



## Direct Attached Storage

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## Direct Attached Storage

A typical Direct Attached Storage (DAS) system is made of a data storage device (for example enclosures holding a number of hard disk drives connected directly to a computer through a host bus adapter (HBA). Between those two points there is no network device (like a switch or router).

The main protocols used for DAS connections are ATA, SATA, eSATA, SCSI, SAS, USB, USB 3.0, IEEE 1394 and Fibre Channel.

Cisco UCS Manager allows you to have DAS with without the need for a SAN switch to push the zoning configuration.

The DAS configuration described assumes that the physical cables are already connected between the storage array ports and the Fabric Interconnects.

Cisco UCS 6400 Series Fabric Interconnects do not support 8 Gbps direct-attached FC connectivity (FC uplink ports or FC storage ports) without fill-pattern set to IDLE.

## Fibre Channel Switching Mode

The Fibre Channel switching mode determines how the fabric interconnect behaves as a switching device between the servers and storage devices. The fabric interconnect operates in either of the following Fibre Channel switching modes:

### End-Host Mode

End-host mode allows the fabric interconnect to act as an end host to the connected fibre channel networks, representing all servers (hosts) connected to it through virtual host bus adapters (vHBAs). This behavior is

achieved by pinning (either dynamically pinned or hard pinned) vHBAs to Fibre Channel uplink ports, which makes the Fibre Channel ports appear as server ports (N-ports) to the rest of the fabric. When in end-host mode, the fabric interconnect avoids loops by denying uplink ports from receiving traffic from one another.

End-host mode is synonymous with N Port Virtualization (NPV) mode. This mode is the default Fibre Channel Switching mode.



**Note** When you enable end-host mode, if a vHBA is hard pinned to an uplink Fibre Channel port and this uplink port goes down, the system cannot repin the vHBA, and the vHBA remains down.

### Switch Mode

Switch mode is the traditional Fibre Channel switching mode. Switch mode allows the fabric interconnect to connect directly to a storage device. Enabling Fibre Channel switch mode is useful in Pod models where there is no SAN (for example, a single Cisco UCS domain that is connected directly to storage), or where a SAN exists (with an upstream MDS).

Switch mode is not the default Fibre Channel switching mode.



**Note** In Fibre Channel switch mode, SAN pin groups are irrelevant. Any existing SAN pin groups are ignored.

## Configuring Fibre Channel Switching Mode



**Important** When you change the Fibre Channel switching mode, Cisco UCS Manager logs you out and restarts the fabric interconnect. For a cluster configuration, Cisco UCS Manager restarts both fabric interconnects simultaneously in Cisco UCS Manager Release 3.1(1) and earlier releases. In Cisco UCS Manager Release 3.1(2), when the Fibre Channel switching mode is changed, the UCS fabric interconnects reload sequentially. In Cisco UCS Manager Release 3.1(3), and later releases, the subordinate fabric interconnect reboots first as a result of the change in switching mode. The primary fabric interconnect reboots only after you acknowledge it in **Pending Activities**. The primary fabric interconnect can take several minutes to complete the change in Fibre Channel switching mode and become system ready.



**Note** Reloading of both the fabric interconnects simultaneously will cause a system-wide downtime for approximately 10-15 minutes.

### Procedure

- Step 1** In the **Navigation** pane, click **Equipment**.
- Step 2** Expand **Equipment** > **Fabric Interconnects** > *Fabric\_Interconnect\_Name*.

**Step 3** In the **Work** pane, click the **General** tab.

**Step 4** In the **Actions** area of the **General** tab, click one of the following links:

- **Set Fibre Channel Switching Mode**
- **Set Fibre Channel End-Host Mode**

The link for the current mode is dimmed.

**Step 5** In the dialog box, click **Yes**.

Cisco UCS Manager restarts the fabric interconnect, logs you out, and disconnects Cisco UCS Manager GUI.

## Creating a Storage VSAN



**Note** FCoE VLANs in the SAN cloud and VLANs in the LAN cloud must have different IDs. Using the same ID for an FCoE VLAN in a VSAN and a VLAN results in a critical fault and traffic disruption for all vNICs and uplink ports using that FCoE VLAN. Ethernet traffic is dropped on any VLAN with an ID that overlaps with an FCoE VLAN ID.

