CHAPTER 4

Initial Configuration

This chapter describes how to initially configure switches so they can be accessed by other devices. This chapter includes the following sections:

Starting a Switch in the Cisco MDS 9000 Family

The following procedure is a review of the tasks you should have completed during hardware installation, including starting up the switch. These tasks must be completed before you can configure the switch.

Before you can configure a switch, follow these steps:

Step 1 Verify the following physical connections for the new Cisco MDS 9000 Family switch:

- The console port is physically connected to a computer terminal (or terminal server).
- The management 10/100 Ethernet port (mgmt0) is connected to an external hub, switch, or router.

Refer to the *Cisco MDS 9000 Family Hardware Installation Guide* (for the required product) for more information.

Tip Save the host ID information for future use (for example, to enable licensed features). The host ID information is provided in the Proof of Purchase document that accompanies the switch.

Step 2 Verify that the default console port parameters are identical to those of the computer terminal (or terminal server) attached to the switch console port:

- 9600 baud
- 8 data bits
- 1 stop bit
- No parity

Note On Cisco terminal servers, issue the following commands starting in EXEC mode:

```
switch# config t
switch(config)# no flush-at-activation
switch(config)# exit
switch# copy running-config startup-config
```

This configuration ensures that the MDS switch does not receive random characters that might cause it to hang.

Step 3 Power on the switch. The switch boots automatically and the `switch#` prompt appears in your terminal window.

Initial Setup Routine

The first time that you access a switch in the Cisco MDS 9000 Family, it runs a setup program that prompts you for the IP address and other configuration information necessary for the switch to communicate over the supervisor module Ethernet interface. This information is required to configure and manage the switch.

Note The IP address can only be configured from the CLI. When you power up the switch for the first time assign the IP address. After you perform this step, the Cisco MDS 9000 Family Fabric Manager can reach the switch through the console port.

Preparing to Configure the Switch

Before you configure a switch in the Cisco MDS 9000 Family for the first time, you need the following information:

- Administrator password, including:
  - Creating a password for the administrator (required).
  - Creating an additional login account and password (optional).
- IP address for the switch management interface—The management interface can be an out-of-band Ethernet interface or an in-band Fibre Channel interface (recommended).
- Subnet mask for the switch's management interface (optional).
- IP addresses, including:
  - Destination prefix, destination prefix subnet mask, and next hop IP address, if you want to enable IP routing. Also, provide the IP address of the default network (optional).
  - Otherwise, provide an IP address of the default gateway (optional).
- SSH service on the switch—To enable this optional service, select the type of SSH key (dsa/rsa/rsa1) and number of key bits (768 to 2048).
- DNS IP address (optional).
- Default domain name (optional).
- NTP server IP address (optional).
- SNMP community string (optional).
- Switch name—This is your switch prompt (optional).

Note Be sure to configure the IP route, the IP default network address, and the IP default gateway address to enable SNMP access. If IP routing is enabled, the switch uses the IP route and the default network IP address. If IP routing is disabled, the switch uses the default gateway IP address.

Default Login

All Cisco MDS 9000 Family switches have the network administrator as a default user (admin). You cannot change the default user at any time (see the "Role-Based Authorization" section on page 26-1).

There is no default password so you must explicitly configure a strong password. If a password is trivial (short, easy-to-decipher), your password configuration is rejected. Be sure to configure a strong password (see the "Characteristics of Strong Passwords" section on page 26-10). If you configure and subsequently forget this new password, you have the option to recover this password (see the "Recovering the Administrator Password" section on page 26-17).

Note If you issue a **write erase** command and reload the switch, you must reconfigure the default user (admin) password using the setup procedure.

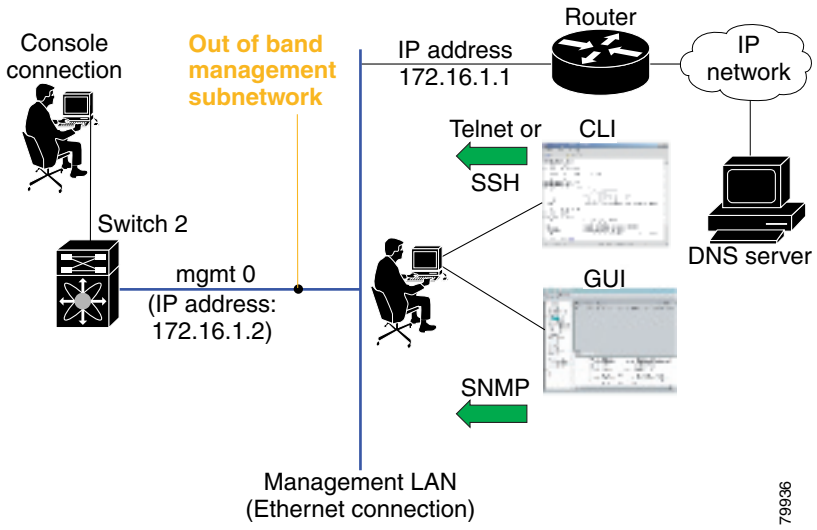
Setup Options

The setup scenario differs based on the subnet to which you are adding the new switch. You must configure a Cisco MDS 9000 Family switch with an IP address to enable management connections from outside of the switch.

Note Some concepts such as out-of-band management and in-band management are briefly explained here. These concepts are explained in more detail in subsequent chapters.

- Out-of-band management—This feature provides a connection to the network through a supervisor module front panel Ethernet port (see Figure 4-1).
- In-band management—This feature provides IP over Fibre Channel (IPFC) to manage the switches. The in-band management feature is transparent to the network management system (NMS). Instead of conventional Ethernet physical media, switches in the Cisco MDS 9000 Family use IPFC as the transport mechanism (see Figure 4-1 and Chapter 36, "Configuring IP Services").

Figure 4-1 Management Access to Switches



Assigning Setup Information

This section describes how to initially configure the switch for both out-of-band and in-band management.

Note Press **Ctrl-C** at any prompt to skip the remaining configuration options and proceed with what is configured until that point. Entering the new password for the administrator is a requirement and cannot be skipped. See the "Characteristics of Strong Passwords" section on page 26-10.

Tip If you do not wish to answer a previously configured question, or if you wish to skip answers to any questions, press **Enter**. If a default answer is not available (for example, switch name), the switch uses what was previously configured and skips to the next question.

Configuring Out-of-Band Management

Note You can configure both in-band and out-of-band configuration together by entering **Yes** in both Step 11c. and Step 11d. in the following procedure.

To configure the switch for first time out-of-band access, follow these steps:

Step 1 Power on the switch. Switches in the Cisco MDS 9000 Family boot automatically.

Step 2 Enter the new password for the administrator.

```
Enter the password for admin: 2004AsdfLkjh18
```

Tip If a password is trivial (short, easy-to-decipher), your password configuration is rejected. Be sure to configure a strong password as shown in the sample configuration. Passwords are case-sensitive. You must explicitly configure a password that meets the requirements listed in the "Characteristics of Strong Passwords" section on page 26-10.

Step 3 Enter **yes** to enter the setup mode.

```
This setup utility will guide you through the basic configuration of the system. Setup
configures only enough connectivity for management of the system.

Please register Cisco MDS 9000 Family devices promptly with your supplier. Failure to
register may affect response times for initial service calls. MDS devices must be
registered to receive entitled support services.

Press Enter incase you want to skip any dialog. Use ctrl-c at anytime to skip away
remaining dialogs.

Would you like to enter the basic configuration dialog (yes/no): yes
```

The setup utility guides you through the basic configuration process. Press **Ctrl-C** at any prompt to end the configuration process.

Step 4 Enter the new password for the administrator (admin is the default).

```
Enter the password for admin: admin
```

Step 5 Enter **yes** (no is the default) to create additional accounts.

```
Create another login account (yes/no) [n]: yes
```

While configuring your initial setup, you can create an additional user account (in the network-admin role) besides the administrator's account. See the "Role-Based Authorization" section on page 26-1 for information on default roles and permissions.

