CHAPTER 8

Configuring FC-SP and DHCHAP

This chapter includes the following sections:

About Fabric Authentication

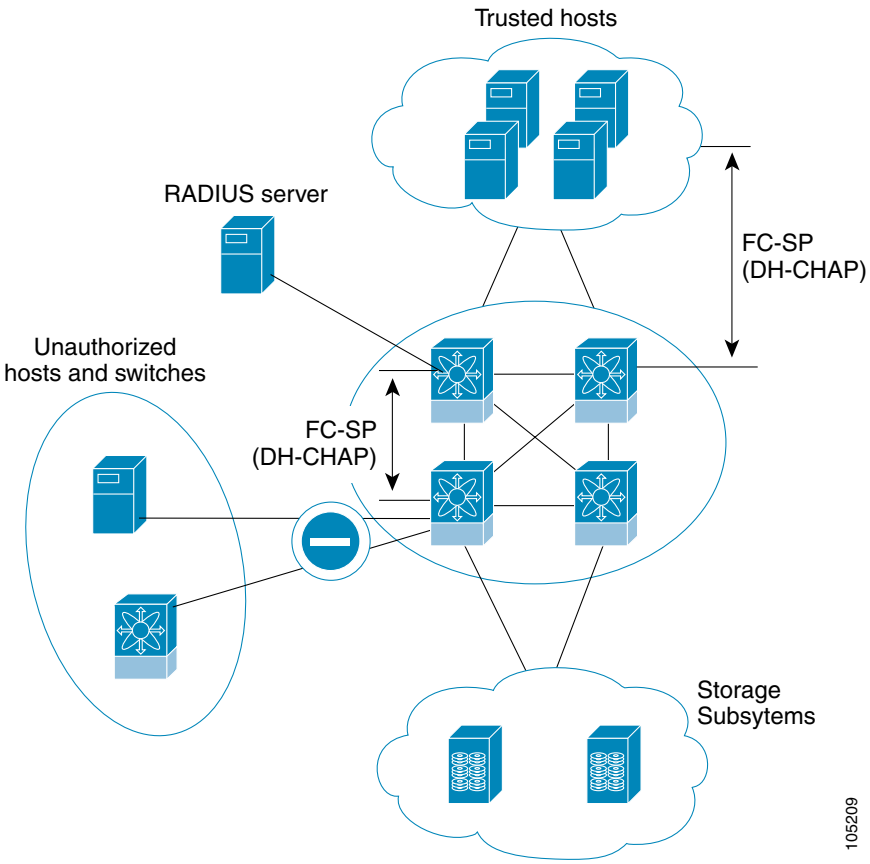
Fibre Channel Security Protocol (FC-SP) capabilities provide switch-switch and host-switch authentication to overcome security challenges for enterprise-wide fabrics. Diffie-Hellman Challenge Handshake Authentication Protocol (DHCHAP) is an FC-SP protocol that provides authentication between Cisco MDS 9000 Family switches and other devices. DHCHAP consists of the CHAP protocol combined with the Diffie-Hellman exchange.

To authenticate through VFC ports, FC-SP peers use the port VSAN for communication. Hence, the port VSAN needs to be the same and active on both the peers to send and receive authentication messages.

All switches in the Cisco MDS 9000 Family enable fabric-wide authentication from one switch to another switch, or from a switch to a host. These switch and host authentications are performed locally or remotely in each fabric. As storage islands are consolidated and migrated to enterprise-wide fabrics new security challenges arise. The approach of securing storage islands cannot always be guaranteed in enterprise-wide fabrics.

For example, in a campus environment with geographically distributed switches someone could maliciously interconnect incompatible switches or you could accidentally do so, resulting in Inter-Switch Link (ISL) isolation and link disruption. This need for physical security is addressed by switches in the Cisco MDS 9000 Family (see Figure 8-1).

Figure 8-1 Switch and Host Authentication



Note Fibre Channel (FC) host bus adapters (HBAs) with appropriate firmware and drivers are required for host-switch authentication.

DHCHAP

DHCHAP is an authentication protocol that authenticates the devices connecting to a switch. Fibre Channel authentication allows only trusted devices to be added to a fabric, which prevents unauthorized devices from accessing the switch.

