C H A P T E R **11**

Managing IP Storage Services

Cisco MDS 9000 Family switches can route FCIP and iSCSI IP storage services independently, allowing servers to connect to a storage network using Fibre Channel or IP. Using open-standard IP-based technology, the Cisco MDS 9000 Family IP storage services enable you to consolidate remote SAN islands using FCIP, and to extend SAN connectivity to IP-enabled servers using iSCSI protocols.

Fabric Manager allows you to configure and monitor FCIP and iSCSI storage services on multiple Cisco 9000 switches. Device Manager allows you to configure and monitor these services on a single Cisco 9000 switch.

For information about configuring FCIP and iSCSI storage services using the command-line interface (CLI), refer to the *Cisco 9000 Family Configuration Guide*.

To learn more about managing IP storage services, refer to the following topics:

- IP Storage Services Module, page 11-5
- Managing Gigabit Ethernet Interfaces, page 11-6
- Managing FCIP, page 11-6
- Managing iSCSI Services, page 11-6

IP Storage Services Module

The IP Storage Services (IPS) module must be installed in your Cisco MDS 9000 Family switch before you can manage FCIP and iSCSI services on that switch. It integrates seamlessly into the Cisco MDS 9000 Family, and supports the full range of services available on the switching modules, including VSANs, security, and traffic management. Traffic can be forwarded between any IP storage port and any other port on a Cisco MDS 9000 Family switch.

The IPs module can be used in any Cisco MDS 9500 or 9200 series switch, and has eight SFP Gigabit Ethernet (Gig-E) ports, and it is hot-swappable. Each port can run FCIP and iSCSI protocols simultaneously.

- FCIP — FCIP transports Fibre Channel frames transparently over an IP network between two Cisco MDS 9000 Family switches or other FCIP standards-compliant devices.
- iSCSI — The IPS module provides IP hosts access to Fibre Channel storage devices. The IP host-initiated SCSI commands are encapsulated in IP and sent to a Cisco MDS 9000 port. At this point, the commands are routed from the IP network into a Fibre Channel network and forwarded to the intended target.

Managing Gigabit Ethernet Interfaces

The Gigabit Ethernet ports on the IPS module can only be used to perform IP storage services like iSCSI and FCIP. This port does not bridge ethernet frames or route IP packets. A new port mode option, **IPS mode**, is defined for Gigabit Ethernet ports. IP storage ports are implicitly set to IPS mode (so they only perform IP storage functionality). You can use an IPS module to perform either iSCSI or FCIP storage services.

The Gigabit Ethernet interface must be configured with an IP address before it can perform IP storage services functions. When one Cisco MDS 9000 Family switch connects to another Cisco MDS 9000 Family switch via the IPS modules, the following apply:

- The two switches are connected through a virtual ISL running on the FCIP tunnel. The endpoints of the virtual ISL are two virtual E ports.
- The virtual E ports become virtual TE ports if trunking is enabled, and the connecting link is a virtual EISL.

Refer to the *Cisco 9000 Family Configuration Guide* if there are problems.

Procedures for configuring Gigabit Ethernet interfaces include:

- Configuring Gigabit Ethernet Interfaces, page 11-7

Managing FCIP

Fibre Channel over TCP/IP (FCIP) is a service that allows islands of Fibre Channel SANs to be interconnected over IP networks to form a unified SAN — a single Fibre Channel fabric. These connections are referred to as "FCIP tunnels."

This section describes two ways to create FCIP tunnels. You can use the Device Manager, or you can use the FCIP Wizard to create tunnels using the Fabric Manager. See the "Creating FCIP Tunnels with Fabric Manager" section on page 11-10 for this information.

Procedures for creating and managing FCIP include:

- Assigning FCIP Profiles, page 11-8
- Creating Tunnels, page 11-8
- Verifying Interfaces, page 11-9
- Verifying Extended Link Protocols, page 11-9
- Checking Trunk Status, page 11-10
- Checking for Interface Errors, page 11-10

Managing iSCSI Services

Cisco MDS 9000 Family iSCSI storage services provide IP hosts with access to Fibre Channel storage devices as if each storage device were directly attached to the hosts. The switch transparently presents each IP host to the storage device as if each host were an Fibre Channel host. iSCSI services create virtual iSCSI targets and maps them to physical Fibre Channel targets available in the Fibre Channel SAN. It presents the iSCSI targets to IP hosts as if the physical targets were directly attached to the hosts.

