



## PfRv3 Intelligent Load Balance

The Performance Routing v3 (PfRv3) Intelligent Load Balance feature helps to move the traffic-classes based on the remote ingress interface, if the remote interface is overrun the bandwidth threshold. It validates remote interface ingress bandwidth when choosing the path. The PfRv3 Intelligent Load Balance feature detects the remote bandwidth overrun at the earliest and helps to reduce the packet drop caused by per tunnel QoS and increases the bandwidth utilization.

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## Feature Information for PfRv3 Intelligent Load Balance

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to [www.cisco.com/go/cfn](http://www.cisco.com/go/cfn). An account on Cisco.com is not required.

**Table 1: Feature Information for PfRv3 Intelligent Load Balance**

| Feature Name                   | Releases           | Feature Information                                                                                                                                                                                                                                                                                          |
|--------------------------------|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PfRv3 Intelligent Load Balance | Cisco IOS XE 16.11 | <p>The Performance Routing v3 (PfRv3) Intelligent Load Balance feature helps to move the traffic-classes (TC) based on the remote ingress interface, if the remote interface is overrun the bandwidth threshold.</p> <p>The following command was introduced:<br/><b>remote-ingress-bandwidth-check.</b></p> |

## Prerequisites for PfRv3 Intelligent Load Balance

You must upgrade master hub software version to 16.11 or later. The spoke sites that require PfRv3 Intelligent Load Balance feature must be upgraded to version 16.11 or later. However, It is not mandatory to upgrade the spoke sites that do not use the PfRv3 intelligent Load Balance feature to the recommended versions.

## Restrictions for PfRv3 Intelligent Load Balance

- The PfRv3 Intelligent Load balance supports the traffic only from hub to spoke.
- Only the default traffic classes are load-balanced among paths when the WAN interface is overrun in remote spoke sites.
- Remote bandwidth check is only supported on the hub or on the transit hub.
- Remote bandwidth TCA is sent from branch to hub or from branch to transit hub only.

## Information About PfRv3 Intelligent Load Balance

## How to Configure PfRv3 Intelligent Load Balance

### Configuring PfRv3 Intelligent Load Balance

#### SUMMARY STEPS

1. `enable`
2. `configure terminal`
3. `domain iwan`
4. `vrf default`
5. `master hub`
6. `load-balance`
7. `load-balance advanced`
8. `path-preference INET1 fallback MPLS1`
9. `advanced`
10. `remote-ingress-bandwidth-check max 75`
11. `exit`

#### DETAILED STEPS

|        | Command or Action   | Purpose                       |
|--------|---------------------|-------------------------------|
| Step 1 | <code>enable</code> | Enables privileged EXEC mode. |

