Configuring Parallel Redundancy Protocol (PRP)

This chapter provides details about configuring Parallel Redundancy Protocol (PRP) on the Cisco IR8340 Router.

Information About PRP

Parallel Redundancy Protocol (PRP) is defined in the International Standard IEC 62439-3. PRP is designed to provide hitless redundancy (zero recovery time after failures) in Ethernet networks.

To recover from network failures, redundancy can be provided by network elements connected in mesh or ring topologies using protocols like RSTP, REP, or MRP, where a network failure causes some reconfiguration in the network to allow traffic to flow again (typically by opening a blocked port). These schemes for redundancy can take between a few milliseconds to a few seconds for the network to recover and traffic to flow again.

PRP uses a different scheme, where the end nodes implement redundancy (instead of network elements) by connecting two network interfaces to two independent, disjointed, parallel networks (LAN-A and LAN-B). Each of these Dually Attached Nodes (DANs) then have redundant paths to all other DANs in the network.

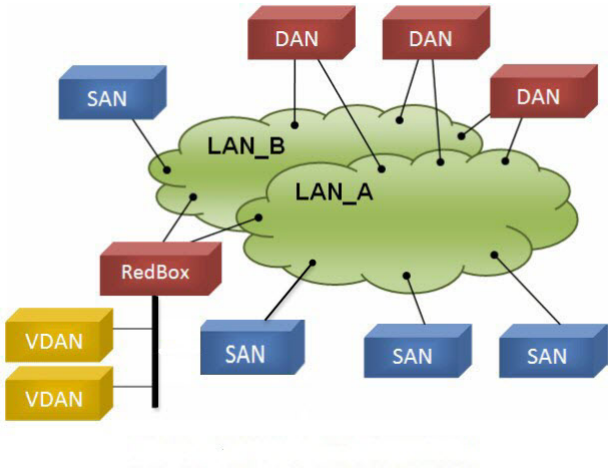
The DAN sends two packets simultaneously through its two network interfaces to the destination node. A redundancy control trailer (RCT), which includes a sequence number, is added to each frame to help the destination node distinguish between duplicate packets. When the destination DAN receives the first packet successfully, it removes the RCT and consumes the packet. If the second packet arrives successfully, it is discarded. If a failure occurs in one of the paths, traffic continues to flow over the other path uninterrupted, and zero recovery time is required.

Non-redundant endpoints in the network that attach only to either LAN-A or LAN-B are known as Singly Attached Nodes (SANs).

A Redundancy Box (RedBox) is used when an end node that does not have two network ports and does not implement PRP needs to implement redundancy. Such an end node can connect to a RedBox, which provides connectivity to the two different networks on behalf of the device. Because a node behind a RedBox appears

for other nodes like a DAN, it is called a Virtual DAN (VDAN). The RedBox itself is a DAN and acts as a proxy on behalf of its VDANs.

Figure 1: PRP Redundant Network



PRP Channels

PRP channel or channel group is a logical interface that aggregates two Gigabit Ethernet interfaces (access, trunk, or routed) into a single link. In the channel group, the lower numbered Gigabit Ethernet member port is the primary port and connects to LAN_A. The higher numbered port is the secondary port and connects to LAN_B. The PRP channel remains up as long as at least one of these member ports remains up and sends traffic. When both member ports are down, the channel is down. The total number of supported PRP channel groups is 2 per router, and the interfaces that can be utilized for each group are fixed.

- PRP channel group 1 always uses Gi0/1/4 for LAN_A and Gi0/1/5 for LAN_B
- PRP channel group 2 always uses Gi0/1/6 for LAN_A and Gi0/1/7 for LAN_B

Creating a PRP Channel and Group

To create and enable a PRP channel and group, follow these steps:

Procedure

Step 1 Enter global configuration mode:

configure terminal

Step 2 Assign two Gigabit Ethernet interfaces to the PRP channel group:

interface {**GigabitEthernet 0/1/4** | **GigabitEthernet 0/1/5**}

Use the **no interface prp-channel 1|2** command to disable PRP on the defined interfaces and shut down the interfaces.