Note User login IDs must contain non-numeric characters.

a. Enter the user login ID.

```
Enter the user login ID: user_name
```

b. Enter the user password.

```
Enter the password for user_name: user-password
```

Step 6 Enter **yes** (yes is the default) to create an SNMPv3 account.

```
Configure SNMPv3 Management parameters (yes/no) [y]: yes
```

a. Enter the user name (admin is the default).

```
SNMPv3 user name [admin]: admin
```

b. Enter the SNMPv3 password (minimum of eight characters). The default is **admin123**.

```
SNMPv3 user authentication password: admin_pass
```

Note By default, if the admin password is at least eight characters, then the SNMP authentication password is the same as the admin password (at least eight characters). If the admin password is less than eight characters, then you need to provide a new password for SNMP.
The admin password can have a minimum of one character, but the SNMP authentication password must have a minimum of eight characters.

Step 7 Enter **yes** (no is the default) to configure the read-only or read-write SNMP community string.

```
Configure read-only SNMP community string (yes/no) [n]: yes
```

a. Enter the SNMP community string.

```
SNMP community string: snmp_community
```

Step 8 Enter a name for the switch.

Note The switch name is limited to 32 alphanumeric characters. The default is **switch**.

```
Enter the switch name: switch_name
```

Step 9 Enter **yes** (yes is the default) to configure out-of-band management.

```
Continue with Out-of-band (mgmt0) management configuration? [yes/no]: yes
```

a. Enter the mgmt0 IP address.

```
Mgmt0 IP address: ip_address
```

b. Enter the mgmt0 subnet mask.

```
Mgmt0 IP netmask: subnet_mask
```

Step 10 Enter **yes** (yes is the default) to configure the default gateway (recommended).

```
Configure the default-gateway: (yes/no) [y]: yes
```

a. Enter the default gateway IP address.

```
IP address of the default-gateway: default_gateway
```

Step 11 Enter **yes** (**no** is the default) to configure advanced IP options such as inband management, static routes, default network, DNS and domain name.

```
Configure Advanced IP options (yes/no)? [n]: yes
```

a. Enter **no** (no is the default) at the in-band management configuration prompt.

```
Continue with in-band (VSAN1) management configuration? (yes/no) [no]: no
```

b. Enter **yes** (yes is the default) to enable IP routing capabilities.

```
Enable the ip routing? (yes/no) [y]: yes
```

c. Enter **yes** (yes is the default) to configure a static route (recommended).

```
Configure static route: (yes/no) [y]: yes
```

Enter the destination prefix.

```
Destination prefix: dest_prefix
```

Type the destination prefix mask.

```
Destination prefix mask: dest_mask
```

Type the next hop IP address.

```
Next hop ip address: next_hop_address
```

Note Be sure to configure the IP route, the default network IP address, and the default gateway IP address to enable SNMP access. If IP routing is enabled, the switch uses the IP route and the default network IP address. If IP routing is disabled, the switch uses the default gateway IP address.

d. Enter **yes** (yes is the default) to configure the default network (recommended).

```
Configure the default network: (yes/no) [y]: yes
```

Enter the default network IP address.

Note The default network IP address is the destination prefix provided in Step 11c .

```
Default network IP address [dest_prefix]: dest_prefix
```

e. Enter **yes** (yes is the default) to configure the DNS IP address.

```
Configure the DNS IP address? (yes/no) [y]: yes
```

Enter the DNS IP address.

```
DNS IP address: name_server
```

f. Enter **yes** (default is no) to configure the default domain name.

```
Configure the default domain name? (yes/no) [n]: yes
```

Enter the default domain name.

```
Default domain name: domain_name
```

Step 12 Enter **yes** (yes is the default) to enable Telnet service.

```
Enable the telnet service? (yes/no) [y]: yes
```

Step 13 Enter **yes** (no is the default) to enable the SSH service.

```
Enabled SSH service? (yes/no) [n]: yes
```

Step 14 Enter the SSH key type (see the "Generating the SSH Server Key Pair" section on page 26-14) that you would like to generate.

```
Type the SSH key you would like to generate (dsa/rsa/rsa1)? dsa
```

Step 15 Enter the number of key bits within the specified range.

```
Enter the number of key bits? (768 to 2048): 768
```

Step 16 Enter **yes** (no is the default) to configure the NTP server.

```
Configure NTP server? (yes/no) [n]: yes
```

a. Enter the NTP server IP address.

```
NTP server IP address: ntp_server_IP_address
```

Step 17 Enter **shut** (shut is the default) to configure the default switchport interface to the shut state.

```
Configure default switchport interface state (shut/noshut) [shut]: shut
```

Note The management ethernet interface is not shut down at this point—only the Fibre Channel, iSCSI, FCIP, and Gigabit Ethernet interfaces are shut down.

Step 18 Enter **on** (on is the default) to configure the switchport trunk mode.

```
Configure default switchport trunk mode (on/off/auto) [on]: on
```

Step 19 Enter **on** (off is the default) to configure the PortChannel auto-create state.

```
Configure default port-channel auto-create state (on/off) [off]: on
```

Step 20 Enter **permit** (deny is the default) to deny a default zone policy configuration.

```
Configure default zone policy (permit/deny) [deny]: permit
```

Permits traffic flow to all members of the default zone.

Step 21 Enter **yes** (no is the default) to enable a full zone set distribution (see the "Zone Set Distribution" section on page 19-11).

```
Enable full zoneset distribution (yes/no) [n]: yes
```

Overrides the switch-wide default for the full zone set distribution feature.

You see the new configuration. Review and edit the configuration that you have just entered.

Step 22 Enter **no** (no is the default) if you are satisfied with the configuration.

```
The following configuration will be applied:
  username admin password admin_pass role network-admin
  username user_name password user_pass role network-admin
  snmp-server community snmp_community ro
  switchname switch
  interface mgmt0
    ip address ip_address subnet_mask
    no shutdown
  ip routing
  ip route dest_prefix dest_mask dest_address
  ip default-network dest_prefix
  ip default-gateway default_gateway
  ip name-server name_server
  ip domain-name domain_name
  telnet server enable
  ssh key dsa 768 force
  ssh server enable
  ntp server ipaddr ntp_server
  system default switchport shutdown
  system default switchport trunk mode on
  system default port-channel auto-create
  zone default-zone permit vsan 1-4093
  zoneset distribute full vsan 1-4093

Would you like to edit the configuration? (yes/no) [n]: no
```

Step 23 Enter **yes** (yes is default) to use and save this configuration:

```
Use this configuration and save it? (yes/no) [y]: yes
```

Caution If you do not save the configuration at this point, none of your changes are updated the next time the switch is rebooted. Type **yes** in order to save the new configuration. This ensures that the kickstart and system images are also automatically configured (see Chapter 6, "Software Images").

Configuring In-Band Management

The in-band management logical interface is VSAN 1. This management interface uses the Fibre Channel infrastructure to transport IP traffic. An interface for VSAN 1 is created on every switch in the fabric. Each switch should have its VSAN 1 interface configured with an IP address in the same subnetwork. A default route that points to the switch providing access to the IP network should be configured on every switch in the Fibre Channel fabric (see Chapter 16, "Configuring and Managing VSANs").

Note You can configure both in-band and out-of-band configuration together by entering **Yes** in both Step 9c. and Step 9d. in the following procedure.

To configure a switch for first time in-band access, follow these steps:

Step 1 Power on the switch. Switches in the Cisco MDS 9000 Family boot automatically.

Step 2 Enter the new password for the administrator.

```
Enter the password for admin: 2004asdf*lkjh18
```

Tip If a password is trivial (short, easy-to-decipher), your password configuration is rejected. Be sure to configure a strong password as shown in the sample configuration. Passwords are case-sensitive. You must explicitly configure a password that meets the requirements listed in the "Characteristics of Strong Passwords" section on page 26-10.

Step 3 Enter **yes** to enter the setup mode.

```
This setup utility will guide you through the basic configuration of the system. Setup
configures only enough connectivity for management of the system.

Please register Cisco MDS 9000 Family devices promptly with your supplier. Failure to
register may affect response times for initial service calls. MDS devices must be
registered to receive entitled support services.

Press Enter incase you want to skip any dialog. Use ctrl-c at anytime to skip away
remaining dialogs.

Would you like to enter the basic configuration dialog (yes/no): yes
```

The setup utility guides you through the basic configuration process. Press **Ctrl-C** at any prompt to end the configuration process.

