
 - facilities supported [51-12](#)
 - message logging configuration [51-11](#)
 - UplinkFast
 - and MST [18-23](#)
 - enabling [21-16](#)
 - MST and [18-23](#)
 - overview [21-11](#)
 - User Based Rate Limiting
 - configuring [37-38](#)
 - overview [37-38](#)
 - user EXEC mode [2-5](#)
 - user sessions
 - disconnecting [7-6](#)
 - monitoring [7-6](#)
 - using PACL with access-group mode [47-35](#)
-
- V**
- VACLs
 - Layer 4 port operations [47-15](#)
 - Violation action, configure with 802.1X [40-49](#)
 - virtual configuration register [62-3](#)
 - virtual LANs
 - See VLANs
 - Virtual Private Network
 - See VPN
 - Virtual Switch System(VSS), displaying EtherChannel to [22-15](#)
 - VLAN ACLs
 - See VLAN maps
 - VLAN-based QoS on Layer 2 interfaces, configuring [37-47](#)
 - VLAN blocking, REP [20-12](#)
 - vlan command [14-7](#)
 - vlan dot1q tag native command [25-4](#)
 - VLAN ID, discovering [4-30](#)
 - VLAN load balancing
 - REP [20-4](#)
 - VLAN load balancing, triggering [20-5](#)
 - VLAN load balancing on flex links [19-2](#)
 - configuration guidelines [19-6](#)
 - VLAN Management Policy Server
 - See VMPS
 - VLAN maps
 - applying to a VLAN [47-27](#)
 - configuration example [47-28](#)
 - configuration guidelines [47-24](#)
 - configuring [47-23](#)
 - creating and deleting entries [47-25](#)
 - defined [47-3](#)
 - denying access example [47-29](#)

- denying packets **47-25**
- displaying **47-30**
- order of entries **47-24**
- permitting packets **47-25**
- router ACLs and **47-31**
- using (figure) **47-5**
- using in your network **47-28**
- VLAN maps, PAACL and Router ACLs **47-37**
- VLANs**
 - allowed on trunk **16-6**
 - configuration guidelines **14-3**
 - configuring **14-5**
 - customer numbering in service-provider networks **25-3**
 - default configuration **14-4**
 - description **1-7**
 - extended range **14-3**
 - IDs (default) **14-5**
 - interface assignment **14-8**
 - limiting source traffic with RSPAN **50-23**
 - monitoring with RSPAN **50-22**
 - name (default) **14-5**
 - normal range **14-3**
 - overview **14-1**
 - reserved range **14-3**
 - See also PVLANS
- VLAN Trunking Protocol**
 - See VTP
- VLAN trunks**
 - overview **16-3**
- VMPS**
 - configuration file example **14-33**
 - configuring dynamic access ports on client **14-26**
 - configuring retry interval **14-28**
 - database configuration file **14-33**
 - dynamic port membership
 - example **14-30**
 - reconfirming **14-27**
 - reconfirming assignments **14-27**
 - reconfirming membership interval **14-27**
 - server overview **14-22**
 - VMPS client
 - administering and monitoring **14-29**
 - configure switch
 - configure reconfirmation interval **14-27**
 - dynamic ports **14-26**
 - entering IP VMPS address **14-25**
 - reconfirmation interval **14-28**
 - reconfirm VLAM membership **14-27**
 - default configuration **14-25**
 - dynamic VLAN membership overview **14-24**
 - troubleshooting dynamic port VLAN membership **14-30**
 - VMPS server
 - fall-back VLAN **14-24**
 - illegal VMPS client requests **14-24**
 - overview **14-22**
 - security modes
 - multiple **14-23**
 - open **14-23**
 - secure **14-23**
 - voice interfaces
 - configuring **38-1**
 - Voice over IP
 - configuring **38-1**
 - voice ports
 - configuring VVID **38-3**
 - voice traffic **11-2, 38-5**
 - voice VLAN
 - IP phone data traffic, described **38-2**
 - IP phone voice traffic, described **38-2**
 - voice VLAN ports
 - using 802.1X **40-19**
 - VPN
 - configuring routing in **36-11**
 - forwarding **36-4**
 - in service provider networks **36-1**
 - routes **36-2**

- routing and forwarding table
 - See VRF
 - VRF
 - defining **36-4**
 - tables **36-1**
 - VRF-aware services
 - ARP **36-7, 36-10**
 - configuring **36-6**
 - ftp **36-9**
 - ping **36-7**
 - SNMP **36-7**
 - syslog **36-8**
 - tftp **36-9**
 - traceroute **36-9**
 - uRPF **36-8**
 - VRF-lite
 - description **1-15**
 - VTP
 - client, configuring **14-17**
 - configuration guidelines **14-13**
 - default configuration **14-14**
 - disabling **14-17**
 - Layer 2 protocol tunneling **25-7**
 - monitoring **14-20**
 - overview **14-8**
 - pruning
 - configuring **14-16**
 - See also VTP version 2
 - server, configuring **14-17**
 - statistics **14-20**
 - transparent mode, configuring **14-17**
 - version 2
 - enabling **14-16**
 - VTP advertisements
 - description **14-10**
 - VTP domains
 - description **14-9**
 - VTP modes **14-9**
 - VTP pruning
 - overview **14-11**
 - VTP versions 2 and 3
 - overview **14-10**
 - See also VTP
 - VTY and Network Assistant **13-11**
 - VVID (voice VLAN ID)
 - and 802.1X authentication **40-19**
 - configuring **38-3**
-

W

- Wake-on-LAN
 - configure with 802.1X **40-58**
- WCCP
 - configuration examples **61-9**
 - configuring on a router **61-2, 61-10**
 - features **61-4**
 - restrictions **61-5**
 - service groups **61-6**
- web-based authentication
 - authentication proxy web pages **42-4**
 - description **1-27, 40-13, 42-1**
- web-based authentication, interactions with other features **42-4**
- Web Cache Communication Protocol
 - See WCCP **61-1**
- web caches
 - See cache engines
- web cache services
 - description **61-4**
- web caching
 - See web cache services
- See also WCCP
- web scaling **61-1**