In conjunction with presenting iSCSI targets to hosts, iSCSI Service presents each IP host as an Fibre Channel host, i.e. Host Bus Adaptor (HBA) to the storage device. The storage device is aware of each IP host and responds to each IP host as if it were an Fibre Channel host connected to the storage device.

For more information on iSCSI services, see the *Cisco 9000 Family Configuration Guide*.

Procedures for managing iSCSI include:

- Specifying Targets, page 11-11
- Specifying LUN Mappings, page 11-12
- Viewing iSCSI Statistics, page 11-12
- Viewing iSCSI Sessions, page 11-13
- Viewing Session Statistics, page 11-14
- Creating an iSCSI Initiator, page 11-14

Configuring Gigabit Ethernet Interfaces

Each port or interface on the IPS module is displayed in the Ethernet Port dialog.

To configure Ethernet port interfaces, do the following:

Step 1   Be sure you are connected to a switch that contains an IPS module.

Step 2   Open Device Manager.

Step 3   Select any Ethernet port by clicking on it once.

Step 4   Select Gigabit Ethernet Ports from the Interfaces menu. All Gigabit Ethernet ports for the switch are displayed in a table.

Step 5   To configure the alias, state, or IP address for a particular port, double-click on the appropriate table cell.

Step 6   Enter the alias, IP address, or state for the port.

Step 7   Click Apply.

Note   You can access the field descriptions for the windows or dialog boxes in this procedure in the Reference section of the Fabric Manager or Device Manager help systems.

Creating FCIP Tunnels with Device Manager

To create and manage FCIP tunnels with Device Manager, first verify that the IPS module is inserted in the required Cisco MDS 9000 Family switches, and that the switches' Gigabit Ethernet interfaces are connected and the connectivity verified using the **ping** command. The steps in creating FCIP tunnels are:

- Assigning FCIP Profiles, page 11-8
- Creating Tunnels, page 11-8
- Verifying Interfaces, page 11-9

Assigning FCIP Profiles

You can use Device Manager to configure FCIP tunnels between switches. First, you must create FCIP profiles, and then bind the interfaces to the profile. To bind an FCIP profile to an interface, use the IP address of the interface in the FCIP profile's IP address configuration. Profile numbers range from 1 to 255. The interface associated with a profile can be either of the following:

- EtherChannel
- Ethernet subinterface slot and port (or slot, port, and VLAN ID)

To create and bind profiles on a Gigabit Ethernet interface, follow these steps.

Step 1	Be sure you are connected to a switch that contains an IPS module.
Step 2	Open Device Manager.
Step 3	Select FCIP from the IP menu.
Step 4	Click the Profiles tab if it is not already selected. The FCIP Profiles dialog is displayed. Any profiles already bound, are listed in the table along with their IP addresses.
Step 5	To add a new profile, click Create. The Create FCIP Profiles dialog is displayed.
Step 6	Enter the profile ID in the ID field.
Step 7	Select an IP address of the interface to which you want to bind the profile from the IP Address dropdown list.
Step 8	Enter all the optional information, if desired.
Step 9	When finished, click Create to add this profile to the table. Click Close to exit the Create FCIP profiles dialog without adding the profile.

> **Note** You can access the field descriptions for the windows or dialog boxes in this procedure in the Reference section of the Fabric Manager or Device Manager help systems.

Creating Tunnels

Each Gigabit Ethernet interface can have 3 active FCIP tunnels on it at one time. To create these tunnels, do the following:

Step 1	Be sure you are connected to a switch that contains an IPS module.
Step 2	Open Device Manager.
Step 3	Select FCIP from the IP menu.
Step 4	Click the Tunnels tab if it is not already selected. The FCIP Tunnels dialog is displayed. This table lists the remote IP address of the interface together with optional attributes.
Step 5	Click the Create button. The Create FCIP Tunnels dialog is displayed.
Step 6	Enter the entity ID in the ID field.
Step 7	Enter a remote IP address as the endpoint to which you want to link.

Step 8   Enter all the optional information, if desired.

Step 9   When finished, click Create to add this tunnel to the table. Click Close to exit the Create FCIP Tunnels dialog without adding the tunnel.

Note   You can access the field descriptions for the windows or dialog boxes in this procedure in the Reference section of the Fabric Manager or Device Manager help systems.

Verifying Interfaces

To verify the interfaces, do the following:

Step 1   Be sure you are connected to a switch that contains an IPS module.