Step 4 Enter **no** (no is the default) if you do not wish to create additional accounts.

```
Create another login account (yes/no) [no]: no
```

Step 5 Configure the read-only or read-write SNMP community string.

a. Enter **no** (no is the default) to avoid configuring the read-only SNMP community string.

```
Configure read-only SNMP community string (yes/no) [n]: no
```

b. Enter **no** (no is the default) to configure the read-only SNMP community string.

```
Configure read-only SNMP community string (yes/no) [n]: yes
```

c. Enter the SNMP community string.

```
SNMP community string: snmp_community
```

Step 6 Enter a name for the switch.

Note The switch name is limited to 32 alphanumeric characters. The default is **switch**.

```
Enter the switch name: switch_name
```

Step 7 Enter **no** (yes is the default) at the configuration prompt to configure out-of-band management.

```
Continue with Out-of-band (mgmt0) management configuration? [yes/no]: no
```

Step 8 Enter **yes** (yes is the default) to configure the default gateway.

```
Configure the default-gateway: (yes/no) [y]: yes
```

a. Enter the default gateway IP address.

```
IP address of the default gateway: default_gateway
```

Step 9 Enter **yes** (**no** is the default) to configure advanced IP options such as Inband management, static routes, default network, dns and domain name.

```
Configure Advanced IP options (yes/no)? [n]: yes
```

a. Enter **yes** (no is the default) at the in-band management configuration prompt.

```
Continue with in-band (VSAN1) management configuration? (yes/no) [no]: yes
```

Enter the VSAN 1 IP address.

```
VSAN1 IP address: ip_address
```

Enter the subnet mask.

```
VSAN1 IP net mask: subnet_mask
```

b. Enter **no** (yes is the default) to enable IP routing capabilities.

```
Enable ip routing capabilities? (yes/no) [y]: no
```

c. Enter **no** (yes is the default) to configure a static route.

```
Configure static route: (yes/no) [y]: no
```

d. Enter **no** (yes is the default) to configure the default network.

```
Configure the default-network: (yes/no) [y]: no
```

e. Enter **no** (yes is the default) to configure the DNS IP address.

```
Configure the DNS IP address? (yes/no) [y]: no
```

f. Enter **no** (no is the default) to skip the default domain name configuration.

```
Configure the default domain name? (yes/no) [n]: no
```

Step 10 Enter **no** (yes is the default) to disable Telnet service.

```
Enable the telnet service? (yes/no) [y]: no
```

Step 11 Enter **yes** (no is the default) to enable the SSH service.

```
Enabled SSH service? (yes/no) [n]: yes
```

Step 12 Enter the SSH key type (see the "Generating the SSH Server Key Pair" section on page 26-14) that you would like to generate.

```
Type the SSH key you would like to generate (dsa/rsa/rsa1)? rsa
```

Step 13 Enter the number of key bits within the specified range.

```
Enter the number of key bits? (768 to 1024): 1024
```

Step 14 Enter **no** (no is the default) to configure the NTP server.

```
Configure NTP server? (yes/no) [n]: no
```

Step 15 Enter **shut** (shut is the default) to configure the default switchport interface to the shut state.

```
Configure default switchport interface state (shut/noshut) [shut]: shut
```

Note The management Ethernet interface is not shut down at this point—only the Fibre Channel, iSCSI, FCIP, and Gigabit Ethernet interfaces are shut down.

Step 16 Enter **auto** (off is the default) to configure the switchport trunk mode.

```
Configure default switchport trunk mode (on/off/auto) [off]: auto
```

Step 17 Enter **off** (off is the default) to configure the PortChannel auto-create state.

```
Configure default port-channel auto-create state (on/off) [off]: off
```

Step 18 Enter **deny** (deny is the default) to deny a default zone policy configuration.

```
Configure default zone policy (permit/deny) [deny]: deny
```

Denies traffic flow to all members of the default zone.

Step 19 Enter **no** (no is the default) to disable a full zone set distribution (see the "Zone Set Distribution" section on page 19-11).

```
Enable full zoneset distribution (yes/no) [n]: no
```

Disables the switch-wide default for the full zone set distribution feature.

You see the new configuration. Review and edit the configuration that you have just entered.

Step 20 Enter **no** (no is the default) if you are satisfied with the configuration.

```
The following configuration will be applied:
  username admin password admin_pass role network-admin
  snmp-server community snmp_community rw
  switchname switch
  interface vsan1
    ip address ip_address subnet_mask
    no shutdown
  ip default-gateway default_gateway
  no telnet server enable
  ssh key rsa 1024 force
  ssh server enable
  no system default switchport shutdown
  system default switchport trunk mode auto
  no zone default-zone permit vsan 1-4093
  no zoneset distribute full vsan 1-4093

Would you like to edit the configuration? (yes/no) [n]: no
```

Step 21 Enter **yes** (yes is default) to use and save this configuration.

```
Use this configuration and save it? (yes/no) [y]: yes
```

Caution If you do not save the configuration at this point, none of your changes are updated the next time the switch is rebooted. Type **yes** in order to save the new configuration. This ensures that the kickstart and system images are also automatically configured (see Chapter 6, "Software Images").

Using the setup Command

To make changes to the initial configuration at a later time, you can issue the **setup** command in EXEC mode.

```
switch# setup
---- Basic System Configuration Dialog ----
This setup utility will guide you through the basic configuration of
the system. Setup configures only enough connectivity for management
of the system.
*Note: setup always assumes a predefined defaults irrespective
of the current system configuration when invoked from CLI.

Press Enter incase you want to skip any dialog. Use ctrl-c at anytime
to skip away remaining dialogs.

Would you like to enter the basic configuration dialog (yes/no): yes
```

The setup utility guides you through the basic configuration process.

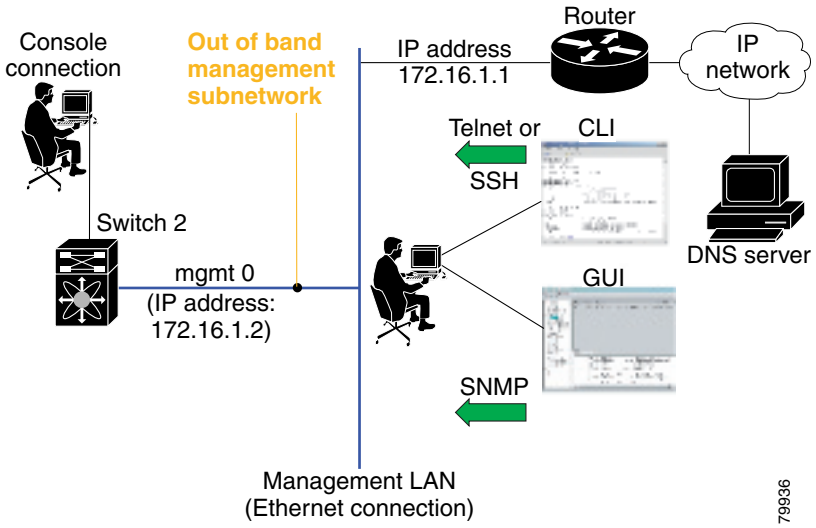
Accessing the Switch

After initial configuration, you can access the switch in one of three ways (see Figure 4-2):

- Serial console access—You can use a serial port connection to access the CLI.
- In-band IP (IPFC) access—You can use Telnet or SSH to access a switch in the Cisco MDS 9000 Family or use SNMP to connect to a Cisco MDS 9000 Fabric Manager application.
- Out-of-band (10/100BASE-T Ethernet) access—You can use Telnet or SSH to access a switch in the Cisco MDS 9000 Family or use SNMP to connect to a Cisco MDS 9000 Fabric Manager application.

Note To use the Cisco Fabric Manager, refer to the *Cisco MDS 9000 Family Fabric Manager Configuration Guide*.

Figure 4-2 Switch Access Options



Assigning a Switch Name

Each switch in the fabric requires a unique name. You can assign names to easily identify the switch by its physical location, its SAN association, or the organization to which it is deployed. The assigned name is displayed in the command-line prompt. The switch name is limited to 20 alphanumeric characters.

