CHAPTER 23

# Configuring FC-SP and DHCHAP

Fibre Channel Security Protocol (FC-SP) capabilities provide switch-to-switch and host-to-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 Nexus 5000 Series switches and other devices. DHCHAP consists of the CHAP protocol combined with the Diffie-Hellman exchange.

This chapter includes the following sections:

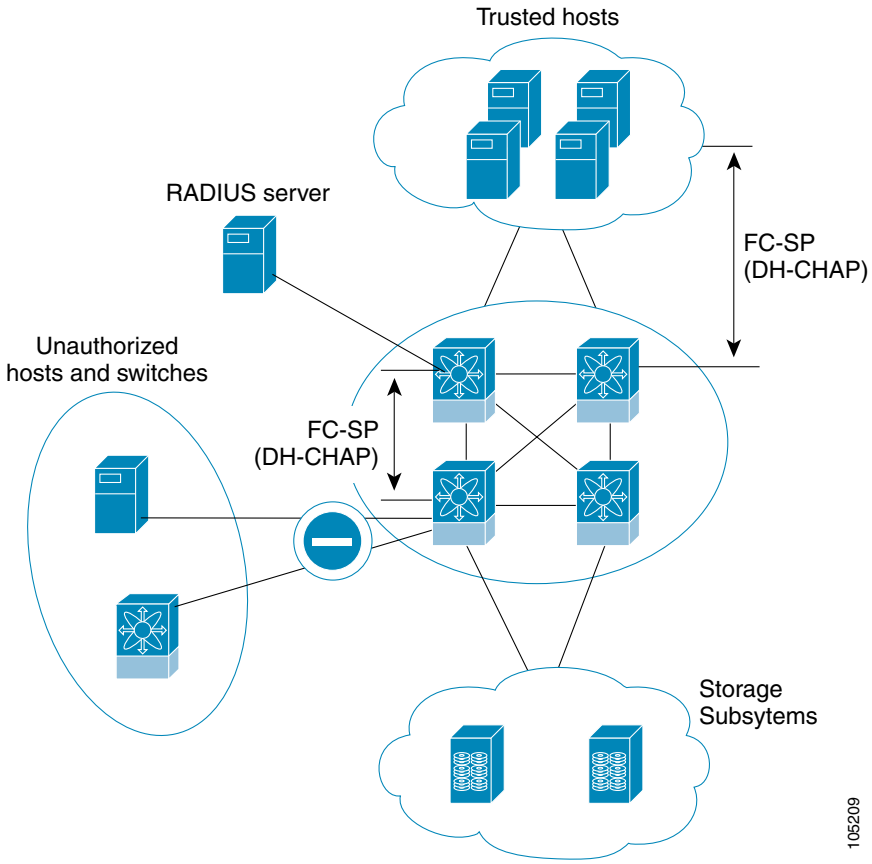


## Information About Fabric Authentication

All Cisco Nexus 5000 Series switches 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.

Cisco Nexus 5000 Series switches support authentication features to address physical security (see Figure 23-1).

*Figure 23-1 Switch and Host 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.

To configure DHCHAP authentication using the local password database, perform this task:

**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 Fibre Channel Features

This section identifies the impact of configuring the DHCHAP feature along with existing Cisco NX-OS features:

- SAN port channel interfaces—If DHCHAP is enabled for ports belonging to a SAN port channel, DHCHAP authentication is performed at the physical interface level, not at the port channel level.
- 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.

# About Enabling DHCHAP

By default, the DHCHAP feature is disabled in all Cisco Nexus 5000 Series switches.

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.

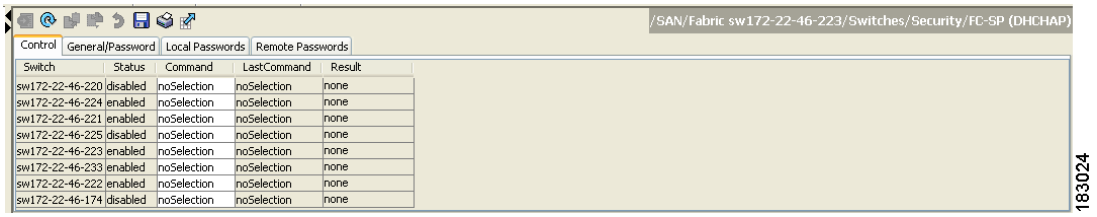
# Enabling DHCHAP

To enable DHCHAP for a Cisco MDS switch using Fabric Manager, perform this task:

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

You see the FC-SP (DHCHAP) configuration in the Information pane as shown in Figure 23-2.