Note You must apply the Gi 0/1/4 interface before the Gi 0/1/5 interface. So, we recommend using the **interface range** command. Similarly, you must apply the Gi 0/1/6 interface before the Gi 0/1/7 interface.

Step 3 (Optional) For Layer 2 traffic, enter **switchport**. (Default):

switchport

Note For Layer 3 traffic, enter **no switchport**.

Step 4 (Optional) Set a non-trunking, non-tagged single VLAN Layer 2 (access) interface:

switchport mode access

Step 5 (Optional) Create a VLAN for the Gi 0/1/4 and Gi 0/1/5 interfaces:

switchport access vlan <*value*>

Note Only required for Layer 2 traffic.

Step 6 (Optional) Disable Precision Time Protocol (PTP) on the switch:

no ptp enable

PTP is enabled by default. You can disable it if you do not need to run PTP.

Step 7 Disable loop detection for the redundancy channel:

no keepalive

Step 8 Disable UDLD for the redundancy channel:

udld port disable

Step 9 Enter sub-interface mode and create a PRP channel group:

prp-channel-group *prp-channel group*

prp-channel group—Value of 1 or 2

The two interfaces that you assigned in step 2 are assigned to this channel group.

The **no** form of this command is not supported.

Step 10 Bring up the PRP channel:

no shutdown

Step 11 Specify the PRP interface and enter interface mode:

interface prp-channel *prp-channel-number*

prp-channel-number—Value of 1 or 2

Step 12 Configure bpdufilter on the prp-channel interface:

spanning-tree bpdufilter enable

Spanning-tree BPDU filter drops all ingress/egress BPDU traffic. This command is required to create independent spanning-tree domains (zones) in the network.

Step 13 (Optional) Configure LAN-A/B ports to quickly get to FORWARD mode:

spanning-tree portfast edge trunk

This command is optional but highly recommended. It improves the spanning-tree convergence time on PRP RedBoxes and LAN-A and LAN-B switch edge ports. It is also highly recommended to configure this command on the LAN_A/LAN_B ports directly connected to a RedBox PRP interface.

Clearing All Node Table and VDAN Table Dynamic Entries

To clear all dynamic entries in the node table, enter

clear prp node-table [**channel-group** *group*]

To clear all dynamic entries in the VDAN table, enter

clear prp vdan-table [**channel-group** *group*]

If you do not specify a channel group, the dynamic entries are cleared for all PRP channel groups.

Note The **clear prp node-table** and **clear prp vdan-table** commands clear only dynamic entries. To clear static entries, use the **no** form of the **nodeTableMacaddress** or **vdanTableMacaddress** commands.

Disabling the PRP Channel and Group

Procedure

Step 1 Enter global configuration mode:

configure terminal

Step 2 Disable the PRP channel:

no interface prp-channel *prp-channel-number*

prp-channel number— Value of 1 or 2

Step 3 Exit interface mode:

exit

PRP Mode LED

The REDUN (Redundancy status) LED is on the faceplate. The router supports the following states.

Label Description	Color and State	Description
REDUN (Redundancy status)	Green (solid)	Redundancy protocols are configured and active.
	Amber (solid)	Redundancy fault detected.

Verifying Configuration

Command	Purpose
show prp control {**ptpLanOption** | **ptpProfile** | **supervisionFrameLifeCheckInterval** | **supervisionFrameOption** | **supervisionFrameRedboxMacaddress** | **supervisionFrameTime** | **nodeForgetTime** | **entryForgetTime** | **nodeRebootIntervalTime** | **pauseFrameTime**}	Displays PRP control information and supervision frame information.
show prp statistics {**egressPacketStatistics** | **ingressPacketStatistics** | **nodeTableStatistics** | **pauseFrameStatistics** | **ptpPacketStatistics**}	Displays statistics for PRP components.