|                | Command or Action                                                                                                                                 | Purpose                                                                                                                                                                                                                                                                                                                  |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                | <b>Example:</b><br>Device> enable                                                                                                                 | <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>                                                                                                                                                                                                                                     |
| <b>Step 2</b>  | <b>configure terminal</b><br><b>Example:</b><br>Device# configure terminal                                                                        | Enters global configuration mode.                                                                                                                                                                                                                                                                                        |
| <b>Step 3</b>  | <b>domain iwan</b><br><b>Example:</b><br>Device(config)# domain iwan                                                                              | Enters domain iwan configuration mode.                                                                                                                                                                                                                                                                                   |
| <b>Step 4</b>  | <b>vrf default</b><br><b>Example:</b><br>Device(config-domain)# vrf default                                                                       | Configures Virtual Routing and Forwarding (VRF) for the default domain.                                                                                                                                                                                                                                                  |
| <b>Step 5</b>  | <b>master hub</b><br><b>Example:</b><br>Device(config-domain-vrf)# master hub                                                                     | Configures the device as a master hub and enters master controller configuration mode.                                                                                                                                                                                                                                   |
| <b>Step 6</b>  | <b>load-balance</b><br><b>Example:</b><br>Device(config-domain-vrf-mc)# load-balance                                                              | Enables load balance.                                                                                                                                                                                                                                                                                                    |
| <b>Step 7</b>  | <b>load-balance advanced</b><br><b>Example:</b><br>Device(config-domain-vrf-mc)# load balance advanced                                            | (Optional) Enables advanced mode of VRF on master hub.                                                                                                                                                                                                                                                                   |
| <b>Step 8</b>  | <b>path-preference INET1 fallback MPLS1</b><br><b>Example:</b><br>Device(config-domain-vrf-mc-load-balance)# path-preference INET1 fallback MPLS1 | Specifies the path preference name and the fallback path(s) preference to use when the primary path(s) are out of policy.                                                                                                                                                                                                |
| <b>Step 9</b>  | <b>advanced</b><br><b>Example:</b><br>Device(config-domain-vrf-mc-load-balance)# advanced                                                         | Enters advanced configuration mode.                                                                                                                                                                                                                                                                                      |
| <b>Step 10</b> | <b>remote-ingress-bandwidth-check max 75</b><br><b>Example:</b><br>Device(config-domain-vrf-mc-advanced)# remote-ingress-bandwidth-check max 75   | (Optional) Enables to change the value of remote bandwidth threshold. The default value of remote bandwidth threshold is 75%. You should change the remote bandwidth threshold followed by per tunnel QoS.<br><br><b>Note</b> Remote spoke site sends out BW-TCA, if WAN interface BW utilization exceeds the threshold. |

|         | Command or Action                                                             | Purpose                                                              |
|---------|-------------------------------------------------------------------------------|----------------------------------------------------------------------|
| Step 11 | <b>exit</b><br><b>Example:</b><br>Device (config-domain-vrf-mc-advanced) exit | Exits border configuration mode and returns to privileged EXEC mode. |

### What to do next

The remote BW percentage must be configured after configuring PfRv3 Intelligent Load Balance.

## Verifying PfRv3 Intelligent Load Balance

Use the following commands to verify PfRv3 intelligent load balance configuration:

- **show domain *domain-name* vrf *vrf-name* master exists**
- **show domain *domain-name* vrf *vrf-name* master exists *site-id* path-id**

## Example: Configuring PfRv3 Intelligent Load Balance

```
domain iwan
vrf default
master hub
load-balance advanced
path-preference INET1 fallback MPLS1
advanced
remote-ingress-bandwidth-check max 75
```

## Example: Verifying PfRv3 Intelligent Load Balance

The following is an example output from the **show domain iwan master exists** command.

```
Device#show domain iwan master exists
BR address: 168.254.0.2 | Name: Tunnel10 | type: external | Path: MPLS1 | path-id: 11 |
PLR TCs: 0

    Egress capacity: 1000000 Kbps | Egress BW: 2 Kbps | Ideal:1078 Kbps | under: 1076
Kbps | Egress Utilization: 0 %
    Ingress capacity: 1000000 Kbps | Ingress BW: 1076 Kbps | Ingress Utilization: 0 %

BR address: 168.254.0.3 | Name: Tunnel20 | type: external | Path: INET1 | path-id: 12 |
PLR TCs: 0
    Egress capacity: 1000000 Kbps | Egress BW: 1076 Kbps | Ideal:1078 Kbps | under: 2
Kbps | Egress Utilization: 0 %
    Ingress capacity: 1000000 Kbps | Ingress BW: 2 Kbps | Ingress Utilization: 0 %
DSCP: default[0]-Number of Traffic Classes[1]
```

The following is an example output from the **show domain iwan master exists 168.254.0.9 path-id** command.

```
Device#domain iwan master exists 168.254.0.9 path-id
Site id : 168.254.0.9
Site mc type : Branch
Border Address : 168.254.0.9
    Service provider: MPLS1 path-id: 11 if_index: 28 bandwidth: 2000Kbps
bw-from-local-to-remote: 0Kbps Address: NA
```

```
Service provider: INET1 path-id: 12 if_index: 29 bandwidth: 300000Kbps  
bw-from-local-to-remote: 1040Kbps Address: NA
```