Note This guide refers to a switch in the Cisco MDS 9000 Family as *switch*, and it uses the `switch#` prompt.

To change the name of the switch, follow these steps:

	Command	Purpose
Step 1	`switch# config t`	Enters configuration mode.
Step 2	`switch(config)# switchname myswitch1` `myswitch1(config)#`	Changes the switch name prompt as specified.
Step 3	`myswitch1(config)# no switchname` `switch(config)#`	Reverts the switch name prompt to its default (switch#).

Where Do You Go Next?

After reviewing the default configuration, you can change it or perform other configuration or management tasks. The initial setup can only be performed at the CLI. However, you can continue to configure other software features, or access the switch after initial configuration by using either the CLI or the Device Manager and Fabric Manager applications.

To use the Cisco MDS 9000 Fabric Manager, refer to the *Cisco MDS 9000 Family Fabric Manager Configuration Guide*.

Verifying the Module Status

Before you begin configuring the switch, you need to ensure that the modules in the chassis are functioning as designed. To verify the status of a module at any time, issue the **show module** command in EXEC mode. A sample output of the **show module** command follows:

```
switch# show module
Mod  Ports  Module-Type                       Model              Status
---  -----  -------------------------------- ------------------ ------------
2    8      IP Storage Services Module       DS-X9308-SMIP      ok
5    0      Supervisor/Fabric-1              DS-X9530-SF1-K9    active *
6    0      Supervisor/Fabric-1              DS-X9530-SF1-K9    ha-standby
8    0      Caching Services Module          DS-X9560-SMAP      ok
9    32     1/2 Gbps FC Module               DS-X9032           ok

Mod  Sw           Hw      World-Wide-Name(s) (WWN)
---  -----------  ------  --------------------------------------------------
2    1.3(0.106a)  0.206   20:41:00:05:30:00:00:00 to 20:48:00:05:30:00:00:00
5    1.3(0.106a)  0.602   --
6    1.3(0.106a)) 0.602   --
8    1.3(0.106a)  0.702   --
9    1.3(0.106a)  0.3     22:01:00:05:30:00:00:00 to 22:20:00:05:30:00:00:00


Mod  MAC-Address(es)                         Serial-Num
---  --------------------------------------  ----------
2    00-05-30-00-9d-d2 to 00-05-30-00-9d-de  JAB064605a2
5    00-05-30-00-64-be to 00-05-30-00-64-c2  JAB06350B1R
6    00-d0-97-38-b3-f9 to 00-d0-97-38-b3-fd  JAB06350B1R
8    00-05-30-01-37-7a to 00-05-30-01-37-fe  JAB072705ja
9    00-05-30-00-2d-e2 to 00-05-30-00-2d-e6  JAB06280ae9

* this terminal session
```

If the status is OK or active, you can continue with your configuration (see Chapter 10, “Managing Modules”).

Configuring Date and Time

Switches in the Cisco MDS 9000 Family use Universal Coordinated Time (UTC), which is the same as Greenwich Mean Time (GMT). To change the default time on the switch, issue the **clock** command from EXEC mode.

```
switch# clock set <HH:MM:SS> <DD> <Month in words> <YYYY>
```

For example:

```
switch# clock set 15:58:09 23 September 2002
Mon Sep 23 15:58:09 UTC 2002
```

Where *HH* represents hours in military format (15 for 3 p.m.), *MM* is minutes (58), *SS* is seconds (09), *DD* is the date (23), *Month* is the month in words (September), and *YYYY* is the year (2002).

Note The **clock** command changes are saved across system resets.

Configuring the Time Zone

You can specify a time zone for the switch.

To specify the local time without the daylight saving time feature, follow these steps:

	Command	Purpose
Step 1	`switch# config t`	Enters configuration mode.

Step 2	`switch(config)# clock timezone <timezone name> <-23 to 23 hours offset from UTC time> <0 to 50 minutes offset from UTC>`
	
	Example:
	`switch(config)# clock timezone PST -8 0`
		Sets the time zone with a specified name, specified hours, and specified minutes.
		
		This example sets the time zone to Pacific Standard Time (PST) and offsets the UTC time by negative eight hours and 0 minutes.

Step 3	`switch(config)# exit` `switch#`	Returns to EXEC mode.
Step 4	`switch# show clock`	Verifies the time zone configuration.
Step 5	`switch# show run`	Displays changes made to the time zone configuration along with other configuration information.

Adjusting for Daylight Saving Time or Summer Time

You can configure your switch to adjust for daylight saving time (or summer time). By default, MDS SAN-OS does not automatically adjust for daylight saving time. You must manually configure the switch to adjust to the daylight saving time.

For example, following U.S. standards, you can have the switch advance the clock one hour at 2:00 a.m. on the first Sunday in April and move back the clock one hour at 2:00 a.m. on the last Sunday in October. You can also explicitly specify the start and end dates and times and whether or not the time adjustment recurs every year.

To enable the daylight saving time clock adjustment, follow these steps:

	Command	Purpose
Step 1	`switch# config t` `switch(config)#`	Enters configuration mode.

Step 2	`switch(config)# clock timezone timezone_name hour_offset_from_UTC minute_offset_from_UTC`
	
	Example:
	`switch(config)# clock timezone PST -8 0`
		Offsets the time zone as specified.
		
		This example sets the U.S. Pacific standard offset time as negative 8 hours and 0 minutes.

	`switch(config)# no clock timezone`	Disables the time zone adjustment feature.

	Command	Purpose

Step 3	`switch(config)# clock summer-time daylight_timezone_name start_week start_day start_month start_time end_week end_day end_month end_time daylight_offset_inminutes`
	
	Example:
	`switch(config)# clock summer-time PDT 1 Sunday April 02:00 5 Sunday October 02:00 60`
	`switch(config)#`
		Sets the daylight savings time for a specified time zone.
		The start and end values are as follows:
		• Week ranging from 1 through 5
		• Day ranging from Sunday through Saturday
		• Month ranging from January through December
		The daylight offset ranges from 1 through 1440 minutes, which are added to the start time and deleted time from the end time.
		This example adjusts the daylight savings time for the U.S. Pacific daylight time by 60 minutes starting the first Sunday in April at 2 a.m. and ending the last Sunday in October at 2 a.m.

	`switch(config)# no clock summer-time`	Disables the daylight saving time adjustment feature.
Step 4	`switch(config)# exit` `switch#`	Returns to EXEC mode.
Step 5	`switch# show running-config | include summer-time`	Verifies the time zone configuration.

Note In 2007, the U. S. the daylight saving time adjustment changes to start on the second Sunday in March and end on the first Sunday in November. You can update the configuration of your switch to accommodate this change using the following command:

`switch(config)# clock summer-time daylight_timezone_name 2 Sunday March 1 02:00 Sunday November 02:00 60`

NTP Configuration

A Network Time Protocol (NTP) server provides a precise time source (radio clock or atomic clock) to synchronize the system clocks of network devices. NTP is transported over User Datagram Protocol UDP/IP. All NTP communications use UTC. An NTP server receives its time from a reference time source, such as a radio clock or atomic clock, attached to the time. NTP distributes this time across the network.

In a large enterprise network, having one time standard for all network devices is critical for management reporting and event logging functions when trying to correlate interacting events logged across multiple devices. Many enterprise customers with extremely mission-critical networks maintain their own stratum-1 NTP source.

Time synchronization happens when several frames are exchanged between clients and servers. The switches in client mode know the address of one or more NTP servers. The servers act as the time source and receive client synchronization requests.

By configuring an IP address as a peer, the switch will obtain and provide time as required. The peer is capable of providing time on its own and is capable of having a server configured. If both these instances point to different time servers, your NTP service is more reliable. Thus, even if the active server link is lost, you can still maintain the right time due to the presence of the peer.

Tip If an active server fails, a configured peer helps in providing the NTP time. Provide a direct NTP server association and configure a peer to ensure backup support if the active server fails.

If you only configure a peer, the most accurate peer takes on the role of the NTP server and the other peer(s) act as a peer(s). Both machines end at the right time if they have the right time source or if they point to the right NTP source.

