



CONTENTS

Software Features	1-1
Default Settings After Initial Switch Configuration	1-20
Network Configuration Examples	1-23
Where to Go Next	1-37
Understanding Command Modes	1-1
Understanding the Help System	1-3
Understanding Abbreviated Commands	1-3
Understanding no and default Forms of Commands	1-4
Understanding CLI Error Messages	1-4
Using Configuration Logging	1-4
Using Command History	1-5
Using Editing Features	1-6
Searching and Filtering Output of show and more Commands	1-9
Accessing the CLI	1-9
Understanding Cisco Configuration Engine Software	1-1
Understanding Cisco IOS Agents	1-5
Configuring Cisco IOS Agents	1-6
Displaying CNS Configuration	1-14
Understanding the Boot Process	1-1
Assigning Switch Information	1-2
Checking and Saving the Running Configuration	1-16
Modifying the Startup Configuration	1-18
Scheduling a Reload of the Software Image	1-23
Boot Loader Upgrade and Image Verification for the FIPS Mode of Operation	1-25
Restrictions for Switch Stacks	1-1
Understanding Switch Stacks	1-2
Configuring the Switch Stack	1-24
Accessing the CLI of a Specific Stack Member	1-30
Displaying Switch Stack Information	1-30
Troubleshooting Stacks	1-31
Understanding Switch Clusters	1-2

Planning a Switch Cluster	1-4
Using the CLI to Manage Switch Clusters	1-16
Using SNMP to Manage Switch Clusters	1-17
Managing the System Time and Date	1-1
Configuring a System Name and Prompt	1-7
Creating a Banner	1-10
Managing the MAC Address Table	1-12
Managing the ARP Table	1-24
Understanding the SDM Templates	1-1
Configuring the Switch SDM Template	1-5
Displaying the SDM Templates	1-7
Understanding Cisco StackPower	1-2
Configuring Cisco StackPower	1-6
Preventing Unauthorized Access to Your Switch	1-1
Protecting Access to Privileged EXEC Commands	1-2
Controlling Switch Access with TACACS+	1-10
Controlling Switch Access with RADIUS	1-17
Controlling Switch Access with Kerberos	1-39
Configuring the Switch for Local Authentication and Authorization	1-43
Configuring the Switch for Secure Shell	1-44
Configuring the Switch for Secure Socket Layer HTTP	1-48
Configuring the Switch for Secure Copy Protocol	1-54
Understanding IEEE 802.1x Port-Based Authentication	1-1
Configuring 802.1x Authentication	1-37
Displaying 802.1x Statistics and Status	1-76
Understanding Media Access Control Security and MACsec Key Agreement	1-2
Configuring MKA and MACsec	1-6
Understanding Cisco TrustSec MACsec	1-8
Configuring Cisco TrustSec MACsec	1-10
Understanding Web-Based Authentication	1-1
Configuring Web-Based Authentication	1-9
Displaying Web-Based Authentication Status	1-17
Configuration Guidelines and Limitations	1-3
Interface Types	1-1
Using the Switch USB Ports	1-16

Using Interface Configuration Mode	1-20
Using the Ethernet Management Port	1-26
Configuring Ethernet Interfaces	1-30
Configuring Layer 3 Interfaces	1-40
Configuring the System MTU	1-43
Configuring the Power Supplies	1-46
Configuring the Cisco RPS 2300 in a Mixed Stack	1-46
Configuring the Cisco eXpandable Power System (XPS) 2200	1-48
Monitoring and Maintaining the Interfaces	1-51
Understanding VLANs	1-1
Configuring Normal-Range VLANs	1-4
Configuring Extended-Range VLANs	1-10
Displaying VLANs	1-14
Configuring VLAN Trunks	1-14
Configuring VMPS	1-26
Understanding VTP	1-1
Configuring VTP	1-8
Monitoring VTP	1-18
Understanding Voice VLAN	1-1
Configuring Voice VLAN	1-3
Displaying Voice VLAN	1-7
Understanding Private VLANs	1-1
Configuring Private VLANs	1-6
Monitoring Private VLANs	1-15
Understanding IEEE 802.1Q Tunneling	1-1
Configuring IEEE 802.1Q Tunneling	1-4
Understanding Layer 2 Protocol Tunneling	1-8
Configuring Layer 2 Protocol Tunneling	1-11
Monitoring and Maintaining Tunneling Status	1-19
Understanding Spanning-Tree Features	1-1
Configuring Spanning-Tree Features	1-13
Displaying the Spanning-Tree Status	1-25
Understanding MSTP	1-2
Understanding RSTP	1-9
Configuring MSTP Features	1-14

