New and Changed Information xvii

Preface xix

Audience xix

Organization xix

Document Conventions xx

Related Documentation xxi

Release Notes xxi

Regulatory Compliance and Safety Information xxi

Compatibility Information xxi

Hardware Installation xxi

Software Installation and Upgrade xxii

Cisco NX-OS xxii

Cisco DCNM-SAN xxii

Command-Line Interface xxii

Intelligent Storage Networking Services Configuration Guides xxii

Troubleshooting and Reference xxiii

Obtaining Documentation and Submitting a Service Request xxiii

System Management Overview 1-1

Cisco Fabric Services 1-1

System Messages 1-1

Call Home 1-2

Scheduler 1-2

System Processes and Logs 1-2

Embedded Event Manager 1-2

SNMP 1-3

RMON 1-3

Domain Parameters 1-3

SPAN 1-3

Fabric Configuration Server 1-3

Using the CFS Infrastructure 2-1

Information About CFS 2-1

Cisco MDS NX-OS Features Using CFS 2-2
CFS Features 2-2
Enabling CFS for an Application 2-3
CFS Protocol 2-3
CFS Distribution Scopes 2-3
CFS Distribution Modes 2-4
Uncoordinated Distribution 2-4
Coordinated Distribution 2-4
Unrestricted Uncoordinated Distributions 2-4
CFS Connectivity in a Mixed Fabric 2-4
Locking the Fabric 2-5
Committing Changes 2-5
CFS Merge Support 2-6
CFS Distribution over IP 2-6
Static IP Peers for CFS over IP 2-7
About CFS Regions 2-8
Guidelines and Limitations 2-9
Default Settings 2-9
Configuring CFS 2-9
Disabling CFS Distribution on a Switch 2-10
Committing Changes 2-10
Discarding Changes 2-10
Saving the Configuration 2-10
Clearing a Locked Session 2-11
Enabling CFS over IP 2-11
Configuring IP Multicast Address for CFS over IP 2-12
Configuring Static IP Peers for CFS over IP 2-13
Configuring CFS Regions 2-14
Creating CFS Regions 2-14
Assigning Applications to CFS Regions 2-15
Moving an Application to a Different CFS Region 2-15
Removing an Application from a Region 2-15
Deleting CFS Regions 2-16
Verifying CFS Configurations 2-16
Verifying CFS Distribution Status 2-17
Verifying Application Registration Status 2-17
Verifying CFS Lock Status 2-18
Verifying the CFS over IP Configuration 2-18
Verifying IP Multicast Address Configuration for CFS over IP 2-19

Verifying Static IP Peer Configuration 2-19
Verifying CFS Regions 2-19
Additional References 2-19
MIBs 2-20
Feature History for CFS 2-20

Configuring System Message Logging 3-1

Information About System Message Logging 3-1
System Message Logging 3-3
SFP Diagnostics 3-4
Outgoing System Message Logging Server Facilities 3-4
System Message Logging Configuration Distribution 3-5
Fabric Lock Override 3-5
Guidelines and Limitations 3-5
Default Settings 3-6
Configuring System Message Logging 3-6
Task Flow for Configuring System Message Logging 3-7
Enabling or Disabling Message Logging 3-7
Configuring Console Severity Level 3-7
Configuring Monitor Severity Level 3-8
Configuring Module Logging 3-8
Configuring Facility Severity Levels 3-9
Sending Log Files 3-9
Configuring System Message Logging Servers 3-10
Configuring System Message Logging Distribution 3-11
Fabric Lock Override 3-12
Displaying System Message Logging Information 3-12
Additional References 3-17
MIBs 3-17

Configuring Call Home 4-1

Information About Call Home 4-1
Call Home Features 4-2
About Smart Call Home 4-3
Obtaining Smart Call Home 4-5
Call Home Destination Profiles 4-5
Call Home Alert Groups 4-5
Customized Alert Group Messages 4-6
Call Home Message Level Feature 4-6
Syslog-Based Alerts 4-6