Note The terms FC-SP and DHCHAP are used interchangeably in this chapter.

DHCHAP is a mandatory password-based, key-exchange authentication protocol that supports both switch-to-switch and host-to-switch authentication. DHCHAP negotiates hash algorithms and DH groups before performing authentication. It supports MD5 and SHA-1 algorithm-based authentication.

Configuring the DHCHAP feature requires the ENTERPRISE_PKG license (see the *Cisco MDS 9000 Family NX-OS Licensing Guide*).

To configure DHCHAP authentication using the local password database, follow these steps:

Step 1 Enable DHCHAP.

Step 2 Identify and configure the DHCHAP authentication modes.

Step 3 Configure the hash algorithm and DH group.

Step 4 Configure the DHCHAP password for the local switch and other switches in the fabric.

Step 5 Configure the DHCHAP timeout value for reauthentication.

Step 6 Verify the DHCHAP configuration.

This section includes the following topics:

DHCHAP Compatibility with Existing Cisco MDS Features

This section identifies the impact of configuring the DHCHAP feature along with existing Cisco MDS features:

- PortChannel interfaces—If DHCHAP is enabled for ports belonging to a PortChannel, DHCHAP authentication is performed at the physical interface level, not at the PortChannel level.
- FCIP interfaces—The DHCHAP protocol works with the FCIP interface just as it would with a physical interface.
- Port security or fabric binding—Fabric binding policies are enforced based on identities authenticated by DHCHAP.
- VSANs—DHCHAP authentication is not done on a per-VSAN basis.
- High availability—DHCHAP authentication works transparently with existing HA features.

About Enabling DHCHAP

By default, the DHCHAP feature is disabled in all switches in the Cisco MDS 9000 Family.

You must explicitly enable the DHCHAP feature to access the configuration and verification commands for fabric authentication. When you disable this feature, all related configurations are automatically discarded.

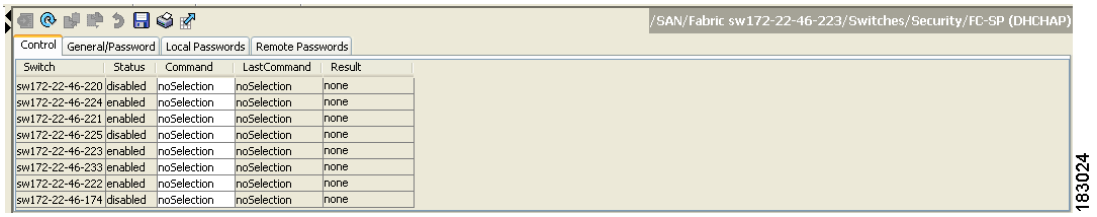
Enabling DHCHAP

To enable DHCHAP for a Cisco MDS switch using Fabric Manager, follow these steps:

Step 1 Expand **Switches**, expand **Security** and then select **FC-SP**.

You see the FC-SP (DHCHAP) configuration in the Information pane shown in Figure 8-2.

Figure 8-2 FC-SP Configuration



The **Control** tab is the default. You see the FC-SP enable state for all switches in the fabric.

Step 2 Set the Command drop-down menu to enable for all switches that you want to enable FC-SP on.

Step 3 Click the **Apply Changes** icon to enable FC-SP and DHCHAP on the selected switches.

About DHCHAP Authentication Modes

The DHCHAP authentication status for each interface depends on the configured DHCHAP port mode.

When the DHCHAP feature is enabled in a switch, each Fibre Channel interface or FCIP interface may be configured to be in one of four DHCHAP port modes:

- On—During switch initialization, if the connecting device supports DHCHAP authentication, the software performs the authentication sequence. If the connecting device does not support DHCHAP authentication, the software moves the link to an isolated state.
- Auto-Active—During switch initialization, if the connecting device supports DHCHAP authentication, the software performs the authentication sequence. If the connecting device does not support DHCHAP authentication, the software continues with the rest of the initialization sequence.
- Auto-Passive (default)—The switch does not initiate DHCHAP authentication, but participates in DHCHAP authentication if the connecting device initiates DHCHAP authentication.
- Off—The switch does not support DHCHAP authentication. Authentication messages sent to such ports return error messages to the initiating switch.