***Figure 23-2 FC-SP Configuration***




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

**Step 2** In the Command drop-down list, choose **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 link is placed in 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 ports in this mode 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 23-1 identifies switch-to-switch authentication between two Cisco switches in various modes.

*Table 23-1 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, perform this task:

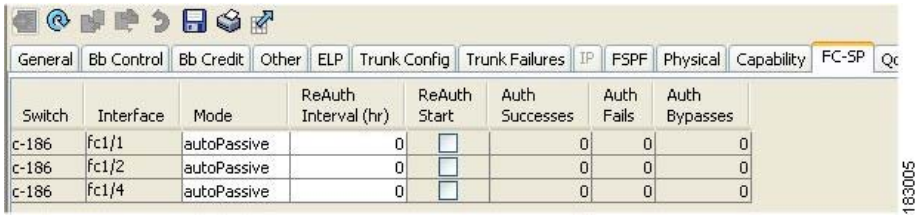
**Step 1** In the Physical Attributes pane, expand **Switches** > **Interfaces**, and then choose **FC Physical**.

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 as shown in Figure 23-3.

*Figure 23-3 FC-SP (DHCHAP) Interface Modes*




**Step 3** In the **Mode** drop-down list, choose **DHCP authentication mode** for each interface that you want to support FC-SP.

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

# About the DHCHAP Hash Algorithm

Cisco SAN 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.

# Configuring the DHCHAP Hash Algorithm

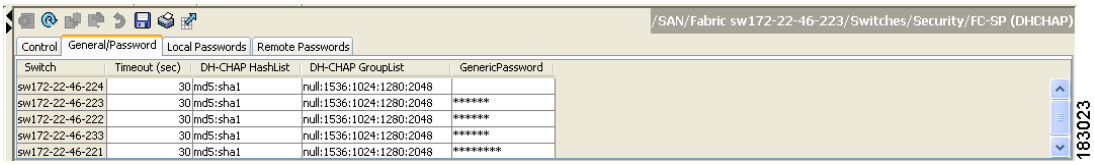
To configure the hash algorithm using Fabric Manager, perform this task:

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

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

You see the DHCHAP general settings mode for each switch as shown in Figure 23-4.

***Figure 23-4 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 Cisco Nexus 5000 Series switches 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, perform this task:

**Step 1** Expand **Switches > Security**, and then choose **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 configurations to manage passwords for all switches in the fabric that participate in DHCHAP:

- Configuration 1—Use the same password for all switches in the fabric. This is the simplest configuration. When you add a new switch, you use the same password to authenticate that switch in this fabric. It is also the most vulnerable configuration if someone from the outside maliciously attempts to access any one switch in the fabric.
- Configuration 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.
- Configuration 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 configuration 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 Configuration 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, perform this task:

**Step 1** Expand **Switches > Security**, and then choose **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, perform this task:

**Step 1** Right-click an ISL and choose **Enable FC-SP** from the drop-down list.

You see the Enable FC-SP dialog box as shown in Figure 23-5.

***Figure 23-5 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 Cisco Nexus 5000 Series 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, perform this task:

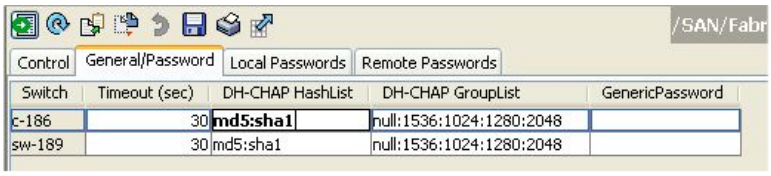
**Step 1** Expand **Switches > Security**, and then choose **FC-SP**.

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 as shown in Figure 23-6.

***Figure 23-6 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 configure AAA authentication to use a RADIUS or TACACS+ server group. If AAA authentication is not configured, local authentication is used by default.

To configure the AAA authentication, see the *Cisco Cisco Nexus 5000 Series CLI Configuration Guide.*

# 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 23-2 lists the default settings for all fabric security features in any switch.

*Table 23-2 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 |