### Procedure

**Step 1** In the **Navigation** pane, click **SAN**.

**Step 2** On the **SAN** tab, expand **SAN > Storage Cloud**.

**Step 3** In the **Work** pane, click the **VSANs** tab.

**Step 4** On the icon bar to the right of the table, click +.

If the + icon is disabled, click an entry in the table to enable it.

**Step 5** In the **Create VSAN** dialog box, complete the required fields.

**Step 6** Click **OK**.

Cisco UCS Manager GUI adds the VSAN to one of the following **VSANs** nodes:

- The **Storage Cloud > VSANs** node for a storage VSAN accessible to both fabric interconnects.
- The **Storage Cloud > Fabric\_Name > VSANs** node for a VSAN accessible to only one fabric interconnect.

# Creating a VSAN for Fibre Channel Zoning



**Note** FCoE VLANs in the SAN cloud and VLANs in the LAN cloud must have different IDs. Using the same ID for an FCoE VLAN in a VSAN and a VLAN results in a critical fault and traffic disruption for all vNICs and uplink ports using that FCoE VLAN. Ethernet traffic is dropped on any VLAN with an ID that overlaps with an FCoE VLAN ID.

## Procedure

- Step 1** In the **Navigation** pane, click **SAN**.
- Step 2** On the **SAN** tab, click the **SAN** node.
- Step 3** In the **Work** pane, click the **SAN Uplinks Manager** link on the **SAN Uplinks** tab.  
The SAN Uplinks Manager opens in a separate window.
- Step 4** In the SAN Uplinks Manager, click the **VSAN** tab.  
You can create the VSAN on any of the subtabs. However, if you use the **All** subtab, you can view all of the configured VSANs in the table.
- Step 5** On the icon bar to the right of the table, click +.  
If the + icon is disabled, click an entry in the table to enable it.
- Step 6** In the **Create VSAN** dialog box, complete the following fields:

Name	Description
Name field	The name assigned to the network.  This name can be between 1 and 32 alphanumeric characters. You cannot use spaces or any special characters other than - (hyphen), _ (underscore), : (colon), and . (period), and you cannot change this name after the object is saved.

Name	Description
<b>FC Zoning</b> field	<p>Click the radio button to determine whether Cisco UCS Manager configures Fibre Channel zoning for the Cisco UCS domain. This can be one of the following:</p> <ul style="list-style-type: none"> <li>• <b>Disabled</b>—The upstream switch handles Fibre Channel zoning, or Fibre Channel zoning is not implemented for the Cisco UCS domain. Cisco UCS Manager does not configure Fibre Channel zoning.</li> <li>• <b>Enabled</b>—Cisco UCS Manager configures and controls Fibre Channel zoning for the Cisco UCS domain.</li> </ul> <p><b>Note</b> If you enable Fibre Channel zoning through Cisco UCS Manager, do not configure the upstream switch with any VSANs that are being used for Fibre Channel zoning.</p>
<b>Type</b> radio button	<p>Click the radio button to determine how the VSAN should be configured. This can be one of the following:</p> <ul style="list-style-type: none"> <li>• <b>Common/Global</b>—The VSAN maps to the same VSAN ID in all available fabrics.</li> <li>• <b>Fabric A</b>—The VSAN maps to the a VSAN ID that exists only in fabric A.</li> <li>• <b>Fabric B</b>—The VSAN maps to the a VSAN ID that exists only in fabric B.</li> <li>• <b>Both Fabrics Configured Differently</b>—The VSAN maps to a different VSAN ID in each available fabric. If you choose this option, Cisco UCS Manager GUI displays a <b>VSAN ID</b> field and a <b>FCoE VLAN</b> field for each fabric.</li> </ul>
<b>VSAN ID</b> field	<p>The unique identifier assigned to the network.</p> <p>The ID can be between 1 and 4078, or between 4080 and 4093. 4079 is a reserved VSAN ID. In addition, if you plan to use FC end-host mode, the range between 3840 to 4079 is also a reserved VSAN ID range.</p>