To configure NTP in a server association, follow these steps:

	Command	Purpose
Step 1	`switch# config t`	Enters configuration mode.
Step 2	`switch(config)# ntp server 10.10.10.10` `switch(config)#`	Forms a server association with a server.
Step 3	`switch(config)# ntp peer 10.20.10.0` `switch(config)#`	Forms a peer association with a peer. You can specify multiple associations.
Step 4	`switch(config)# exit` `switch#`	Returns to EXEC mode.
Step 5	`switch# copy running-config startup-config`	Saves your configuration changes to NVRAM. **Tip** This is one instance where you can save the configuration as a result of an NTP configuration change. You can issue this command at any time.

Step 6	`switch# show ntp peers`
	`-----------------------------------------`
	`Peer IP Address Serv/Peer`
	`-----------------------------------------`
	`10.20.10.2 Server`
	`10.20.10.0 Peer`
		Displays the configured server and peer associations.
		Note A domain name is resolved only when you have a DNS server configured.

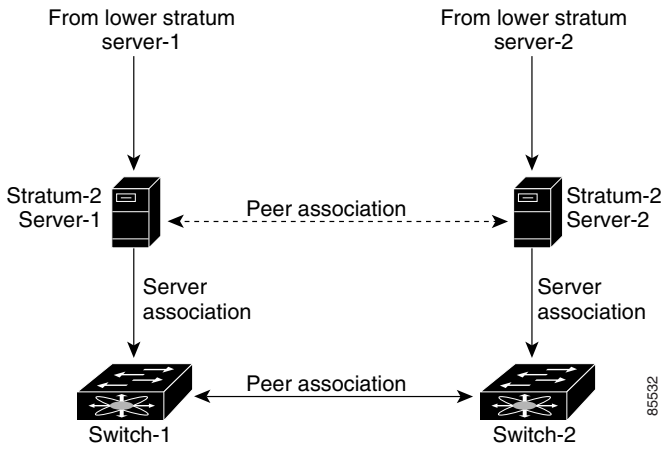
NTP Configuration Guidelines

The following guidelines apply to all NTP configurations:

- You should have a peer association with another switch only when you are sure that your clock is reliable (which means that you are a client of a reliable NTP server).
- A peer configured alone takes on the role of a server and should be used as backup. If you have two servers, then you can have several switches point to one server, and the remaining switches to the other server. Then you would configure peer association between these two sets. This forces the clock to be more reliable.
- If you only have one server, it's better for all the switches to have a client association with that server.

Not even a server down time will affect well-configured switches in the network. Figure 4-3 displays a network with two NTP stratum 2 servers and two switches.

Figure 4-3 NTP Peer and Server Association



In this configuration, the switches were configured as follows:

- Stratum 2 Server 1
  - IP address -10.10.10.10
  - Stratum-2 Server-2
  - IP address -10.10.10.9
- Switch 1 IP address -10.10.10.1
- Switch 1 NTP configuration
  - NTP server 10.10.10.10
  - NTP peer 10.10.10.2
- Switch 2 IP address -10.10.10.2
- Switch 2 NTP configuration
  - NTP server 10.10.10.9
  - NTP peer 10.10.10.1

NTP Configuration Distribution

You can enable NTP fabric distribution for all Cisco MDS switches in the fabric. When you perform NTP configurations, and distribution is enabled, the entire server/peer configuration is distributed to all the switches in the fabric.

You automatically acquire a fabric-wide lock when you issue the first configuration command after you enabled distribution in a switch. The NTP application uses the effective and pending database model to store or commit the commands based on your configuration.

Refer to Chapter 5, “Using the CFS Infrastructure” for more information on the CFS application.

To enable NTP configuration fabric distribution, follow these steps:

	Command	Purpose
Step 1	`switch# config t`	Enters configuration mode.
Step 2	`switch(config)# ntp distribute`	Enables NTP configuration distribution to all switches in the fabric. Acquires a fabric lock and stores all future configuration changes in the pending database.
	`switch(config)# no ntp distribute`	Disables (default) NTP configuration distribution to all switches in the fabric.

Committing NTP Configuration Changes

When you commit the NTP configuration changes, the effective database is overwritten by the configuration changes in the pending database and all the switches in the fabric receive the same configuration. When you commit the NTP configuration changes without implementing the session feature, the NTP configurations are distributed to all the switches in the fabric.

To commit the NTP configuration changes, follow these steps:

	Command	Purpose
Step 1	`switch# config t`	Enters configuration mode.
Step 2	`switch(config)# ntp commit`	Distributes the NTP configuration changes to all switches in the fabric and releases the lock. Overwrites the effective database with the changes made to the pending database.

Discarding NTP Configuration Changes

After making the configuration changes, you can choose to discard the changes or to commit them. In either case, the lock is released.

To discard NTP configuration changes, follow these steps:

	Command	Purpose
Step 1	`switch# config t`	Enters configuration mode.
Step 2	`switch(config)# ntp abort`	Discards the NTP configuration changes in the pending database and releases the fabric lock.

Releasing Fabric Session Lock

If you have performed a NTP fabric task and have forgotten to release the lock by either committing or discarding the changes, an administrator can release the lock from any switch in the fabric. If the administrator performs this task, your changes to the pending database are discarded and the fabric lock is released.

Tip The changes are only available in the volatile directory and are subject to being discarded if the switch is restarted.

To use administrative privileges and release a locked NTP session, use the **clear ntp session** command.

```
switch# clear ntp session
```

Database Merge Guidelines

Refer to the "CFS Merge Support" section on page 5-7 for detailed concepts.

When merging two fabrics, follow these guidelines:

- Be aware that the merge is a a union of the existing and the received database in each switch in the fabric.
- Do not configure an IP address as a server on one switch while and as a peer on another switch. The merge can fail if this configuration exists.
- Verify that the union of the databases does not exceed the max limit of 64.

NTP Session Status Verification

To verify the status of the NTP session, use the s**how ntp session-status** command.

```
switch# show ntp session-status
last-action : Distribution Enable    Result : Success
```

Management Interface Configuration

On director class switches, a single IP address is used to manage the switch. The active supervisor module's management (mgmt0) interface uses this IP address. The mgmt0 interface on the standby supervisor module remains in an inactive state and cannot be accessed until a switchover happens. After a switchover, the mgmt0 interface on the standby supervisor module becomes active and assumes the same IP address as the previously active supervisor module.

The management interface on the switch allows multiple simultaneous Telnet or SNMP sessions. You can remotely configure the switch through the management interface, but first you must configure some IP parameters (IP address, subnet mask) so that the switch is reachable. You can manually configure the management interface from the CLI.

By default, the management port (mgmt0) operates at a speed of 100 Mbps and in full duplex mode. Configuring the speed to auto will internally map to100 Mbps, and configuring the duplex mode to auto will internally map to full duplex. If the duplex mode is configured as auto or full, then the peer device should not be configured as full duplex.

Note Before you begin to configure the management interface manually, obtain the switch's IP address and IP subnet mask. Also make sure the console cable is connected to the console port.

Obtaining Remote Management Access

In some cases, a switch interface might be administratively shut down. You can check the status of an interface at any time by using the **show interface mgmt 0** command.

To obtain remote management access, follow these steps:

	Command	Command
Step 1	`switch# config terminal` `switch(config)#`	Enters configuration mode. You can also abbreviate the command to **config t**.
Step 2	`switch(config)# interface mgmt 0`	Enters the interface configuration mode on the specified interface (mgmt0). You can use the management Ethernet interface on the switch to configure the management interface.
Step 3	`switch(config)# ip address 1.1.1.0 255.255.255.0`	Enters the IP address and IP subnet mask for the interface specified in Step 2.
Step 4	`switch(config-if)# no shutdown`	Enables the interface.
Step 5	`switch(config-if)# exit`	Returns to configuration mode.
Step 6	`switch(config)# ip default-gateway 1.1.1.1`	Configures the default gateway address.