[Displaying the MST Configuration and Status](#) **1-27**
[Understanding Optional Spanning-Tree Features](#) **1-1**
[Configuring Optional Spanning-Tree Features](#) **1-11**
[Displaying the Spanning-Tree Status](#) **1-19**
[Understanding REP](#) **1-1**
[Configuring REP](#) **1-6**
[Monitoring REP](#) **1-13**
[Understanding Flex Links and the MAC Address-Table Move Update](#) **1-1**
[Configuring Flex Links and MAC Address-Table Move Update](#) **1-7**
[Monitoring Flex Links and the MAC Address-Table Move Update](#) **1-14**
[Understanding DHCP Features](#) **1-1**
[Configuring DHCP Features](#) **1-8**
[Displaying DHCP Snooping Information](#) **1-16**
[Understanding IP Source Guard](#) **1-16**
[Configuring IP Source Guard](#) **1-18**
[Displaying IP Source Guard Information](#) **1-26**
[Understanding DHCP Server Port-Based Address Allocation](#) **1-26**
[Configuring DHCP Server Port-Based Address Allocation](#) **1-27**
[Displaying DHCP Server Port-Based Address Allocation](#) **1-29**
[Understanding Dynamic ARP Inspection](#) **1-1**
[Configuring Dynamic ARP Inspection](#) **1-5**
[Displaying Dynamic ARP Inspection Information](#) **1-14**
[Understanding IGMP Snooping](#) **1-2**
[Configuring IGMP Snooping](#) **1-7**
[Displaying IGMP Snooping Information](#) **1-16**
[Understanding Multicast VLAN Registration](#) **1-17**
[Configuring MVR](#) **1-20**
[Displaying MVR Information](#) **1-23**
[Configuring IGMP Filtering and Throttling](#) **1-24**
[Displaying IGMP Filtering and Throttling Configuration](#) **1-29**
[Understanding MLD Snooping](#) **1-1**
[Configuring IPv6 MLD Snooping](#) **1-5**
[Displaying MLD Snooping Information](#) **1-12**
[Understanding CDP](#) **1-1**
[Configuring CDP](#) **1-2**

Monitoring and Maintaining CDP	1-5
Configuring Storm Control	1-1
Configuring Protected Ports	1-6
Configuring Port Blocking	1-7
Configuring Port Security	1-8
Configuring Protocol Storm Protection	1-19
Displaying Port-Based Traffic Control Settings	1-21
Understanding LLDP, LLDP-MED, and Wired Location Service	1-1
Configuring LLDP, LLDP-MED, and Wired Location Service	1-5
Monitoring and Maintaining LLDP, LLDP-MED, and Wired Location Service	1-11
Understanding UDLD	1-1
Configuring UDLD	1-4
Displaying UDLD Status	1-7
Understanding SPAN and RSPAN	1-1
Understanding Flow-Based SPAN	1-11
Configuring SPAN and RSPAN	1-12
Configuring FSPAN and FRSPAN	1-24
Displaying SPAN, RSPAN, FSPAN, and FRSPAN Status	1-28
Understanding RMON	1-1
Configuring RMON	1-2
Displaying RMON Status	1-6
Understanding System Message Logging	1-1
Configuring System Message Logging	1-2
Configuring Smart Logging	1-14
Displaying the Logging Configuration	1-17
Understanding SNMP	1-1
Configuring SNMP	1-6
Displaying SNMP Status	1-19
Understanding Embedded Event Manager	1-1
Configuring Embedded Event Manager	1-6
Displaying Embedded Event Manager Information	1-8
Understanding ACLs	1-2
Configuring IPv4 ACLs	1-7
Creating Named MAC Extended ACLs	1-29
Configuring VLAN Maps	1-32