RMON-Based Alerts 4-7
General E-Mail Options Using HTTPS Support 4-7
Multiple SMTP Server Support 4-7
Periodic Inventory Notification 4-8
Duplicate Message Throttle 4-8
Call Home Configuration Distribution 4-8
Fabric Lock Override 4-8
Clearing Call Home Name Server Database 4-9
EMC E-mail Home Delayed Traps 4-9
Event Triggers 4-10
Call Home Message Levels 4-12
Message Contents 4-14
Guidelines and Limitations 4-21
Default Settings 4-22
Configuring Call Home 4-22
Task Flow for Configuring Call Home 4-23
Configuring Contact Information 4-23
Enabling Call Home Function 4-24
Configuring Destination Profiles 4-24
Associating an Alert Group 4-26
Customizing Alert Group Messages 4-28
Setting the Call Home Message Levels 4-29
Configuring the Syslog-Based Alerts 4-29
Configuring RMON Alerts 4-30
Configuring Event Trap Notifications 4-30
Configuring General E-Mail Options 4-30
Configuring HTTPS Support 4-31
Enable or Disable Transport Method 4-31
Configuring an HTTP Proxy Server 4-32
Configuring SMTP Server and Ports 4-34
Configuring Multiple SMTP Server Support 4-34
Enabling Periodic Inventory Notifications 4-35
Configuring Duplicate Message Throttle 4-35
Enabling Call Home Fabric Distribution 4-36
Fabric Lock Override 4-37
Call Home Communications Test 4-37
Configuring Delayed Traps 4-37
Verifying Call Home Configuration 4-38
Displaying Call Home Information 4-38

Displaying Delayed Trap Information 4-40
Verifying Alert Group Customization 4-40
Verifying Event Notification Trap 4-40
Verifying Call Home Transport 4-41
Verifying the Number of Name Server Database Entries 4-41
Monitoring Call Home 4-41
Sample Syslog Alert Notification in Full-txt Format 4-42
Sample Syslog Alert Notification in XML Format 4-42
Sample RMON Notification in XML Format 4-45
Additional References 4-46
MIBs 4-47
Feature History for Call Home 4-47

Scheduling Maintenance Jobs 5-1

Information About the Command Scheduler 5-1
Scheduler Terminology 5-1
Licensing Requirements for Command Scheduler 5-2
Guidelines and Limitations 5-2
Default Settings 5-2
Configuring the Command Scheduler 5-3
Task Flow for Configuring the Command Scheduler 5-3
Enabling the Command Scheduler 5-3
Configuring Remote User Authentication 5-4
Defining a Job 5-4
Deleting a Job 5-6
Specifying a Schedule 5-6
Specifying a One-Time Schedule 5-7
Deleting a Schedule 5-8
Removing an Assigned Job 5-8
Deleting a Schedule Time 5-8
Configuring Execution Logs 5-8
Clearing the Execution Log File Contents 5-9
Verifying Scheduler Configuration 5-9
Verifying the Command Scheduler Configuration 5-9
Verifying the Command Scheduler Execution Status 5-10
Verifying the Job Definition 5-10
Displaying Execution Log File Contents 5-10
Clearing the Execution Log File Contents 5-11

