C H A P T E R **57**

Configuring Port Tracking

The port tracking feature is unique to the Cisco MDS 9000 Family of switches. This feature uses information about the operational state of the link to initiate a failure in the link that connects the edge device. This process of converting the indirect failure to a direct failure triggers a faster recovery process towards redundant links. When enabled, the port tracking feature brings down the configured links based on the failed link and forces the traffic to be redirected to another redundant link.

This chapter includes the following sections:

About Port Tracking

Generally, hosts can instantly recover from a link failure on a link that is immediately (direct link) connected to a switch. However, recovering from an indirect link failure between switches in a WAN or MAN fabric with a keep-alive mechanism is dependent on several factors such as the time out values (TOVs) and on registered state change notification (RSCN) information (see the "Common Information Model" section on page 28-1 and "About RSCN Information" section on page 25-8).

In Figure 57-1, when the direct link 1 to the host fails, recovery can be immediate. However, when the ISL 2 fails between the two switches, recovery depends on TOVs, RSCNs, and other factors.

Figure 57-1   Traffic Recovery Using Port Tracking
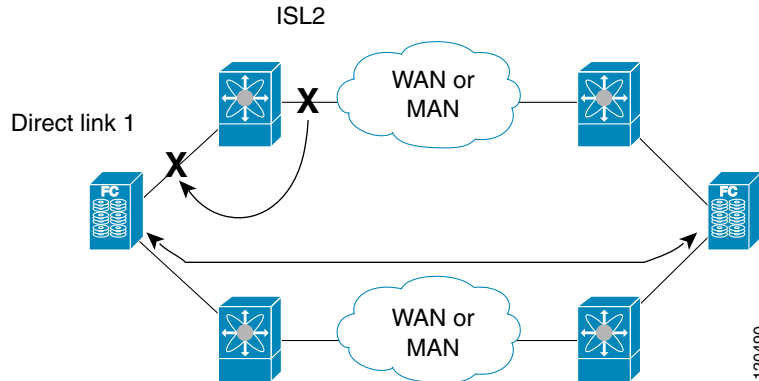
The port tracking feature monitors and detects failures that cause topology changes and brings down the links connecting the attached devices. When you enable this feature and explicitly configure the linked and tracked ports, the Cisco SAN-OS software monitors the tracked ports and alters the operational state of the linked ports on detecting a link state change.

The following terms are used in this chapter.

- Tracked ports—A port whose operational state is continuously monitored. The operational state of the tracked port is used to alter the operational state of one or more ports. Fibre Channel, VSAN, PortChannel, FCIP, or a Gigabit Ethernet port can be tracked. Generally, ports in E and TE port modes can also be Fx ports.

- Linked ports—A port whose operational state is altered based on the operational state of the tracked ports. Only a Fibre Channel port can be linked.

Port Tracking

Before configuring port tracking, consider the following guidelines:

- Verify that the tracked ports and the linked ports are on the same Cisco MDS switch.

- Be aware that the linked port is automatically brought down when the tracked port goes down.

- Do not track a linked port back to itself (for example, Port fc1/2 to Port fc2/5 and back to Port fc1/2) to avoid recursive dependency.

This section includes the following topics:

- **Forcefully Shutting Down a Tracked Port, page 57-6**

About Port Tracking

Port tracking has the following features:

- The application brings the linked port down when the tracked port goes down. When the tracked port recovers from the failure and comes back up again, the tracked port is also brought up automatically (unless otherwise configured).

- You can forcefully continue to keep the linked port down, even though the tracked port comes back up. In this case, you must explicitly bring the port up when required.

Enabling Port Tracking

The port tracking feature is disabled by default in all switches in the Cisco 9000 Family. When you enable this feature, port tracking is globally enabled for the entire switch.

To configure port tracking, enable the port tracking feature and configure the linked port(s) for the tracked port.

To enable port tracking, follow these steps:

	Command	Purpose
Step 1	switch# **config t**	Enters configuration mode.
Step 2	switch(config)# **port-track enable**	Enables port tracking.
	switch(config)# **no port-track enable**	Removes the currently applied port tracking configuration and disables port tracking.

About Configuring Linked Ports

You can link ports using one of two methods:

- Operationally binding the linked port(s) to the tracked port (default).

- Continuing to keep the linked port down forcefully—even if the tracked port has recovered from the link failure.

Operationally Binding a Tracked Port

When you configure the first tracked port, operational binding is automatically in effect. When you use this method, you have the option to monitor multiple ports or monitor ports in one VSAN.