Name	Description
<b>FCoE VLAN field</b>	<p>The unique identifier assigned to the VLAN used for Fibre Channel connections.</p> <p>VLAN 4048 is user configurable. However, Cisco UCS Manager uses VLAN 4048 for the following default values. If you want to assign 4048 to a VLAN, you must reconfigure these values:</p> <ul style="list-style-type: none"> <li>• After an upgrade to Cisco UCS, Release 2.0—The FCoE storage port native VLAN uses VLAN 4048 by default. If the default FCoE VSAN was set to use VLAN 1 before the upgrade, you must change it to a VLAN ID that is not used or reserved. For example, consider changing the default to 4049 if that VLAN ID is not in use.</li> <li>• After a fresh install of Cisco UCS, Release 2.0—The FCoE VLAN for the default VSAN uses VLAN 4048 by default. The FCoE storage port native VLAN uses VLAN 4049.</li> </ul> <p>For FIP-capable, converged network adapters, such as the Cisco UCS CNA M72KR-Q and the Cisco UCS CNA M72KR-E, the named VSAN must be configured with a named VLAN that is not the native VLAN for the FCoE VLAN ID. This configuration ensures that FCoE traffic can pass through these adapters.</p>

**Step 7** Click **OK**.

## Configuring a Fibre Channel Storage Port

This task describes only one method of configuring FC storage ports. You can also configure FC storage ports from the **General** tab for the port.

### Before you begin

The Fibre Channel switching mode must be set to Switching for these ports to be valid. The storage ports cannot function in end-host mode.

### Procedure

- Step 1** In the **Navigation** pane, click **Equipment**.
- Step 2** Expand **Equipment** > **Fabric Interconnects** > *Fabric\_Interconnect\_Name*.
- Step 3** Expand the **Expansion Module** node.
- Step 4** Click one or more of the ports under the **FC Ports** node.
- Step 5** Right-click the selected port or ports and choose **Configure as FC Storage Port**.
- Step 6** If a confirmation dialog box displays, click **Yes**.
- Step 7** Click **OK**.

# Configuring Fibre Channel Zoning



**Note** This procedure provides a high level overview of the steps required to configure a Cisco UCS domain for Fibre Channel zoning that is controlled by Cisco UCS Manager. You must ensure that you complete all of the following steps.

## Procedure

	Command or Action	Purpose
<b>Step 1</b>	If you have not already done so, disconnect the fabric interconnects in the Cisco UCS domain from any external Fibre Channel switches, such as an MDS.	
<b>Step 2</b>	If the Cisco UCS domain still includes zones that were managed by the external Fibre Channel switch, run the <b>clear-unmanaged-fc-zone-all</b> command on every affected VSAN to remove those zones.	This functionality is not currently available in the Cisco UCS Manager GUI. You must perform this step in the Cisco UCS Manager CLI.
<b>Step 3</b>	Configure the Fibre Channel switching mode for both fabric interconnects in Fibre Channel Switch mode.	You cannot configure Fibre Channel zoning in End-Host mode. See <a href="#">Configuring Fibre Channel Switching Mode</a> , on page 2.
<b>Step 4</b>	Configure the Fibre Channel and FCoE storage ports that you require to carry traffic for the Fibre Channel zones.	See <a href="#">Configuring an Ethernet Port as an FCoE Storage Port</a> and <a href="#">Configuring a Fibre Channel Storage Port</a> .
<b>Step 5</b>	Create one or more VSANs and enable Fibre Channel zoning on all VSANs that you require to carry traffic for the Fibre Channel zones.	For a cluster configuration, we recommend that you create the VSANs that you intend to include in a Fibre Channel zone in the SAN Uplinks Manager and use the common/global configuration to ensure they are accessible to both fabric interconnects. See <a href="#">Creating a VSAN for Fibre Channel Zoning</a> .
<b>Step 6</b>	Create one or more Fibre Channel storage connection policies.	You can perform this step when you configure Fibre Channel zoning in the service profiles, if you prefer. See <a href="#">Creating a VSAN for Fibre Channel Zoning</a> .
<b>Step 7</b>	Configure zoning in service profiles or service profile templates for servers that need to communicate through Fibre Channel zones.	Complete the following steps to complete this configuration: <ul style="list-style-type: none"> <li>• Enable zoning in the VSAN or VSANs assigned to the vHBAs. See <a href="#">Creating a VSAN for Fibre Channel Zoning</a></li> </ul>

	Command or Action	Purpose
		<ul style="list-style-type: none"> <li>Configure one or more vHBA initiator groups. See <a href="#">Creating a Service Profile with the Expert Wizard, on page 9</a>.</li> </ul>

## Creating a Fibre Channel Storage Connection Policy

### Procedure

**Step 1** In the **Navigation** pane, click **SAN**.

**Step 2** Expand **SAN > Policies**.

**Step 3** Expand the node for the organization where you want to create the policy.

If the system does not include multi tenancy, expand the **root** node.