Using the force Option

When you try to shut down a management interface (mgmt0), a follow-up message confirms your action before performing the operation. You can use the **force** option to bypass this confirmation. The following example shuts down the interface without using the **force** option:

```
switch# config t
switch(config)# interface mgmt 0
switch(config-if)# shutdown
Shutting down this interface will drop all telnet sessions.
Do you wish to continue (y/n)? y
```

The following example shuts down the interface using the **force** option:

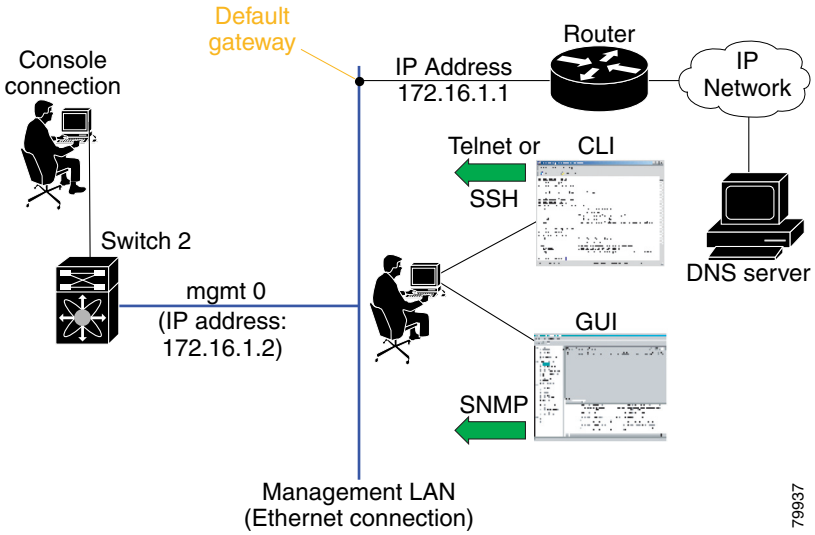
```
switch# config t
switch(config)# interface mgmt 0
switch(config-if)# shutdown force
```

Note You need to explicitly configure a default gateway to connect to the switch and send IP packets or add a route for each subnet.

Default Gateway Configuration

The supervisor module sends IP packets with unresolved destination IP addresses to the default gateway (see Figure 4-4).

Figure 4-4 Default Gateway



Configuring the Default Gateway

To configure the IP address of the default gateway, follow these steps:

	Command	Purpose
Step 1	`switch# config t`	Enters configuration mode.
Step 2	`switch(config)# ip default-gateway 172.16.1.1`	Configures the 172.16.1.1 IP address.

Telnet Server Connection

The Telnet server is enabled by default on all switches in the Cisco MDS 9000 Family. If you require a secure SSH connection, you need to disable the default Telnet connection and then enable the SSH connection (see the "Enabling SSH Service" section on page 26-13).

Note For information on connecting a terminal to the supervisor module console port, refer to the *Cisco MDS 9200 Series Hardware Installation Guide* or the *Cisco MDS 9500 Series Hardware Installation Guide*.

Tip A maximum of 16 sessions are allowed in any switch in the Cisco MDS 9500 Series or the Cisco MDS 9200 Series.

Make sure the terminal is connected to the switch and that the switch and terminal are both powered on.

Disabling a Telnet Connection

To disable Telnet connections to the switch, follow these steps:

	Command	Purpose
Step 1	`switch# config t`	Enters configuration mode.
Step 2	`switch(config)# no telnet server enable` `updated`	Disables the Telnet server.
	`switch(config)# telnet server enable` `updated`	Enables the Telnet server to return a Telnet connection from a secure SSH connection.

Configuring Console Port Settings

The console port is an asynchronous serial port that enables switches in the Cisco MDS 9000 Family to be set up for initial configuration through a standard RS-232 port with an RJ-45 connector. Any device connected to this port must be capable of asynchronous transmission. Connection to a terminal requires a terminal emulator to be configured as 9600 baud, 8 data bits, 1 stop bit, no parity.

Caution The console baud rate automatically reverts to the default rate (9600) after any BIOS upgrade.

To configure the console port parameters from the console terminal, follow these steps:

	Command	Command
Step 1	`switch# config terminal` `switch(config)#`	Enters configuration mode.
Step 2	`switch(config)# line console` `switch(config-console)#`	Enters the line console configuration mode.
Step 3	`switch(config-console)# speed 9600`	Configures the port speed for the serial console. The default console baud rate is 9600 baud. The valid range is between 110 and 115,200 bps (110, 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 28800, 38400, 57600, 115200). Be sure to specify one of these exact values.
Step 4	`switch(config-console)# databits 8`	Configures the data bits for the console connection. The default is 8 data bits and the valid range is between 5 and 8 data bits.
Step 5	`switch(config-console)# stopbits 1`	Configures the stop bits for the console connection. The default is 1 stop bit and the valid values are 1 or 2 stop bits.
Step 6	`switch(config-console)# parity none`	Configures the parity for the console connection. The default is no parity and the valid values are even or odd parity.

Verifying Console Port Settings

Use the **show line console** command to verify the configured console settings. This command also displays problems that may have occurred along with the other registration statistics.

```
switch# show line console
line Console:
    Speed:        9600 bauds
    Databits:     8 bits per byte
    Stopbits:     1 bit(s)
    Parity:       none
    Modem In: Enable
    Modem Init-String -
        default : ATE0Q1&D2&C1S0=1\015
    Statistics:  tx:12842     rx:366     Register Bits:RTS|CTS|DTR|DSR|CD|RI
```

Configuring COM1 Port Settings

A COM1 port is a RS-232 port with a DB-9 interface that enables you to connect to an external serial communication device such as a modem. Connection to a terminal requires the terminal emulator to be configured as 9600 baud, 8 data bits, 1 stop bit, no parity.

To configure the COM1 port settings, follow these steps:

	Command	Command
Step 1	`switch# config terminal` `switch(config)#`	Enters configuration mode.
Step 2	`switch(config)# line com1` `switch(config-com1)#`	Enters the COM1 port configuration mode.
Step 3	`switch(config-com1)# speed 9600`	Configures the port speed for the COM1 connection. The default console baud rate is 9600 baud. The valid range is between 110 and 115,200 bps (110, 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 28800, 38400, 57600, 115200). Be sure to specify one of these exact values. **Note** This configuration depends on the incoming speed of the modem connected to COM1.
Step 4	`switch(config-com1)# databits 8`	Configures the data bits for the COM1 connection. The default is 8 data bits and the valid range is between 5 and 8 data bits.
Step 5	`switch(config-com1)# stopbits 1`	Configures the stop bits for the COM1 connection. The default is 1 stop bits and the valid values are 1 or 2 stop bits.
Step 6	`switch(config-com1)# parity none`	Configures the parity for the COM1 connection. The default is no parity and the valid values are even or odd parity.
Step 7	`switch(config-com1)# no flowcontrol hardware`	Disables hardware flow control. By default, hardware flow control is enabled on all switches in the Cisco 9000 Family. When enabled, this option is useful in protecting data loss at higher baud rates. **Note** This option is only available through the COM1 port.

Verifying COM1 Port Settings

Use the **show line com1** command to verify the configured COM1 settings. This command also displays problems that may have occurred along with the other registration statistics.

```
switch# show line com1
line Aux:
    Speed:        9600 bauds
    Databits:     8 bits per byte
    Stopbits:     1 bit(s)
    Parity:       none
    Modem In: Enable
    Modem Init-String -
        default : ATE0Q1&D2&C1S0=1\015
    Statistics:  tx:17     rx:0     Register Bits:RTS|DTR
```

Configuring Modem Connections

Modems can only be configured if you are connected to the console or COM1 ports. A modem connection to a switch in the Cisco MDS 9000 Family does not affect switch functionality.

Note If you plan on connecting a modem to the console port or the COM1 port of a switch in the Cisco MDS 9000 Family, refer to the *Cisco MDS 9200 Series Hardware Installation Guide* or the *Cisco MDS 9500 Series Hardware Installation Guide*. COM1 ports are not available on switches in the Cisco MDS 9100 Series. Refer to the *Cisco MDS 9100 Series Hardware Installation Guide*.

Guidelines to Configure Modems

Tip We recommend you use the COM1 port to connect the modem from any director in the Cisco MDS 9500 Series or any Switch in the Cisco MDS 9200 Series.