To operationally bind a tracked port, follow these steps:

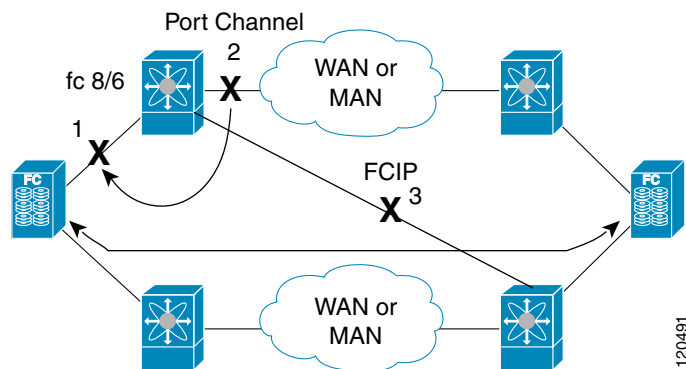|	Command	Purpose
Step 1	switch# **config t**	Enters configuration mode.
Step 2	switch(config)# **interface fc8/6** switch(config-if)#	Configures the specified interface and enters the interface configuration submode. You can now configure tracked ports. **Note** This link symbolizes the direct link (1) in Figure 57-1.

	Command	Purpose
Step 3	switch(config-if)# **port-track interface port-channel 1**	Tracks interface fc8/6 with interface port-channel 1. When port-channel 1 goes down, interface fc8/6 is also brought down.
		Note This link symbolizes the ISL (2) in Figure 57-1.
	switch(config-if)# **no port-track interface port-channel 1**	Removes the port tracking configuration that is currently applied to interface fc8/6.

About Tracking Multiple Ports

You can control the operational state of the linked port based on the operational states of multiple tracked ports. When more than one tracked port is associated with a linked port, the operational state of the linked port will be set to down only if all the associated tracked ports are down. Even if one tracked port is up, the linked port will stay up.

In Figure 57-2, only if both ISLs 2 and 3 fail, will the direct link 1 be brought down. Direct link 1 will not be brought down if either 2 or 3 are still functioning as desired.

Figure 57-2   Traffic Recovery Using Port Tracking

Tracking Multiple Ports

To track multiple ports, follow these steps:

	Command	Purpose
Step 1	switch# **config t**	Enters configuration mode.
Step 2	switch(config)# **interface fc8/6**	Configures the specified interface and enters the interface configuration submode. You can now configure tracked ports.
		Note This link symbolizes the direct link (1) in Figure 57-2.

	Command	Purpose
Step 3	switch(config-if)# **port-track interface port-channel 1**	Tracks interface fc8/6 with interface port-channel 1. When port-channel 1 goes down, interface fc8/6 is also brought down. **Note** This link symbolizes the ISL (2) in Figure 57-2.
Step 4	switch(config-if)# **port-track interface fcip 5**	Tracks interface fc8/6 with interface fcip 5. When FCIP 5 goes down, interface fc8/6 is also brought down. **Note** This link symbolizes the ISL (3) in Figure 57-2.

About Monitoring Ports in a VSAN

You can optionally configure one VSAN from the set of all operational VSANs on the tracked port with the linked port by specifying the required VSAN. This level of flexibility provides higher granularity in tracked ports. In some cases, when a tracked port is a TE port, the set of operational VSANs on the port can change dynamically without bringing down the operational state of the port. In such cases, the port VSAN of the linked port can be monitored on the set of operational VSANs on the tracked port.

If you configure this feature, the linked port is up only when the VSAN is up on the tracked port.

Tip   The specified VSAN does not have to be the same as the port VSAN of the linked port.

Monitoring Ports in a VSAN

To monitor a tracked port in a specific VSAN, follow these steps:

	Command	Purpose
Step 1	switch# **config t**	Enters configuration mode.
Step 2	switch(config)# **interface fc8/6**	Configures the specified interface and enters the interface configuration submode. You can now configure tracked ports.
Step 3	switch(config-if)# **port-track interface port-channel 1 vsan 2**	Enables tracking of the PortChannel in VSAN 2.
	switch(config-if)# **no port-track interface port-channel 1 vsan 2**	Removes the VSAN association for the linked port. The PortChannel link remains in effect.

AboutForceful Shutdown

If a tracked port flaps frequently, then tracking ports using the operational binding feature may cause frequent topology change. In this case, you may choose to keep the port in the down state until you are able to resolve the reason for these frequent flaps. Keeping the flapping port in the down state forces the traffic to flow through the redundant path until the primary tracked port problems are resolved. When the problems are resolved and the tracked port is back up, you can explicitly enable the interface.

Tip   If you configure this feature, the linked port continues to remain in the shutdown state even after the tracked port comes back up. You must explicitly remove the forced shut state (by administratively bringing up this interface) of the linked port once the tracked port is up and stable.