**Step 4** Right-click the **Storage Connection Policies** node and choose **Create Storage Connection Policy**.

**Step 5** In the **Create Storage Connection Policy** dialog box, complete the following fields:

Name	Description
<b>Name field</b>	<p>The name of the policy.</p> <p>This name can be between 1 and 16 alphanumeric characters. You cannot use spaces or any special characters other than - (hyphen), _ (underscore), : (colon), and . (period), and you cannot change this name after the object is saved.</p>
<b>Description field</b>	<p>A description of the policy. Cisco recommends including information about where and when to use the policy.</p> <p>Enter up to 256 characters. You can use any characters or spaces except ` (accent mark), \ (backslash), ^ (carat), " (double quote), = (equal sign), &gt; (greater than), &lt; (less than), or ' (single quote).</p>

**Step 6** In the **Zoning Type** field, click one of the following radio buttons:

- **None**—Cisco UCS Manager does not configure Fibre Channel zoning.
- **Single Initiator Single Target**—Cisco UCS Manager automatically creates one zone for each vHBA and storage port pair. Each zone has two members. We recommend that you configure this type of zoning unless you expect the number of zones to exceed the maximum supported.
- **Single Initiator Multiple Targets**—Cisco UCS Manager automatically creates one zone for each vHBA. We recommend that you configure this type of zoning if you expect the number of zones to reach or exceed the maximum supported.

**Step 7** In the **FC Target Endpoints** table, click + on the icon bar to the right of the table.



If the + icon is disabled, click an entry in the table to enable it.

**Step 8** In the **Create FC Target Endpoint** dialog box, complete the following fields and then click **OK**:

Name	Description
<b>WWPN</b> field	The WWPN (WWN) assigned to the physical target port on the Fibre Channel or FCoE storage array that the server uses to access the LUNs configured on the storage array.
<b>Description</b> field	A description of the target endpoint. We recommend that you include information about the port, LUNs, or storage array to which the target endpoint connects.  Enter up to 256 characters. You can use any characters or spaces except ` (accent mark), \ (backslash), ^ (carat), " (double quote), = (equal sign), > (greater than), < (less than), or ' (single quote).
<b>Path</b> field	The fabric interconnect used for communications with the target endpoint.
<b>Select VSAN</b> drop-down list	The VSAN used for communications with the target endpoint.
<b>Create VSAN</b> link	Click this link if you want to create a VSAN.

Repeat this step until you have created all desired target endpoints for the policy.

**Step 9** After you have created all desired target endpoints for the policy, click **OK**.

## Creating a Service Profile with the Expert Wizard

### Procedure

- Step 1** In the **Navigation** pane, click **Servers**.
- Step 2** Expand **Servers** > **Service Profiles**.
- Step 3** Expand the node for the organization where you want to create the service profile.  
If the system does not include multi tenancy, expand the **root** node.
- Step 4** Right-click the organization and select **Create Service Profile (expert)**.
- Step 5** In the **Identify Service Profile** panel, specify the service profile **Name**, UUID assignment and click **Next**.  
You can provide an optional description for this service profile. If the UUID is not available, you can also create a UUID Suffix Pool from this panel.
- Note** To create a service profile quickly, you can click **Finish** after specifying the name. Cisco UCS Manager creates a new service profile with the specified name and all system default values.
- Step 6** (Optional) In the **Networking** panel, specify the required information for the **Dynamic vNIC Connection Policy** and **LAN Connectivity** sections, then click **Next**.

You can create a dynamic vNIC connection policy and LAN connectivity policy from this panel.

**Step 7** (Optional) In the **Storage** panel, specify the SAN configuration information such as, **Local Storage Policy**, **SAN Connectivity**, **WWNN** and **VSAN**, then click **Next**.

You can create a local disk configuration policy and SAN connectivity policy from this panel.