The following guidelines apply to modem configurations:

- The following Cisco modems were tested to work in the Cisco SAN-OS environment:
  - MultiTech MT2834BA (http://www.multitech.com/PRODUCTS/Families/MultiModemII/)
  - Hayes Accura V.92 (http://www.hayesmicro.com/Products/accura-prod-v92.htm)
- Connect the modem before attempting to configure the modem.
- Do not connect a modem to the console port while the system is booting.

  Follow the procedure specified in the "Initializing a Modem in a Powered-On Switch" section on page 4-31.

Enabling Modem Connections

To configure a modem connection through the COM1 port, follow these steps:

	Command	Command
Step 1	`switch# config t` `switch(config)#`	Enters configuration mode.
Step 2	`switch(config)# line com1` `switch(config-com1)#`	Enters the COM1 port configuration mode.
Step 3	`switch(config-com1)# modem in`	Enables the COM1 port to only connect to a modem.
	`switch(config-com1)# no modem in`	Disables (default) the current modem from executing its functions.

To configure a modem connection through the console port, follow these steps:

	Command	Command
Step 1	`switch# config t` `switch(config)#`	Enters configuration mode.
Step 2	`switch(config)# line console` `switch(config-console)#`	Enters the console port configuration mode.
Step 3	`switch(config-console)# modem in`	Enables the console port to only connect to a modem.
	`switch(config-console)# no modem in`	Disables (default) the current modem from executing its functions.

Configuring the Initialization String

Switches in the Cisco MDS 9500 Series and the Cisco MDS 9200 Series have a default initialization string (`ATE0Q1&D2&C1S0=1\015`) to detect connected modems. The default string detects connected modems supported by Cisco Systems. The default string contents are as follows:

- AT—Attention
- E0 (required)—No echo
- Q1—Result code on
- &D2—Normal data terminal ready (DTR) option
- &C1—Enable tracking the state of the data carrier.
- S0=1—Pick up after one ring
- \015 (required)—carriage return in octal

You may retain the default string or change it to another string (80 character limit) using the **user-input** option. This option is provided if you prefer to use a modem that is not supported or tested by Cisco systems. If you change the string, the changes you make are permanent and remain in effect unless you change them again. Rebooting the system or restarting the CLI does not change the modem initialization string. The switch is not affected even if the modem is not functioning.

Tip We recommend you use the default initialization string. If the required options are not provided in the user-input string, the initialization string is not processed.

The modem initialization string usage depends on the modem state when the switch boots:

- If the modem is already attached to the switch during boot-up, the default initialization string is written to the modem (see the "Configuring the Default Initialization String" section on page 4-30).
- If the modem is not attached to the switch during boot-up, then attach the modem as outlined in the *Cisco MDS 9000 Family Hardware Installation Guide* (depending on the product), and follow the procedure provided in this section (see the "Configuring a User-Specified Initialization String" section on page 4-30).

Note You can perform the configuration specified in this section only if you are connected to the console port or the COM1 port.

Configuring the Default Initialization String

To configure the default initialization string through the COM1 port, follow these steps:

	Command	Command
Step 1	`switch# config t` `switch(config)#`	Enters configuration mode.
Step 2	`switch(config)# line com1` `switch(config-com1)#`	Enters the COM1 port configuration mode.
Step 3	`switch(config-com1)# modem init-string default`	Writes the default initialization string to the modem.

To configure the default initialization string through the console port, follow these steps:

	Command	Command
Step 1	`switch# config t` `switch(config)#`	Enters configuration mode.
Step 2	`switch(config)# line com1` `switch(config-console)#`	Enters the console port configuration mode.
Step 3	`switch(config-console)# modem init-string default`	Writes the default initialization string to the modem.

Configuring a User-Specified Initialization String

To configure a user-specified initialization string through the COM1 port, follow these steps:

	Command	Command
Step 1	`switch# config terminal` `switch(config)#`	Enters configuration mode.
Step 2	`switch(config)# line com1` `switch(config-com1)#`	Enters the COM1 port configuration mode.
Step 3	`switch(config-com1)# modem set-string user-input ATE0Q1&D2&C1S0=3\015`	Assigns the user-specified initialization string to its corresponding profile. **Note** You must first set the user-input string, before initializing the string.
	`switch(config-com1)# no modem set-string`	Reverts the configured initialization string to the factory default string.
Step 4	`switch(config-com1)# modem init-string user-input`	Writes the user-specified initialization string to the modem.

To configure a user-specified initialization string through the console port, follow these steps:

	Command	Command
Step 1	`switch# config terminal` `switch(config)#`	Enters configuration mode.
Step 2	`switch(config)# line com1` `switch(config-console)#`	Enters the console port configuration mode.

	Command	Command
Step 3	`switch(config-console)# modem set-string user-input ATE0Q1&D2&C1S0=3\015`	Assigns the user-specified initialization string to its corresponding profile. **Note** You must first set the user-input string, before initializing the string.
	`switch(config-com1)# no modem set-string`	Reverts the configured initialization string to the factory default string.
Step 4	`switch(config-console)# modem init-string user-input`	Writes the user-specified initialization string to the modem.

Initializing a Modem in a Powered-On Switch

When a switch is already powered-on and the modem is later connected to either the console port or the COM1 port, you can initialize the modem using the **modem connect line** command in EXEC mode. You can specify the **com1** option if the modem is connected to the COM1 port, or the **console** option if the modem is connected to the console.

To connect a modem to a switch that is already powered on, follow these steps.

Step 1 Wait until the system has completed the boot sequence and the system image is running.

Step 2 Connect the modem to the switch as specified in the *Cisco MDS 9200 Series Hardware Guide* or the *Cisco MDS 9500 Series Hardware Installation Guide*.

Step 3 Initialize the modem using the **modem connect line** command in EXEC mode.

Verifying the Modem Connection Configuration

Use the **show line** command to verify the configured modem settings.

```
switch# show line
line Console:
    Speed:        9600 bauds
    Databits:     8 bits per byte
    Stopbits:     1 bit(s)
    Parity:       none
    Modem In: Enable
    Modem Init-String -
        default : ATE0Q1&D2&C1S0=1\015
    Statistics:  tx:12842     rx:366     Register Bits:RTS|CTS|DTR|DSR|CD|RI
line Aux:
    Speed:        9600 bauds
    Databits:     8 bits per byte
    Stopbits:     1 bit(s)
    Parity:       none
    Modem In: Enable
    Modem Init-String -
        default : ATE0Q1&D2&C1S0=1\015
    Statistics:  tx:17     rx:0     Register Bits:RTS|DTR
```

Configuring CDP

The Cisco Discovery Protocol (CDP) is an advertisement protocol used by Cisco devices to advertise itself to other Cisco devices in the same network. CDP runs on the data link layer and is independent of Layer 3 protocols. Cisco devices that receive the CDP packets cache the information to make it is accessible through the CLI and SNMP.

CDP is supported on the management Ethernet interface on the supervisor module and the Gigabit Ethernet interface on the IPS module. The CDP daemon is restartable and switchable. The running and startup configurations are available across restarts and switchovers.

CDP version 1 (v1) and version 2 (v2) are supported in Cisco MDS 9000 Family switches. CDP packets with any other version number are silently discarded when received.

When the interface link is established, CDP is enabled by default and three CDP packets are sent at one-second intervals. Following this, the CDP frames are sent at the globally-configured refresh interval.

To globally disable the CDP, follow these steps:

	Command	Command
Step 1	`switch# config terminal` `switch(config)#`	Enters configuration mode.

Step 2	`switch(config)# no cdp enable`
	`Operation in progress. Please check global parameters`
	`switch(config-console)#`
		Disables the CDP protocol on the switch. When CDP is disabled on an interface, one packet is sent to clear out the switch state with each of the receiving devices.

	`switch(config)# cdp enable`
	`Operation in progress. Please check global parameters`
	`switch(config)#`
		Enables (default) the CDP protocol on the switch. When CDP is enabled on an interface, one packet is sent immediately. Subsequent packets are sent at the configured refresh time.

To disable the CDP protocol on a specific interface, follow these steps:

	Command	Command
Step 1	`switch# config terminal` `switch(config)#`	Enters configuration mode.
Step 2	`switch(config)# interface gigbitethernet 8/8` `switch(config-if)#`	Configures the Gigabit Ethernet interface for the module in slot 8 port 8.