Note Whenever DHCHAP port mode is changed to a mode other than the Off mode, reauthentication is performed.

Table 8-1 identifies the switch-to-switch authentication behavior between two Cisco MDS switches in various modes.

Table 8-1 DHCHAP Authentication Status Between Two MDS Switches

Switch N DHCHAP Modes	Switch 1 DHCHAP Modes			
	on	**auto-active**	**auto-passive**	**off**
on	FC-SP authentication is performed.	FC-SP authentication is performed.	FC-SP authentication is performed.	Link is brought down.
auto-Active				FC-SP authentication is *not* performed.
auto-Passive			FC-SP authentication is *not* performed.	
off	Link is brought down.	FC-SP authentication is *not* performed.		

Configuring the DHCHAP Mode

To configure the DHCHAP mode for a particular interface using Fabric Manager, follow these steps:

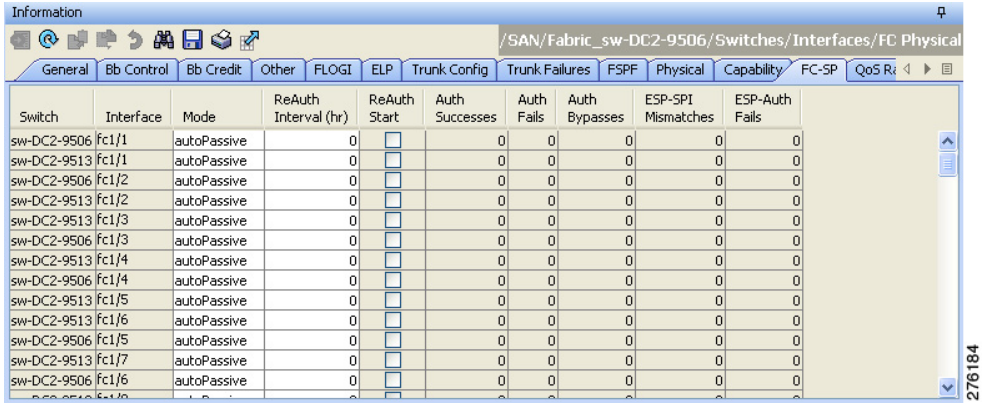
Step 1 Expand **Switches**, expand **Interfaces** and then select **FC Physical**.

You see the interface configuration in the Information pane.

Step 2 Click the **FC-SP** tab.

You see the FC-SP (DHCHAP) configuration in the Information pane shown in Figure 8-3.

Figure 8-3 FC-SP (DHCHAP) Interface Modes



Step 3 Set the **Mode** drop-down menu to the DHCHAP authentication mode you want to configure for that interface.

Step 4 Click the **Apply Changes** icon to save these DHCHAP port mode settings.

About the DHCHAP Hash Algorithm

Cisco MDS switches support a default hash algorithm priority list of MD5 followed by SHA-1 for DHCHAP authentication.

Tip If you change the hash algorithm configuration, then change it globally for all switches in the fabric.

Caution RADIUS and TACACS+ protocols always use MD5 for CHAP authentication. Using SHA-1 as the hash algorithm may prevent RADIUS and TACACS+ usage—even if these AAA protocols are enabled for DHCHAP authentication. If RADIUS or TACACS+ is configured with SHA1 hash algorithm, then FCSP DHCHAP authentication will fail and ports will not come up.

Configuring the DHCHAP Hash Algorithm

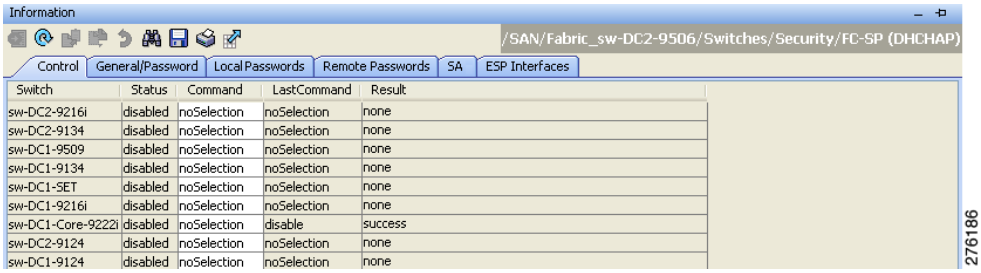
To configure the hash algorithm using Fabric Manager, follow these steps:

Step 1 Choose **Switches > Security** and then select **FC-SP**.

