Path Prefix Hierarchy

The Path Prefix Hierarchy feature allows you to configure service providers per VRF for traffic classes.

Feature Information for Path Prefix Hierarchy

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. An account on Cisco.com is not required.

Table 1: Feature Information for Site Prefix Splitting

Feature Name	Releases	Feature Information
Path Prefix Hiearchy	Cisco IOS XE Denali 16.3.1	The Path Prefix Hierarchy feature allows you to configure service providers per VRF for traffic classes. The following command was introduced or modified: **path-preference**.

Information About Path Prefix Hierarchy

Overview of Path Prefix Hierarchy

In an enterprise nework, you would need to configure service providers to interconnect the hub and branches. The Path Prefix Hierarchy feature allows you to configure three service providers per VRF for traffic classes. The service providers could be primary service provider, fallback service provider, and next-fallback service provider respectively. As the name suggests, the primary service provider is the first preference in the network, followed by fallback and next-fallback, respectively. You cannot have the same service provider for primary and fallback as this results in a “fallback backhole.” In other words, each service provider must be unique.

Use **path-preference** command to specify the service provider order. Use the **blackhole** or **routing** keywords for a next-fallback service provider to drop the packet if fallback unavailable or to specify there is no next-fallback service provider, respectively. When a packet reaches “blackhole” the packet is discarded.

If a hub has three service providers configured, but a branch does not support hiearchical polices, the next-fallback servicer provider will be ignored.

How to Configure Path Prefix Hierarchy

Configuring Path Prefix Hierarchy

Perform this task to configure Path Prefix Hierarchy feature on a hub.

```
domain default
 vrf green
  master hub
   source-interface Loopback1
   site-prefixes prefix-list HUBPFX
   class HEIRARCHICAL sequence 100
    match dscp ef policy custom
     priority 1 loss threshold 10
    path-preference ISP1 ISP2 fallback ISP3 next-fallback blackhole
```

The following is a sample output on a device that displays the route change reason and history. In this example, the traffic class jumps from next-fallback service provider to primary service provider, when the fallback is unavailable.

```
Dst-Site-Prefix: 100.30.0.0/16       DSCP: ef [46] Traffic class id:2
  Clock Time:                 12:57:15 (PST) 03/30/2015
  TC Learned:                 00:22:14 ago
  Present State:              CONTROLLED
  Current Performance Status: in-policy
  Current Service Provider:   ISP2 path-id:2 since 00:03:28
  Previous Service Provider:  ISP3 pfr-label: 0:0 | 0:7 [0x7] for 180 sec
  (A fallback/next-fallback provider. Primary provider will be re-evaluated 00:02:34 later)

  BW Used:                    3 Kbps
  Present WAN interface:      Tunnel20 in Border 100.10.2.1
  Present Channel (primary):  46 ISP2 pfr-label:0:0 | 0:2 [0x2]
  Backup Channel:             42 ISP3 pfr-label:0:0 | 0:7 [0x7]
  Destination Site ID bitmap: 0
  Destination Site ID:        100.30.1.1
  Class-Sequence in use:      10
  Class Name:                 BUSINESS using policy User-defined
    priority 2 packet-loss-rate threshold 10.0 percent
    priority 2 byte-loss-rate threshold 10.0 percent
  BW Updated:                 00:00:14 ago
```

```
  Reason for Latest Route Change:    next-fallback to Higher Path Preference
  Route Change History:
             Date and Time                    Previous Exit                          Current
 Exit                      Reason

    1:  12:53:47 (PST) 03/30/2015   ISP3/100.10.1.1/Tu30 (Ch:42)
ISP2/100.10.2.1/Tu20 (Ch:46)            next-fallback to Higher Path Preference
    2:  12:50:47 (PST) 03/30/2015   None/0.0.0.0/None (Ch:0)
ISP3/100.10.1.1/Tu30 (Ch:42)            Uncontrolled to Controlled Transition
    3:  12:50:15 (PST) 03/30/2015   ISP3/100.10.1.1/Tu30 (Ch:42)          None/0.0.0.0/None
 (Ch:0)                  No Channels Available
    4:  12:48:14 (PST) 03/30/2015   ISP2/100.10.4.1/Tu20 (Ch:43)
ISP3/100.10.1.1/Tu30 (Ch:42)            Exit down
    5:  12:47:57 (PST) 03/30/2015   ISP2/100.10.2.1/Tu20 (Ch:46)
ISP2/100.10.4.1/Tu20 (Ch:43)            Exit down
```

In the following example, continuation of the above example, the traffic class is now controlled by primary service provider.

```
 Route Change History:
             Date and Time                    Previous Exit                          Current
 Exit                      Reason

    1:  12:59:49 (PST) 03/30/2015   ISP2/100.10.2.1/Tu20 (Ch:46)
ISP1/100.10.1.1/Tu10 (Ch:41)            Backup to Primary path preference transition
    2:  12:53:47 (PST) 03/30/2015   ISP3/100.10.1.1/Tu30 (Ch:42)
ISP2/100.10.2.1/Tu20 (Ch:46)            next-fallback to Higher Path Preference
    3:  12:50:47 (PST) 03/30/2015   None/0.0.0.0/None (Ch:0)
ISP3/100.10.1.1/Tu30 (Ch:42)            Uncontrolled to Controlled Transition
    4:  12:50:15 (PST) 03/30/2015   ISP3/100.10.1.1/Tu30 (Ch:42)          None/0.0.0.0/None
 (Ch:0)                  No Channels Available
    5:  12:48:14 (PST) 03/30/2015   ISP2/100.10.4.1/Tu20 (Ch:43)
ISP3/100.10.1.1/Tu30 (Ch:42)            Exit down
```

In the following example, continuation of the above example, the traffic class is discarded since the packet has reached a blackhole.

```
Route Change History:
             Date and Time                    Previous Exit                          Current
 Exit                      Reason

   1:  12:50:15 (PST) 03/30/2015   ISP3/100.10.1.1/Tu30 (Ch:42)          None/0.0.0.0/None
 (Ch:0)                  No Channels Available
    2:  12:48:14 (PST) 03/30/2015   ISP2/100.10.4.1/Tu20 (Ch:43)
ISP3/100.10.1.1/Tu30 (Ch:42)            Exit down
    3:  12:47:57 (PST) 03/30/2015   ISP2/100.10.2.1/Tu20 (Ch:46)
ISP2/100.10.4.1/Tu20 (Ch:43)            Exit down
    4:  12:44:42 (PST) 03/30/2015   ISP1/100.10.1.1/Tu10 (Ch:41)
ISP2/100.10.2.1/Tu20 (Ch:46)            Exit down
    5:  12:44:13 (PST) 03/30/2015   ISP1/100.10.3.1/Tu10 (Ch:44)
ISP1/100.10.1.1/Tu10 (Ch:41)            Exit down
```

Additional References for Path Prefix Hierarchy

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Command List, All Releases
Performance Routing Version 3 commands	Cisco IOS Performance Routing Version 3 Command Reference

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html