Feature Mode for IE 4000 Switches

Configuring Feature Mode

Information About Feature Mode

Use Feature Mode on the IE 4000 to turn certain software features assisted by FPGA on or off. IoT protocols such as Time Sensitive Networking (TSN), Parallel Redundancy Protocol (PRP), and High-Availability Seamless Redundancy (HSR) rely heavily on field-programmable gate array (FPGA) implementation. Feature Mode allows for efficient allocation of platform resources for the operation of multiple time sensitive, resilient industrial protocols without changes to hardware. There is no need to load additional software files to the IE 4000 for FPGA assisted features; a single Cisco IOS tar image provides the option to switch between feature modes.

The IE 4000 supports the following feature modes:

- Media Redeundancy Protocol (MRP) mode

- HSR mode

- TSN mode

The default feature mode is MRP and it is embedded in the Cisco IOS binary image. The HSR and TSN mode files are bundled in the IE 4000 Cisco IOS tar image.

By default, all feature modes support Precision Time Protocol (PTP) and IOx. All feature modes except for TSN mode support Network Address Translation (NAT) and Parallel Redundancy Protocol (PRP). The following table summarizes feature mode support. For each feature mode and feature, the table lists the supported number of ports. (IOx is not a port-specific feature; "Yes" indicates that it is supported for the feature mode.)

Table 1: Feature Mode Port Support Summary

Feature Mode	PTP	NAT	SGT	IOx	PRP	HSR	MRP	TSN
MRP	All	4	All	Yes	4	0	6	0
HSR	All	4	All	Yes	4	4	0	0
TSN	All	0	All	Yes	0	0	0	16

Prerequisites

- Make sure that the Cisco IOS tar image is installed before changing the feature mode. If only the binary image is installed, the FPGA files needed to change the feature mode, which are available only in the installed tar directory, are not available and the operation fails. MRP is the default mode that is included in the binary image.

- Before changing the feature mode, we suggest that you remove the configurations related to the current active feature mode, because those configurations are not valid for the new mode.

Guidelines and Limitations

- A switch reload is required for a feature mode change to take effect.

- In a running system, if you deactivate the current active feature mode and reload the switch, the default mode (MRP) will be applied.

- If you change the feature mode from MRP to HSR or TSN, any MRP configurations and the ability to use MRP are removed.

- If you activate HSR or TSN feature modes and the required FPGA files are not available after the switch is reloaded, this may be because the tar image is not installed or the boot variable is not pointing to the install directory. In this scenario, the switch uses the default feature mode and the HSR or TSN features are not available for use. You can use the command **show platform hw-profile active** to see a mismatch in the FPGA configuration.

Default Settings

The default feature mode is MRP.

To return feature mode to MRP from another mode, deactivate the active mode and reload. MRP feature mode cannot be explicitly made active.

Changing the Feature Mode

Use this procedure to change the feature mode on the switch.

Before You Begin

Make sure that the Cisco IOS tar image is installed before changing the feature mode. (See Prerequisites, on page 2.)

Procedure

Step 1 In privileged exec mode, specify the feature mode you want to activate:
```
Switch# license right-to-use activate <feature_mode>
```
where *feature_mode* is one of the following:

- hsr—Right To Use license for HSR

- mrp-client—Right To Use license for MRP Client

- mrp-manager—Right To Use license for MRP Manager

- tsn—Right To Use license for TSN

For the change to take effect, the switch must be reloaded. Confirm the reload when prompted and wait for the switch to reload and boot.

Step 2 (Optional) To deactivate a feature mode, in privileged exec mode, enter:
```
Switch# license right-to-use deactivate <feature_mode>
```
where *feature_mode* is the current active feature mode.

For the change to take effect, the switch must be reloaded. Confirm the reload when prompted and wait for the switch to reload and boot.

```
Switch# license right-to-use activate ?
hsr Right To Use license for HSR
ipservices IPServices License Level
lanbase LanBase License Level
mrp-client Right To Use license for MRP Client
mrp-manager Right To Use license for MRP Manager
tsn Right To Use license for TSN
Switch# license right-to-use activate hsr
.
.
.
Switch# show ver | inc Feature
Feature Mode : 0x25 Enabled: HSR (Disabled: MRP TSN)

Switch# license right-to-use deactivate ?
hsr Right To Use license for HSR
ipservices IPServices License Level
lanbase LanBase License Level
Switch# license right-to-use deactivate hsr
```

Verifying Configuration

Command	Purpose
show version | inc feature	Displays the feature mode that is currently active.
show platform hw-profile active	Displays detailed information about the configured and active feature mode and FPGA version.

This example shows the output of **show version | inc feature** when HSR feature mode is activated:

```
Switch# show version | inc Feature
Feature Mode                  : 0x25 Enabled: HSR (Disabled: MRP TSN)
```

This example shows the output of **show platform hw-profile active** when HSR feature mode is activated:

```
Switch# show platform hw-profile active
Current active fpga application profile: HSR
Feature Set: PTP SGT IOX PRP HSR
Version: 0.44
Active Since: 19:40:33 UTC Sat May 27 2017
Configured fpga application profile: HSR
Feature Set: PTP SGT IOX PRP HSR
```

Configuration Example

This example shows setting the feature mode for HSR:

```
Switch# license right-to-use activate hsr
```

Related Documents

- Cisco Industrial Ethernet 4000 Series Switches

Feature History

Feature Name	Release	Feature Information
Feature Mode	Cisco IOS Release 15.2(6)E	Initial support on IE 4000.