Step 2 Click the **General/Password** tab.

You see the DHCHAP general settings mode for each switch shown in Figure 8-4.

Figure 8-4 General/ Password Tab



Step 3 Change the DHCHAP HashList for each switch in the fabric.

Step 4 Click the **Apply Changes** icon to save the updated hash algorithm priority list.

About the DHCHAP Group Settings

All switches in the Cisco MDS Family support all DHCHAP groups specified in the standard: 0 (null DH group, which does not perform the Diffie-Hellman exchange), 1, 2, 3, or 4.

Tip If you change the DH group configuration, change it globally for all switches in the fabric.

Configuring the DHCHAP Group Settings

To change the DH group settings using Fabric Manager, follow these steps:

Step 1 Expand **Switches > Security** and then select **FC-SP**.

Step 2 Click the **General/Password** tab.

Step 3 Change the DHCHAP GroupList for each switch in the fabric.

Step 4 Click the **Apply Changes** icon to save the updated hash algorithm priority list.

About the DHCHAP Password

DHCHAP authentication in each direction requires a shared secret password between the connected devices. To do this, you can use one of three approaches to manage passwords for all switches in the fabric that participate in DHCHAP.

- Approach 1—Use the same password for all switches in the fabric. This is the simplest approach. When you add a new switch, you use the same password to authenticate that switch in this fabric. It is also the most vulnerable approach if someone from the outside maliciously attempts to access any one switch in the fabric.
- Approach 2—Use a different password for each switch and maintain that password list in each switch in the fabric. When you add a new switch, you create a new password list and update all switches with the new list. Accessing one switch yields the password list for all switches in that fabric.
- Approach 3—Use different passwords for different switches in the fabric. When you add a new switch, multiple new passwords corresponding to each switch in the fabric must be generated and configured in each switch. Even if one switch is compromised, the password of other switches are still protected. This approach requires considerable password maintenance by the user.

Note All passwords are restricted to 64 alphanumeric characters and can be changed, but not deleted.

Tip We recommend using RADIUS or TACACS+ for fabrics with more than five switches. If you need to use a local password database, you can continue to do so using Approach 3 and using the Cisco MDS 9000 Family Fabric Manager to manage the password database.

Configuring DHCHAP Passwords for the Local Switch

To configure the DHCHAP password for the local switch using Fabric Manager, follow these steps:

Step 1 Expand **Switches > Security** and then select **FC-SP**.

You see the FC-SP configuration in the Information pane.

Step 2 Click the **Local Passwords** tab.

Step 3 Click the **Create Row** icon to create a new local password.

You see the Create Local Passwords dialog box.

Step 4 (Optional) Check the switches that you want to configure the same local password on.

Step 5 Select the switch WNN and fill in the Password field.

Step 6 Click **Create** to save the updated password.

About Password Configuration for Remote Devices

You can configure passwords in the local authentication database for other devices in a fabric. The other devices are identified by their device name, which is also known as the switch WWN or device WWN. The password is restricted to 64 characters and can be specified in clear text (0) or in encrypted text (7).

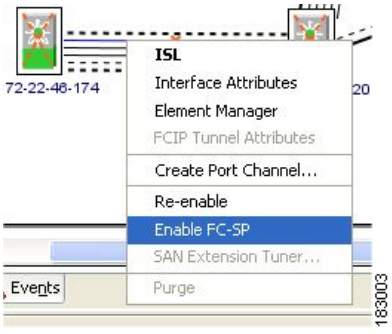
Note The switch WWN identifies the physical switch. This WWN is used to authenticate the switch and is different from the VSAN node WWN.