Configuring the Embedded Event Manager 6-1

Information About EEM 6-1

EEM Overview 6-2

Policies 6-2

Event Statements 6-3

Action Statements 6-4

VSH Script Policies 6-4

Environment Variables 6-5

High Availability 6-5

Licensing Requirements for EEM 6-5

Prerequisites for EEM 6-5

Guidelines and Limitations 6-5

Default Settings 6-6

Configuring EEM 6-6

Defining a User Policy Using the CLI 6-6

Configuring Event Statements 6-7

Configuring Action Statements 6-9

Defining a Policy Using a VSH Script 6-10

Registering and Activating a VSH Script Policy 6-11

Overriding a Policy 6-11

Defining an Environment Variable 6-12

Verifying the EEM Configuration 6-12

Configuration Examples for EEM 6-13

Additional References 6-13

MIBs 6-13

Feature History for EEM 6-13

Monitoring System Processes and Logs 7-1

Information About System Processes and Logs 7-1

Saving Cores 7-2

Saving the Last Core to Bootflash 7-2

First and Last Core 7-2

Online System Health Management 7-2

Loopback Test Configuration Frequency 7-3

Loopback Test Configuration Frame Length 7-3

Hardware Failure Action 7-4

Performing Test Run Requirements 7-4

Tests for a Specified Module 7-4

Clearing Previous Error Reports 7-5

Interpreting the Current Status 7-5
On-Board Failure Logging 7-6
Default Settings 7-7
Core and Log Files 7-7
Saving Cores 7-7
Clearing the Core Directory 7-8
Configuring System Health 7-8
Task Flow for Configuring System Health 7-9
Enabling System Health Initiation 7-9
Configuring Loopback Test Configuration Frequency 7-10
Cofiguring Loopback Test Configuration Frame Length 7-10
Configuring Hardware Failure Action 7-10
Performing Test Run Requirements 7-11
Clearing Previous Error Reports 7-11
Performing Internal Loopback Tests 7-11
Performing External Loopback Tests 7-12
Performing Serdes Loopbacks 7-13
Configuring On-Board Failure Logging 7-14
Configuring OBFL for the Switch 7-14
Configuring OBFL for a Module 7-15
Clearing the Module Counters 7-15
Verifying System Processes and Logs Configuration 7-17
Displaying System Processes 7-17
Displaying System Status 7-20
Displaying Core Status 7-22
Verifying First and Last Core Status 7-23
Displaying System Health 7-23
Verifying Loopback Test Configuration Frame Length 7-26
Displaying OBFL for the Switch 7-26
Displaying the OBFL for a Module 7-26
Displaying OBFL Logs 7-27
Displaying the Module Counters Information 7-27
Additional References 7-28
MIBs 7-28
Feature History for System Processes and Logs 7-28

Configuring RMON 8-1

Information About RMON 8-1
RMON Configuration Information 8-2

RMON Configuration Using Threshold Manager 8-2
RMON Alarm Configuration Information 8-2
Default Settings 8-3
Configuring RMON 8-3
Configuring the RMON Traps in SNMP 8-3
Configuring the RMON Alarm 8-4
Configuring the RMON Event 8-4
Verifying the RMON Configuration 8-5
Additional References 8-6
MIBs 8-6
Feature History for RMON 8-6

Configuring Online Diagnostics 9-1
Information About Online Diagnostics 9-1
Online Diagnostic Overview 9-2
Bootup Diagnostics 9-2
Runtime or Health Monitoring Diagnostics 9-3
On-Demand Diagnostics 9-5
High Availability 9-5
Licensing Requirements for Online Diagnostics 9-5
Guidelines and Limitations 9-5
Default Settings 9-5
Configuring Online Diagnostics 9-6
Setting the Bootup Diagnostic Level 9-6
Activating a Diagnostic Test 9-6
Setting a Diagnostic Test as Inactive 9-8
Starting or Stopping an On-Demand Diagnostic Test 9-8
Clearing Diagnostic Results 9-9
Simulating Diagnostic Results 9-9
Verifying the Online Diagnostics Configuration 9-10
Configuration Examples for Online Diagnostics 9-10
Additional References 9-10
Related Documents 9-11
Feature History for Online Diagnostics 9-11

Configuring SNMP 10-1
Information About SNMP Security 10-1
SNMP Version 1 and Version 2c 10-2
SNMP Version 3 10-2

SNMPv3 CLI User Management and AAA Integration 10-3
CLI and SNMP User Synchronization 10-3
Restricting Switch Access 10-3
Group-Based SNMP Access 10-4
Creating and Modifying Users 10-4
AES Encryption-Based Privacy 10-4
Enabling SNMP Notifications 10-5
LinkUp/LinkDown Notifications for Switches 10-5
Scope of LinkUp and LinkDown Trap Settings 10-5
Default Settings 10-6
Configuring SNMP 10-6
Assigning SNMP Switch Contact and Location Information 10-6
Configuring SNMP Users from the CLI 10-7
Enforcing SNMPv3 Message Encryption 10-8
Assigning SNMPv3 Users to Multiple Roles 10-9
Adding Communities 10-9
Configuring SNMP Trap and Inform Notifications 10-9
Configuring SNMPv2c Notifications 10-10
Configuring SNMPv3 Notifications 10-11
Enabling SNMP Notifications 10-12
Configuring the Notification Target User 10-13
Configuring LinkUp/LinkDown Notifications for Switches 10-14
Configuring Up/Down SNMP Link-State Traps for Interfaces 10-15
Configuring Entity (FRU) Traps 10-16
Verifying SNMP Configuration 10-17
Viewing the Up/Down SNMP Link-State Traps for Interfaces 10-17
Displaying SNMP Traps 10-18
Displaying SNMP Security Information 10-19
Additional References 10-21
MIBs 10-21
Feature History for SNMP 10-22

Configuring Domain Parameters 11-1

Information About Fibre Channel Domains 11-1
Domain Restart 11-3
Domain Manager Fast Restart 11-3
Switch Priority 11-4
fcdomain Initiation 11-4
Incoming RCFs 11-4