Step 3	`switch(config-if)# no cdp enable`
	`Operation in progress. Please check interface parameters`
	`switch(config-console)#`
		Disables the CDP protocol on the selected interface. When CDP is disabled on an interface, one packet is sent to clear out the switch state with each of the receiving devices.

	`switch(config-if)# cdp enable`
	`Operation in progress. Please check interface parameters`
	`switch(config)#`
		Enables (default) the CDP protocol on the selected interface. When CDP is enabled on an interface, one packet is sent immediately. Subsequent packets are sent at the configured refresh time.

To globally configure the refresh time interval for the CDP protocol, follow these steps:

	Command	Command
Step 1	`switch# config terminal` `switch(config)#`	Enters configuration mode.
Step 2	`switch(config)# cdp timer 100` `switch(config)#`	Sets the refresh time interval in seconds. The default is 60 seconds and the valid range is from 5 to 255 seconds.
	`switch(config)# no cdp timer 100` `switch(config)#`	Reverts the refresh time interval to the factory default of 60 seconds.

To globally configure the hold time advertised in CDP packets, follow these steps:

	Command	Command
Step 1	`switch# config terminal` `switch(config)#`	Enters configuration mode.
Step 2	`switch(config)# cdp holdtime 200` `switch(config)#`	Sets the hold time advertised in CDP packets in seconds. The default is 180 seconds and the valid range is from 10 to 255 seconds.
	`switch(config)# no cdp holdtime 200` `switch(config)#`	Reverts the hold time to the factory default of 180 seconds.

To globally configure the CDP version, follow these steps:

	Command	Command
Step 1	`switch# config terminal` `switch(config)#`	Enters configuration mode.
Step 2	`switch(config)# cdp advertise v1` `switch(config)#`	Sets the CDP version to be used. The default is version 2 (v2). The valid options are v1 and v2.
	`switch(config)# no advertise v1` `switch(config)#`	Reverts the version to the factory default of v2.

Clearing CDP Counters and Tables

Use the **clear cdp counters** command to clear CDP traffic counters for all interfaces. You can issue this command for a specified interface or for all interfaces (management and Gigabit Ethernet interfaces).

```
switch# clear cdp counters
switch#
```

Use the **clear cdp table** command to clear neighboring CDP entries for all interfaces. You can issue this command for a specified interface or for all interfaces (management and Gigabit Ethernet interfaces).

```
switch# clear cdp table interface gigabitethernet 4/1
switch#
```

Displaying CDP Information

Use the **show cdp** command to display CDP entries. See Examples 4-1 to 4-11.

Example 4-1 Displays All CDP Capable Interfaces and Parameters

```
switch# show cdp all
GigabitEthernet4/1 is up
    CDP enabled on interface
    Sending CDP packets every 60 seconds
    Holdtime is 180 seconds
GigabitEthernet4/8 is down
    CDP enabled on interface
    Sending CDP packets every 60 seconds
    Holdtime is 180 seconds
mgmt0 is up
    CDP enabled on interface
    Sending CDP packets every 100 seconds
    Holdtime is 200 seconds
```

Example 4-2 Displays All CDP Neighbor Entries

```
switch# show cdp entry all
----------------------------------------
Device ID:069038747(Kiowa3)
Entry address(es):
    IP Address: 172.22.92.5
Platform: WS-C5500, Capabilities: Trans-Bridge Switch
Interface: mgmt0, Port ID (outgoing port): 5/22
Holdtime: 136 sec

Version:
WS-C5500 Software, Version McpSW: 2.4(3) NmpSW: 2.4(3)
Copyright (c) 1995-1997 by Cisco Systems

Advertisement Version: 1
```

Example 4-3 Displays the Specified CDP Neighbor

```
switch# show cdp entry name 0
----------------------------------------
Device ID:0
Entry address(es):
    IP Address: 0.0.0.0
Platform: DS-X9530-SF1-K9, Capabilities: Host
Interface: GigabitEthernet4/1, Port ID (outgoing port): GigabitEthernet4/1
Holdtime: 144 sec

Version:
1.1(0.144)

Advertisement Version: 2
Duplex: full
```

Example 4-4 Displays Global CDP Parameters

```
switch# show cdp global
Global CDP information:
    CDP enabled globally
    Sending CDP packets every 60 seconds
    Sending a holdtime value of 180 seconds
    Sending CDPv2 advertisements is enabled
```

Example 4-5 Displays CDP Parameters for the Management Interface

```
switch# show cdp interface mgmt 0
mgmt0 is up
    CDP enabled on interface
    Sending CDP packets every 60 seconds
    Holdtime is 180 seconds
```

Example 4-6 Displays CDP Parameters for the Gigabit Ethernet Interface

```
switch# show cdp interface gigabitethernet 4/1
GigabitEthernet4/1 is up
    CDP enabled on interface
    Sending CDP packets every 80 seconds
    Holdtime is 200 seconds
```

Example 4-7 Displays CDP Neighbors (in brief)

```
switch# show cdp neighbors
Capability Codes: R - Router, T - Trans-Bridge, B - Source-Route-Bridge
                  S - Switch, H - Host, I - IGMP, r - Repeater

Device ID        Local Intrfce   Hldtme  Capability  Platform      Port ID
0                Gig4/1          135     H           DS-X9530-SF1- Gig4/1
069038732(Kiowa2 mgmt0           132     T S         WS-C5500      8/11
069038747(Kiowa3 mgmt0           156     T S         WS-C5500      6/20
069038747(Kiowa3 mgmt0           158     T S         WS-C5500      5/22
```

Example 4-8 Displays CDP Neighbors (in detail)

```
switch# show CDP neighbor detail
----------------------------------------
Device ID:0
Entry address(es):
    IP Address: 0.0.0.0
Platform: DS-X9530-SF1-K9, Capabilities: Host
Interface: GigabitEthernet4/1, Port ID (outgoing port): GigabitEthernet4/1
Holdtime: 162 sec

Version:
1.1(0.144)

Advertisement Version: 2
Duplex: full
----------------------------------------
Device ID:069038732(Kiowa2)
Entry address(es):
    IP Address: 172.22.91.5
Platform: WS-C5500, Capabilities: Trans-Bridge Switch
Interface: mgmt0, Port ID (outgoing port): 8/11
Holdtime: 132 sec

Version:
WS-C5500 Software, Version McpSW: 2.4(3) NmpSW: 2.4(3)
Copyright (c) 1995-1997 by Cisco Systems
Advertisement Version: 1
```

Example 4-9 Displays the Specified CDP Neighbor (in detail)

```
switch# show CDP neighbors interface gigabitethernet 4/1 detail
----------------------------------------
Device ID:0
Entry address(es):
    IP Address: 0.0.0.0
Platform: DS-X9530-SF1-K9, Capabilities: Host
Interface: GigabitEthernet4/1, Port ID (outgoing port): GigabitEthernet4/1
Holdtime: 144 sec

Version:
1.1(0.144)

Advertisement Version: 2
Duplex: full
```

Example 4-10 Displays CDP Traffic Statistics for the Management Interface

```
switch# show cdp traffic interface mgmt 0
----------------------------------------
Traffic statistics for mgmt0
Input Statistics:
    Total Packets: 1148
    Valid CDP Packets: 1148
        CDP v1 Packets: 1148
        CDP v2 Packets: 0
    Invalid CDP Packets: 0
        Unsupported Version: 0
        Checksum Errors: 0
        Malformed Packets: 0
Output Statistics:
    Total Packets: 2329
        CDP v1 Packets: 1164
        CDP v2 Packets: 1165
    Send Errors: 0
```

Example 4-11 Displays CDP Traffic Statistics for the Gigabit Ethernet Interface

```
switch# show cdp traffic interface gigabitethernet 4/1
----------------------------------------
Traffic statistics for GigabitEthernet4/1
Input Statistics:
    Total Packets: 674
    Valid CDP Packets: 674
        CDP v1 Packets: 0
        CDP v2 Packets: 674
    Invalid CDP Packets: 0
        Unsupported Version: 0
        Checksum Errors: 0
        Malformed Packets: 0

Output Statistics:
    Total Packets: 674
        CDP v1 Packets: 0
        CDP v2 Packets: 674
    Send Errors: 0
```