Using VLAN Maps with Router ACLs 1-40

Displaying IPv4 ACL Configuration 1-44

Understanding QoS 1-2

Configuring Auto-QoS 1-23

Displaying Auto-QoS Information 1-36

Configuring Standard QoS 1-36

Displaying Standard QoS Information 1-91

Understanding IPv6 ACLs 1-2

Configuring IPv6 ACLs 1-4

Displaying IPv6 ACLs 1-8

Understanding EtherChannels 1-1

Configuring EtherChannels 1-11

Displaying EtherChannel, PAgP, and LACP Status 1-22

Understanding Link-State Tracking 1-23

Configuring Link-State Tracking 1-25

Understanding TelePresence E911 IP Phone Support 1-1

Configuring TelePresence E911 IP Phone Support 1-2

Understanding IP Routing 1-2

Steps for Configuring Routing 1-5

Configuring IP Addressing 1-6

Enabling IP Unicast Routing 1-20

Configuring RIP 1-20

Configuring OSPF 1-27

Configuring EIGRP 1-37

Configuring BGP 1-45

Configuring ISO CLNS Routing 1-66

Configuring Multi-VRF CE 1-76

Configuring Unicast Reverse Path Forwarding 1-91

Configuring Protocol-Independent Features 1-91

Monitoring and Maintaining the IP Network 1-106

Understanding IPv6 1-1

Configuring IPv6 1-16

Displaying IPv6 1-39

Understanding HSRP 1-1

Configuring HSRP 1-5

Displaying HSRP Configurations	1-13
Configuring VRRP	1-13
Understanding Cisco IOS IP SLAs	1-2
Configuring IP SLAs Operations	1-6
Monitoring IP SLAs Operations	1-13
Understanding Flexible NetFlow	1-1
Configuring Flexible NetFlow	1-2
Understanding Enhanced Object Tracking	1-1
Configuring Enhanced Object Tracking Features	1-2
Monitoring Enhanced Object Tracking	1-12
Understanding WCCP	1-2
Configuring WCCP	1-5
Monitoring and Maintaining WCCP	1-10
Understanding Cisco's Implementation of IP Multicast Routing	1-2
Multicast Routing and Switch Stacks	1-10
Configuring IP Multicast Routing	1-10
Configuring Advanced PIM Features	1-35
Configuring Optional IGMP Features	1-38
Configuring Optional Multicast Routing Features	1-44
Configuring Basic DVMRP Interoperability Features	1-49
Configuring Advanced DVMRP Interoperability Features	1-54
Monitoring and Maintaining IP Multicast Routing	1-63
Information About Implementing IPv6 Multicast	1-1
Implementing IPv6 Multicast	1-12
Understanding MSDP	1-1
Configuring MSDP	1-3
Monitoring and Maintaining MSDP	1-19
Understanding Fallback Bridging	1-1
Configuring Fallback Bridging	1-3
Monitoring and Maintaining Fallback Bridging	1-10
Recovering from a Software Failure	1-2
Recovering from a Lost or Forgotten Password	1-3
Preventing Switch Stack Problems	1-8
Recovering from a Command Switch Failure	1-9
Recovering from Lost Cluster Member Connectivity	1-12

Preventing Autonegotiation Mismatches	1-13
Troubleshooting Power over Ethernet Switch Ports	1-13
SFP Module Security and Identification	1-14
Monitoring SFP Module Status	1-14
Monitoring Temperature	1-15
Using Ping	1-15
Using Layer 2 Traceroute	1-16
Using IP Traceroute	1-18
Using TDR	1-19
Using Debug Commands	1-20
Using the show platform forward Command	1-22
Using the crashinfo Files	1-24
Using Memory Consistency Check Routines	1-26
Using On-Board Failure Logging	1-26
Troubleshooting Tables	1-29
Understanding Online Diagnostics	1-1
Configuring Online Diagnostics	1-1
Running Online Diagnostic Tests	1-4
Working with the Flash File System	1-1
Working with Configuration Files	1-9
Working with Software Images	1-25
Access Control Lists	1-1
Archive Commands	1-2
ARP Commands	1-2
Boot Loader Commands	1-2
Debug Commands	1-3
Embedded Event Manager	1-3
Embedded Syslog Manager	1-4
Fallback Bridging	1-4
HSRP	1-6
IGMP Snooping Commands	1-6
Interface Commands	1-6
IP Multicast Routing	1-8
IP Unicast Routing	1-9
MAC Address Commands	1-11
Miscellaneous	1-11

MSDP	1-12
Multicast	1-13
NetFlow Commands	1-13
Network Address Translation (NAT) Commands	1-13
QoS	1-14
RADIUS	1-14
SNMP	1-14
Spanning Tree	1-15
VLAN	1-15
VTP	1-15