Autoreconfiguring Merged Fabrics 11-4
Domain IDs 11-4
Specifying Static or Preferred Domain IDs 11-6
Allowed Domain ID Lists 11-6
CFS Distribution of Allowed Domain ID Lists 11-7
Contiguous Domain ID Assignments 11-7
Locking the Fabric 11-7
Committing Changes 11-7
Clearing a Fabric Lock 11-7
FC IDs 11-8
Persistent FC IDs 11-8
Persistent FC ID Configuration 11-8
About Unique Area FC IDs for HBAs 11-9
Persistent FC ID Selective Purging 11-9
Guidelines and Limitations 11-9
Default Settings 11-9
Configuring Fibre Channel Domains 11-11
Restarting a Domain 11-11
Enabling Domain Manager Fast Restart 11-12
Configuring Switch Priority 11-12
Enabling or Disabling fcdomains 11-12
Configuring Fabric Names 11-13
Rejecting Incoming RCFs 11-13
Enabling Autoreconfiguration 11-14
Configuring Domain IDs 11-14
Specifying Static or Preferred Domain IDs 11-14
Configuring Allowed Domain ID Lists 11-15
Enabling Allowed Domain ID Distribution 11-16
Committing Changes 11-16
Discarding Changes 11-16
Enabling Contiguous Domain ID Assignments 11-17
Configuring FC IDs 11-17
Enabling the Persistent FC ID Feature 11-17
Configuring Persistent FC IDs 11-18
Configuring Unique Area FC IDs for an HBA 11-19
Purging Persistent FC IDs 11-20
Clearing a Fabric Lock 11-20
Verifying FC Domain Configuration 11-20
Displaying CFS Distribution Status 11-21

Displaying Pending Changes 11-21
Displaying Session Status 11-22
Displaying fcdomain Information 11-22
Feature History for Domain Parameters 11-25
11-25

Monitoring Network Traffic Using SPAN 12-1
Information About SPAN 12-1
SPAN Sources 12-3
IPS Source Ports 12-3
Allowed Source Interface Types 12-4
VSAN as a Source 12-4
SPAN Sessions 12-4
Specifying Filters 12-5
SD Port Characteristics 12-5
SPAN Conversion Behavior 12-5
Monitoring Traffic Using Fibre Channel Analyzers 12-6
Monitoring Without SPAN 12-7
Monitoring with SPAN 12-7
Single SD Port to Monitor Traffic 12-8
SD Port Configuration 12-9
Mapping the FC Tunnel 12-9
Creating VSAN Interfaces 12-10
Remote SPAN 12-10
Advantages of Using RSPAN 12-11
FC and RSPAN Tunnels 12-11
ST Port Configuration 12-12
ST Port Characteristics 12-12
Creating Explicit Paths 12-13
Guidelines and Limitations 12-13
Default SPAN and RSPAN Settings 12-15
Configuring SPAN 12-15
Configuring SD Ports for SPAN 12-16
Configuring SPAN max-queued-packets 12-17
Configuring SPAN for Generation 2 Fabric Switches 12-18
Suspending and Reactivating SPAN Sessions 12-19
Encapsulating Frames 12-20
Configuring Fibre Channel Analyzers Using SPAN 12-20
Configuring Single SD Port to Monitor Traffic 12-21

Configuring the Source Switch 12-22
Creating VSAN Interfaces 12-22
Enabling FC Tunnels 12-22
Initiating the FC Tunnel 12-23
Configuring the ST Port 12-23
Configuring an RSPAN Session 12-23
Configuring All Intermediate Switches 12-24
Configuring VSAN Interfaces 12-24
Enabling IP Routing 12-24
Configuring the Destination Switch 12-24
Configuring VSAN Interfaces 12-25
Configuring the SD Port 12-25
Mapping the FC Tunnel 12-25
Creating Explicit Paths 12-26
Monitoring RSPAN Traffic 12-27
Verifying SPAN Configuration 12-27
Displaying SPAN Information 12-28
Displaying RSPAN Information 12-29
Configuration Examples for RSPAN 12-31
Single Source with One RSPAN Tunnel 12-32
Single Source with Multiple RSPAN Tunnels 12-32
Multiple Sources with Multiple RSPAN Tunnels 12-32

Configuring Fabric Configuration Server 13-1

Information About FCS 13-1
Significance of FCS 13-2
Default Settings 13-3
Configuring FCS 13-3
Specifying a FCS Name 13-3
Verifying FCS Configuration 13-4
Displaying FCS Elements 13-5
Additional References 13-8
MIBs 13-8

INDEX