Configuring DHCHAP Passwords for Remote Devices

To locally configure the remote DHCHAP password for another switch in the fabric using Fabric Manager, follow these steps:

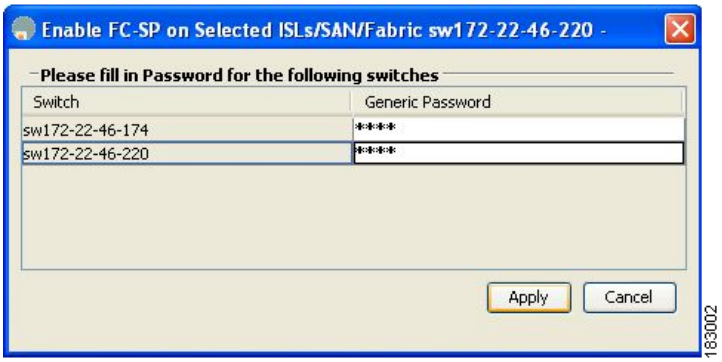
Step 1 Right-click an ISL and select **Enable FC-SP** from the drop-down list (see Figure 8-5).

Figure 8-5 Enable FC-SP



You see the Enable FC-SP dialog box.

Figure 8-6 Enable FC-SP Dialog Box



Step 2 Click **Apply** to save the updated password.

About the DHCHAP Timeout Value

During the DHCHAP protocol exchange, if the MDS switch does not receive the expected DHCHAP message within a specified time interval, authentication failure is assumed. The time ranges from 20 (no authentication is performed) to 1000 seconds. The default is 30 seconds.

When changing the timeout value, consider the following factors:

- The existing RADIUS and TACACS+ timeout values.
- The same value must also be configured on all switches in the fabric.

Configuring the DHCHAP Timeout Value

To configure the DHCHAP timeout value using Fabric Manager, follow these steps:

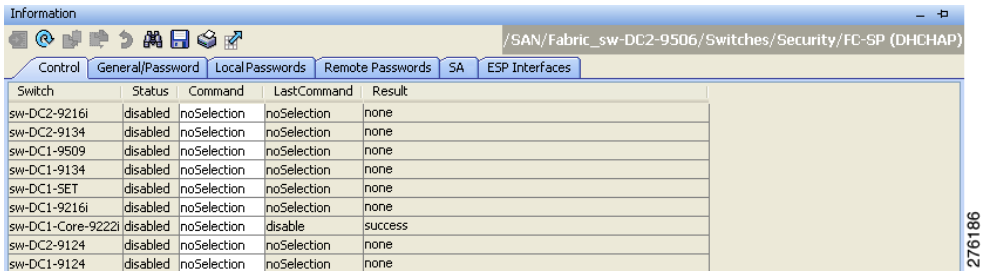
Step 1 Expand **Switches > Security** and then select **FC-SP**.

You see the FC-SP configuration in the Information pane.

Step 2 Click the **General/Password** tab.

You see the DHCHAP general settings mode for each switch (see Figure 8-7).

Figure 8-7 General/Password Tab



Step 3 Change the DHCHAP timeout value for each switch in the fabric.

Step 4 Click the **Apply Changes** icon to save the updated information.

Configuring DHCHAP AAA Authentication

You can individually set authentication options. If authentication is not configured, local authentication is used by default.

Enabling FC-SP on ISLs

There is an ISL pop-up menu in Fabric Manager called Enable FC-SP that enables FC-SP on switches at either end of the ISL. You are prompted for an FC-SP generic password, then asked to set FC-SP interface mode to ON for affected ports. Right-click an ISL and click **Enable FC-SP** to access this feature.

Default Settings

Table 8-2 lists the default settings for all fabric security features in any switch.

Table 8-2 Default Fabric Security Settings

Parameters	Default
DHCHAP feature	Disabled
DHCHAP hash algorithm	A priority list of MD5 followed by SHA-1 for DHCHAP authentication
DHCHAP authentication mode	Auto-passive
DHCHAP group default priority exchange order	0, 4, 1, 2, and 3 respectively
DHCHAP timeout value	30 seconds