Step 2   Open Device Manager.

Step 3   Select FCIP from the IP menu.

Step 4   Click the Interfaces tab if it is not already selected. The FCIP Interfaces dialog is displayed.

Note   You can access the field descriptions for the windows or dialog boxes in this procedure in the Reference section of the Fabric Manager or Device Manager help systems.

Verifying Extended Link Protocols

To verify the extended link protocol, do the following:

Step 1   Be sure you are connected to a switch that contains an IPS module.

Step 2   Open Device Manager.

Step 3   Select FCIP from the IP menu.

Step 4   Click the ELP tab if it is not already selected. The FCIP ELP dialog is displayed.

Note   You can access the field descriptions for the windows or dialog boxes in this procedure in the Reference section of the Fabric Manager or Device Manager help systems.

Checking Trunk Status

To check the trunk status, do the following:

Step 1   Be sure you are connected to a switch that contains an IPS module.

Step 2   Open Device Manager.

Step 3   Select FCIP from the IP menu.

Step 4   Click the Trunk Status tab if it is not already selected. The FCIP Trunk Status dialog is displayed.

> **Note**   You can access the field descriptions for the windows or dialog boxes in this procedure in the Reference section of the Fabric Manager or Device Manager help systems.

Checking for Interface Errors

To check for interface errors, do the following:

Step 1   Be sure you are connected to a switch that contains an IPS module.

Step 2   Open Device Manager.

Step 3   Select FCIP from the IP menu.

Step 4   Click the Interface Errors tab if it is not already selected. The FCIP Interface Errors dialog is displayed, listing FCIP-specific end-point/interface errors.

> **Note**   You can access the field descriptions for the windows or dialog boxes in this procedure in the Reference section of the Fabric Manager or Device Manager help systems.

Creating FCIP Tunnels with Fabric Manager

To create and manage FCIP tunnels with Fabric Manager, you use the FCIP Wizard. First verify that the IPS module is inserted in the required Cisco MDS 9000 Family switches, and that the switches' Gigabit Ethernet interfaces are connected and the connectivity verified. The steps in creating FCIP tunnels using the FCIP Wizard are:

- select the endpoints
- choose the interfaces' IP addresses
- specify link attributes

To create FCIP tunnels using the FCIP Wizard, follow these steps:

Step 1   Select the endpoints.

Step 2 Choose the ports' IP addresses.

Step 3 Select the link attributes.

Authenticating iSCSI Targets

To authenticate iSCSI targets, first specify the initiators. To specify initiators, perform the following steps:

Step 1 Be sure you are connected to a switch that contains an IPS module.

Step 2 Open Device Manager.

Step 3 Select iSCSI from the IP menu. The iSCSI dialog is displayed.

Step 4 Select the Initiators tab if it is not already selected.

This table lists iSCSI initiators, VSAN membership, and, if applicable, persistent node and port WWN addresses. Use the Create dialog is used to assign the VSAN and addresses.

Step 5 Click the Create button. The Create iSCSI Initiators dialog is displayed.

Step 6 Enter the initiator name in the Name field.

Step 7 Enter the VSAN membership number in the VSAN Membership field.

Step 8 Enter all the node and port information.

Step 9 When finished, click Create to add this initiator to the table. Click Close to exit the Create iSCSI initiators dialog without adding the initiator. Like physical N ports, iSCSI Initiators will appear in the Fabric Login Table.

> **Note** You can access the field descriptions for the windows or dialog boxes in this procedure in the Reference section of the Fabric Manager or Device Manager help systems.

Specifying Targets

To specify targets, perform the following steps:

Step 1 Be sure you are connected to a switch that contains an IPS module.

Step 2 Open Device Manager.

Step 3 Select iSCSI from the IP menu. The iSCSI dialog is displayed.

Step 4 Select the Targets tab if it is not already selected.

This table lists both statically assigned as well as dynamically discovered Fiber Channel targets. Use the import button to automatically discover and populate this table with existing targets. Use the Create button to assign port address or control iSCSI access to certain targets.

Step 5 Click the Create button. The Create iSCSI Targets dialog is displayed.

Step 6 Enter the target name in the Name field.

Step 7   Enter the Port WWN, node access information, and advertised interfaces information in the appropriate fields.

Step 8   When finished, click Create to add this target to the table. Click Close to exit the Create iSCSI Targets dialog without adding the target.

