



## PfRv3 Per Interface Probe Tuning

The PfRv3 Per Interface Probe Tuning feature provides the flexibility to specify different profiles for a channel associated with an interface thereby allowing you to measure the metrics of a channel.

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## Feature Information for PfRv3 Per Interface Probe Tuning

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 Per Interface Probe Tuning**

Feature Name	Releases	Feature Information
PfRv3 Per Interface Probe Tuning	Cisco IOS XE Everest 16.6.1	The following commands were introduced or modified: <b>domain smart-probe</b> , <b>smart-probe</b> , <b>show platform hardware qfp active feature pfrv3</b> , <b>show platform software pfrv3</b> .

## Prerequisites for PfRv3 Probe Reduction

### Restrictions for PfRv3 Per Interface Probe Tuning

- The profile parameters must be defined or enforced on all border hub routers. Configuring the profile on a hub master controller does not propagate the profile parameters to the border hub routers.
- The default data expiration value for a channel is 90 seconds.
- You must configure the Performance Routing v3 Zero SLA Support feature on the hub border router to suppress nonzero DSCP (Differentiated Services Code Point) channels.

## Information About PfRv3 Per Interface Probe Tuning

### Probe Reduction and Per Interface Probe Tuning

Probing helps in measuring the metrics of a channel. A “profile” is a set of probing parameters configured on a device to send a probe packet on a channel that must be monitored. Before sending a probe packets on a channel, the channel that is to be monitored must be understood because each monitor has different profiles. In most cases, there are two monitors—default and quick. Each probe has two parameters, namely, burst packets and burst interval, which can be configured to define the probe packets sent on a PfR channel.

The PfRv3 Probe Reduction feature allows reducing traffic probe on channels that do not carry any traffic. For more information see the *PfRv3 Probe Reduction* module.

The PfRv3 Probe Reduction feature enforces similar probing on all interfaces irrespective of an interface through which a channel goes out, whereas the PfRv3 Per Interface Probe Tuning feature provides the flexibility to enforce different profiles on channels associated with an interface.

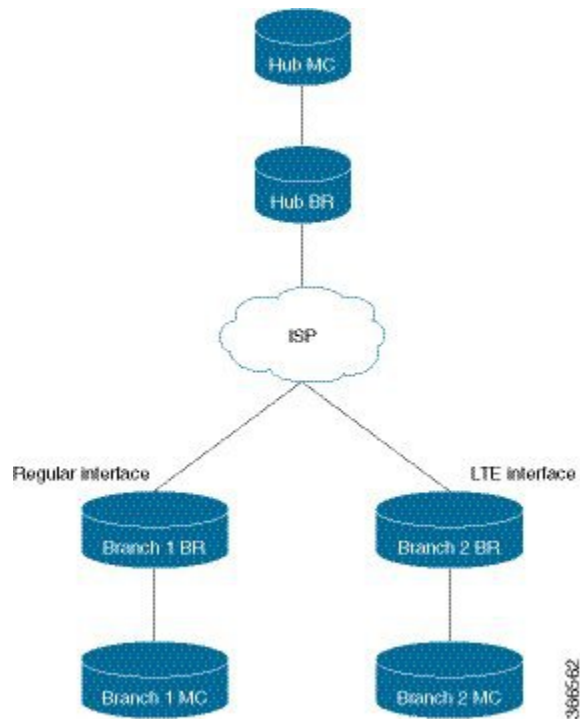
### How Per Interface Probe Tuning Works?

The PfRv3 Per Interface Probe Tuning feature is configured on border hub routers via the *profile-id* argument in the **smart-probes** command and applied to an interface via the **domain smart-probe profile** command.

If you do not configure these commands, the default profile 0, is set on a device. The default profile has predefined parameters of 1 packet every 1 second for a default monitor and 20 packets every 1 second for a quick monitor.

The following is a sample topology to explain the working of the PfRv3 Per Interface Probe Tuning feature.

**Figure 1: Per Interface Probe Tuning—Sample Topology**



A hub branch router communicates to two branch routers Branch 1 Router and Branch 2 Router via ISP. Branch 1 Router has a regular interface, while Branch 2 Router has an Long-Term Evolution (LTE) interface. The LTE interface requires different probing parameters on the channel connected to the interface as LTE radio channels are established when data needs to be transmitted over the interface and radio frequency band occupies the transmission.

The profile parameters for the LTE interface are 100 packets every 1200 seconds for default monitor and default values for quick monitor. The profile parameters for the regular interface is the default parameters, which is, one packet every one second for default monitor and 20 packets every one second for quick monitor.