**Step 8** (Optional) In the **Zoning** panel, specify the required zoning information, then click **Next**.

You can create the vHBA initiator groups from this panel.

**Step 9** (Optional) In the **vNIC/vHBA Placement** panel, specify the placement method and PCI order, then click **Next**.

You can create a placement policy from this panel.

**Step 10** (Optional) In the **Server Boot Order** panel, specify the **Boot Policy** from the drop-down list, then click **Next**.

You can create a boot policy from this panel.

**Step 11** (Optional) In the **Maintenance Policy** panel, specify the maintenance policy, then click **Next**.

You can create a new maintenance policy and specify a maintenance schedule from this panel.

**Step 12** (Optional) In the **Server Assignment** panel, specify the **Server Assignment** from the drop down list and the power state to apply on assignment, then click **Next**.

You can create a server pool or a host firmware package from this panel.

**Step 13** (Optional) In the **Operational Policies** panel, specify the system operational information such as, **BIOS Configuration**, **External IPMI Management Configuration**, **Management IP Address**, **Monitoring Configuration (Thresholds)**, **Power Control Policy Configuration**, and **Scrub Policy**, then click **Finish**.

**Note** To set up an Outband IPv4 address or an Inband IPv4 or IPv6 address, click the respective tabs and complete the required fields.

If you do not find the policies you need for each of these configurations, you can create them from this panel.

## Associating a Service Profile with a Server or Server Pool

Follow this procedure if you did not associate the service profile with a blade server or server pool when you created it, or to change the blade server or server pool with which a service profile is associated.

### Procedure

**Step 1** In the **Navigation** pane, click **Servers**.

**Step 2** Expand **Servers > Service Profiles**.

**Step 3** Expand the node for the organization that contains the service profile that you want to associate with a new server or server pool.

If the system does not include multi tenancy, expand the **root** node.

**Step 4** Right-click the service profile you want to associate with a server and select **Associate Service Profile**.

**Step 5** In the **Associate Service Profile** dialog box, select one of the following options:

Option	Description
<b>Server Pool</b>	Select a server pool from the drop-down list. Cisco UCS Manager assigns a server from this pool to the service profile.  Continue with Step 7.
<b>Server</b>	Navigate to the desired available server in the navigation tree and select the server which will be assigned to the service profile.  Continue with Step 7.
<b>Custom Server</b>	Specifies the chassis and slot that contains the server that will be assigned to the service profile. If the server is not in the slot or is otherwise unavailable, the service profile will be associated with the server when it becomes available.  Continue with Step 6.

**Step 6** If you chose **Custom Server**, do the following:

- a) In the **Chassis Id** field, enter the number of the chassis where the selected server is located.
- b) In the **Server Id** field, enter the number of the slot where the selected server is located.

**Step 7** If you want to restrict the migration of the service profile after it is associated with a server, check the **Restrict Migration** check box.

If you choose not to restrict migration, Cisco UCS Manager does not perform any compatibility checks on the new server before migrating the existing service profile. If the hardware of both servers are not similar, the association might fail.

**Step 8** Click **OK**.

## Verifying Fibre Channel Zoning Configuration

Verify that the zone configuration and zoneset activation works properly.

### Procedure

**Step 1** In the **Navigation** pane, click the **Servers** tab.

**Step 2** On the **Servers** tab, expand **Servers > Service Profiles**.

**Step 3** Navigate to and click the service profile you created previously.

**Step 4** Click the **FC Zones** tab in the right pane.

Verify that:

- The initiator and target WWPN are in the same zone.
- The zone Admin State is Applied
- The Oper State is Active

**Note** UCS Manager automatically creates the zone name. The zone naming convention is ClusterName\_FabricID\_ZoneID\_ServiceProfileName\_InitiatorName.

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## Troubleshooting Fibre Channel Zoning Configuration

If you create a service profile, but cannot see the zones under the FC Zones tab, use this troubleshooting checklist:

- Is the zoning enabled on the intended VSAN?
- Is the service profile associated?  
Zones are created only when the service profile is associated with the server.
- Is the correct storage connection policy selected under vHBA initiator groups?
- Is the correct VHBA added to the correct vHBA initiator group?
- Is the correct VSAN selected for the vHBAs?
- Are the correct VSAN and fabric selected under the storage connection policy?