> **Note**   You can access the field descriptions for the windows or dialog boxes in this procedure in the Reference section of the Fabric Manager or Device Manager help systems.

Specifying LUN Mappings

To specify LUN mappings, perform the following steps:

Step 1   Be sure you are connected to a switch that contains an IPS module.

Step 2   Open Device Manager.

Step 3   Select iSCSI from the IP menu. The iSCSI dialog is displayed.

Step 4   Select the LUN Mappings tab if it is not already selected.

Step 5   Click the Create button. The Create iSCSI LUN Mappings dialog is displayed. Use this dialog to map Fiber Channel LUNs to iSCSI LUNs:

Step 6   Enter the iSCSI LUN name in the Name field.

Step 7   Enter the iSCSI LUN, Port WWN, and FC LUN information in the appropriate fields.

Step 8   When finished, click Create to add this LUN to the table. Click Close to exit the Create iSCSI LUN Mappings dialog without adding the LUN.

> **Note**   You can access the field descriptions for the windows or dialog boxes in this procedure in the Reference section of the Fabric Manager or Device Manager help systems.

Viewing iSCSI Statistics

To view iSCSI statistics, perform the following steps:

Step 1   Be sure you are connected to a switch that contains an IPS module.

Step 2   Open Device Manager.

Step 3   Select iSCSI from the IP menu. The iSCSI dialog is displayed.

Step 4   Select the Statistics tab if it is not already selected.

> **Note**   You can access the field descriptions for the windows or dialog boxes in this procedure in the Reference section of the Fabric Manager or Device Manager help systems.

Viewing iSCSI Sessions

To view iSCSI sessions, perform the following steps:

Step 1   Be sure you are connected to a switch that contains an IPS module.

Step 2   Open Device Manager.

Step 3   Select iSCSI from the IP menu. The iSCSI dialog is displayed.

Step 4   Select the Sessions tab if it is not already selected.

> **Note**   You can access the field descriptions for the windows or dialog boxes in this procedure in the Reference section of the Fabric Manager or Device Manager help systems.

Viewing Session Statistics

To view session statistics, perform the following steps:

Step 1   Be sure you are connected to a switch that contains an IPS module.

Step 2   Open Device Manager.

Step 3   Select iSCSI from the IP menu. The iSCSI dialog is displayed.

Step 4   Select the Session Statistics tab if it is not already selected.

Note   You can access the field descriptions for the windows or dialog boxes in this procedure in the Reference section of the Fabric Manager or Device Manager help systems.

Creating an iSCSI Initiator

To create an iSCSI Initiator using Device Manager, follow these steps:

Step 1   Select iSCSI from the IP menu.

Step 2   Click the Initiators tab.

Step 3   Click the Create button.

The Create Initiators dialog is displayed.

Step 4   Enter the IP address, or the IQN name created from the iSCSI driver running on the initiator. The IQN name must be at least 16 characters.

Step 5   Assign names for the node WWN and port WWN fields.

There are three options. The **Auto** option assigns the WWN from a pool of about 440,000 WWNs per switch and is returned to pool whenyou log out. The **Persistent** option also assigns the WWN from a pool. However, when you log out of the switch, the WWIN is not returned to the pool but is saved for the initiator. The third option is to statically assign wht WWN by manually entering WWN that the initiator will use.

Step 6   Select **Create** when all fields are complete, to create the initiator

Note   You can access the field descriptions for the windows or dialog boxes in this procedure in the Reference section of the Fabric Manager or Device Manager help systems.

Creating an iSCSI Virtual Target

To create an iSCSI Initiator using Device Manager, follow these steps:

Step 1   Select iSCSI from the IP menu.

Step 2   Click the Targets tab.

Step 3   Click the Create button.

The Create Targets dialog is displayed.

Step 4   Enter the the logical name to give to this virtual target.

Step 5   Click the drop-down button to the right of the pWWN field.

Step 6   Select the pWWN of the FC target that will be advertised as an iSCSI virtual target.

The drop-down list shows all pWWNs that are logged into the name server.

Step 7   Select the iSCSI initiators that will access this virtual target.

Select **All** if you want all the initators to access the target. Select **None**, and then enter in the numbers by hand (separated by commas) if you want only certain initiators to access the target.

Step 8   Select **Create** when all fields are complete, to create the virtual target.

Note   You can access the field descriptions for the windows or dialog boxes in this procedure in the Reference section of the Fabric Manager or Device Manager help systems.