Forcefully Shutting Down a Tracked Port

To forcefully shut down a tracked port, follow these steps:

	Command	Purpose
Step 1	switch# **config t**	Enters configuration mode.
Step 2	switch(config)# **interface fc1/5**	Configures the specified interface and enters the interface configuration submode. You can now configure tracked ports.
Step 3	switch(config-if)# **port-track force-shut**	Forcefully shuts down the tracked port.
	switch(config-if)# **no port-track force-shut**	Removes the port shutdown configuration for the tracked port.

Displaying Port Tracking Information

The **show** commands display the current port tracking settings for the Cisco MDS switch (see Examples 57-1 to 57-4).

Example 57-1   Displays the Linked and Tracked Port Configuration

```
switch# show interface
...
fc8/6 is down (All tracked ports down)       <-------------------------------------Linked port
    Hardware is Fibre Channel, FCOT is short wave laser
    Port WWN is 21:c6:00:05:30:00:37:1e
    Admin port mode is auto, trunk mode is on
    Port vsan is 1
    Receive data field Size is 2112
    Beacon is turned off
    Port tracked with interface port-channel 1 vsan 2 (trunking) <-----Tracked port
    Port tracked with interface fcip 5 <-----------------------------------------Tracked port
    5 minutes input rate 0 bits/sec, 0 bytes/sec, 0 frames/sec
    5 minutes output rate 0 bits/sec, 0 bytes/sec, 0 frames/sec
      269946 frames input, 22335204 bytes
        0 discards, 0 errors
        0 CRC,  0 unknown class
        0 too long, 0 too short
      205007 frames output, 10250904 bytes
        0 discards, 0 errors
      0 input OLS, 0 LRR, 0 NOS, 0 loop inits
      2 output OLS, 2 LRR, 0 NOS, 1 loop inits
      0 receive B2B credit remaining
      0 transmit B2B credit remaining
...
```

Example 57-2   Displays a Tracked Port Configuration for a Fibre Channel Interface

```
switch# show interface fc1/1
fc1/1 is down (Administratively down)
    Hardware is Fibre Channel, FCOT is short wave laser w/o OFC (SN)
    Port WWN is 20:01:00:05:30:00:0d:de
    Admin port mode is FX
    Port vsan is 1
    Receive data field Size is 2112
```

```
          Beacon is turned off
          Port tracked with interface fc1/2 (down)
          Port tracked with interface port-channel 1 vsan 2 (down)
          Port tracked with interface fcip1 (down)
          5 minutes input rate 0 bits/sec, 0 bytes/sec, 0 frames/sec
          5 minutes output rate 0 bits/sec, 0 bytes/sec, 0 frames/sec
            1 frames input, 128 bytes
              0 discards, 0 errors
              0 CRC,   0 unknown class
              0 too long, 0 too short
            1 frames output, 128 bytes
              0 discards, 0 errors
            0 input OLS, 0 LRR, 0 NOS, 0 loop inits
            0 output OLS, 0 LRR, 0 NOS, 0 loop inits
            0 receive B2B credit remaining
            0 transmit B2B credit remaining
```

Example 57-3   Displays a Tracked Port Configuration for a PortChannel Interface

```
switch# show interface port-channel 1
port-channel 1 is down (No operational members)
    Hardware is Fibre Channel
    Port WWN is 24:01:00:05:30:00:0d:de
    Admin port mode is auto, trunk mode is on
    Port vsan is 2
    Linked to 1 port(s)
      Port linked to interface fc1/1
    5 minutes input rate 0 bits/sec, 0 bytes/sec, 0 frames/sec
    5 minutes output rate 0 bits/sec, 0 bytes/sec, 0 frames/sec
      0 frames input, 0 bytes
        0 discards, 0 errors
        0 CRC,   0 unknown class
        0 too long, 0 too short
      0 frames output, 0 bytes
        0 discards, 0 errors
      0 input OLS, 0 LRR, 0 NOS, 0 loop inits
      0 output OLS, 0 LRR, 0 NOS, 0 loop inits
    No members
```

Example 57-4   Displays a Forced Shutdown Configuration

```
switch# show interface fc 1/5

fc1/5 is up
    Hardware is Fibre Channel, FCOT is short wave laser
    Port WWN is 20:05:00:05:30:00:47:9e
    Admin port mode is F
    Port mode is F, FCID is 0x710005
    Port vsan is 1
    Speed is 1 Gbps
    Transmit B2B Credit is 64
    Receive B2B Credit is 16
    Receive data field Size is 2112
    Beacon is turned off
    Port track mode is force_shut <--this port remains shut even if the tracked port is back up
```

Default Port Tracking Settings

Table 57-1 lists the default settings for port tracking parameters.

Table 57-1   Default Port Tracking Parameters

Parameters	Default
Port tracking	Disabled.
Operational binding	Enabled along with port tracking.