The hub border router establishes channels through its WAN interface to Branch 1 Router and Branch 2 Router via the ISP. Based on the defined profile parameters, channels from the hub border router to the Branch 1 Router are probed at regular intervals. Channels from the hub border router to Branch 2 Router will have not have incoming probes for 19 minutes. The following happens before data is transmitted to the LTE interface:

- Burst probe packets are sent over the channel to measure the metrics.
- The burst interval range is increased to allow a longer duration so that radio bandwidth is not stagnated.
- Unreachable probe packets are not sent after sending the burst probe packets. This is to free up the radio bandwidth. to transmit the data.
- The burst interval range is configured to a longer duration so that radio bandwidth is not occupied.
- Unreachability detection is suppressed to ensure that there is no unreachability from a remote device for a period of time.

## Profile—Channel Association

The profiles are associated with the channel and not the interface because it is possible that the same interface may host different channels, especially on border hub routers. If two channels have different profile numbers, the channel with a higher profile number is chosen to transmit data. The profile negotiation rule requires a profile with higher ID number to have a slower probing rate. The default profile (one packet every one second for default monitor and 20 packets every one second for quick monitor) has sufficient probing rate. When a channel probes at a slower rate (bigger profile ID number) another channel in the network probes at a higher rate (smaller profile ID number).




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**Note** There is no automatic detection mechanism to calculate the rate of different profiles if the profile negotiation rule (higher-ID-slower-rate) is violated.

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## How to Configure PfRv3 Per Interface Probe Tuning

### Defining a Profile on a Border Hub Router

```
domain domain1
border
advanced
smart-probe 1 burst quick 10 packets every 20 seconds 1
```

### Applying a Profile to an Interface on a Border Hub Router

```
interface tunnel 100
domain smart-probe profile 1
```

### Verifying Profile Parameters

The following is a sample output of the **show platform software pfrv3** command that displays the profile parameters applied to an device:

```
HubBr2# show platform software pfrv3 rp active smart-probe
PfRv3 smart probe parameters :
Profile ID: 0
Attribute: 0x0000
Probe Burst interval: 1 second
Probe Burst number: 1 packets
Quick Monitor Probe Burst interval: 1 second
Quick Monitor Probe Burst number: 20 packets
Unreachable interval: 4 second
Profile ID: 1
Attribute: 0x0000
Probe Burst interval: 0 second
Probe Burst number: 0 packets
Quick Monitor Probe Burst interval: 0 second
Quick Monitor Probe Burst number: 0 packets
Unreachable interval: 4 second
Profile ID: 2
Attribute: 0x0000
```

```

Probe Burst interval: 0 second
Probe Burst number: 0 packets
Quick Monitor Probe Burst interval: 0 second
Quick Monitor Probe Burst number: 0 packets
Unreachable interval: 4 second

```

## Verifying Profile Parameters Associated with a Channel

The following is a sample output of the **show platform hardware qfp** command that displays the profile parameters associated with a channel:

```

Branch100# show platform hardware qfp active feature pfrv3 client channel id 7 detail
Chan id: 7 tbl-id: 0, if_h: 14(Tunnell100), site-id: 10.3.1.1, in_uidb: 65528, dscp: 0,
pfr-label: 0:0 | 0:0 [00000000]
  Supports zero-sla: Yes
  Muted by zero-sla: No
  Plr rx state: No
  Plr tx state: No
  Plr establish state: No
  next hop: 100.1.1.1
  State:      Discovered and open
  rx state: Reachable
  tx state: Reachable
  Smart Probe in Burst: No
  Unreach Probing only: Off
  Profile_ID: 0
  V4 Smart Probe Received: Yes
  V4 Smart Probe Sent: Yes
  Current profile_id: 1 <<< different than "Profile ID" (two lines above), resulted from
negotiation
  Remote profile_id: 1
  hash val: 25699
  exmem info:
    PPE addr: 0xebd26000
  stats:
    RX pkts: 0 bytes: 0
    TX pkts: 0 bytes: 0
    Blackhole pkts: 0 bytes: 0
    Loop pkts: 0 bytes: 0
    Probes: rx: 6288 tx: 474
    Number of SMP Profile Bursts sent: 100
    Number of Active Channel Probes sent: 374
    Number of Reachability Probes sent: 0
    Number of Force Unreaches sent: 0
    Last Probe rx: 44115 ms Ago
    Last Probe tx: 3379 ms Ago

```

# Configuration Examples for PfRv3 Per Interface Probe Tuning

## Additional References for PfRv3 Per Interface Probe Tuning

### Related Documents

Related Topic	Document Title
Performance Routing Version 3 commands	<a href="#">Cisco IOS Performance Routing Version 3 Command Reference</a>
Probe Reduction	<a href="#">PfRv3 Probe Reduction</a>

### Standards and RFCs

Standard/RFC	Title