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Introduction

Performance Routing (

Prerequisites

Requirements

Cisco recommends that you have basic knowledge of Performance Routing (PfR).

Components Used

This document is not restricted to specific software and hardware versions.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Configure

Centralized Policy Definition

In PfRv3 , all the policies are created and modified by master hub device. Master hub is also responsible for pushing these policies to all master spoke devices. This central provisioning of policies adds great deal to scalability of PfRv3. Network administrator-defined policies dictates

treatment of various type of traffic. Traffic could be grouped/categorized based on DSCP value or on basis of application type like Lotus notes, WebEx etc.

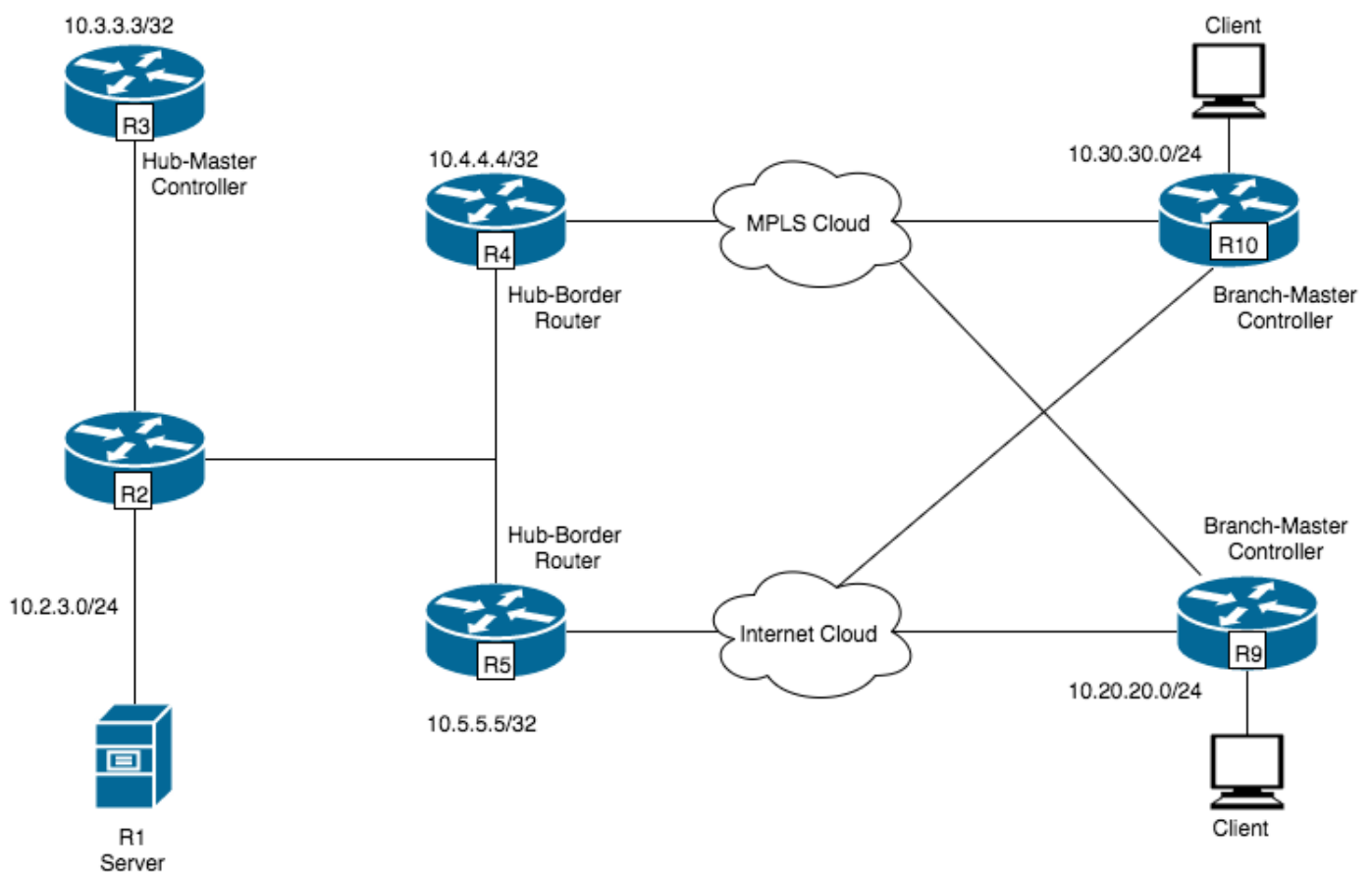
EIGRP Service Address Family(SAF):

EIGRP will form the SAF neighbor adjacency with Hub Border Router as well as Master Branch router as well. Below is set of EIGRP SAF neighbor adjacency formed:

1. Hub Master Controller <---> Hub Border Router
2. Hub Master Controller <---> Branch Master Controller
3. Branch Master Controller <---> Branch Border Router

EIGRP SAF framework is used by PfRv3 to push policies from hub site to several spoke sites. Only hub master is authorised to modify any pre-deployed policy and these modified policies are then synchronised with other spoke-master over EIGRP SAF framework.

Network Diagram



Configurations

R3 Master Hub Router

R4 Hub Border Router

R5 Hub Border Router

R9 Branch Master Router

R10 Branch Master Router

Verify

Checking And Verifying EIGRP SAF

R3 will form the EIGRP SAF adjacency with Spoke Master Controller (R9 and R10) and Hub Border routers (R4 and R5).

R3#show eigrp service-family ipv4 neighbors

```
EIGRP-SFv4 VR(#AUTOCFG#) Service-Family Neighbors for AS(59501)
H   Address                Interface                Hold Uptime    SRTT    RTO  Q  Seq
                               (sec)            (ms)          Cnt Num
3   10.4.4.4                Lo0                    503 01:30:28    9   100  0  7
2   10.5.5.5                Lo0                    592 01:30:28   11   100  0  7
1   10.9.9.9                Lo0                    505 01:30:28   22   132  0 10
0   10.10.10.10             Lo0                    519 01:30:28   21   132  0 10
```

Spoke Master router will form the SAF neighbor relationship with hub master controller

R9#show eigrp service-family ipv4 neighbors

```
EIGRP-SFv4 VR(#AUTOCFG#) Service-Family Neighbors for AS(59501)
H   Address                Interface                Hold Uptime    SRTT    RTO  Q  Seq
                               (sec)            (ms)          Cnt Num
0   10.3.3.3                Lo0                    530 01:34:43   32   192  0 19
```

When Pfrv3 is configured, EIGRP SAF is automatically initiated in the background. There is no additional configuration needed to be done. EIGRP SAF neighborship is built between master hub and master border routers (BR) as well as master hub and master spokes.

It is essential to have EIGRP SAF adjacency established as SAF lays the foundation for exchange and synchronization of policies ,performance monitoring indexes (PMLs) etc.

Policy Push From Master Hub To Master Spokes Over EIGRP SAF

R3#show domain one master policy

```
No Policy publish pending
class VOICE sequence 10
  path-preference MPLS fallback INET
  class type: Dscp Based
  match dscp ef policy voice
  priority 2 packet-loss-rate threshold 1.0 percent
  priority 1 one-way-delay threshold 150 msec
  priority 3 jitter threshold 30000 usec
  priority 2 byte-loss-rate threshold 1.0 percent
```

R9#show domain one master policy

```
class VOICE sequence 10
  path-preference MPLS fallback INET
  class type: Dscp Based
  match dscp ef policy voice
  priority 2 packet-loss-rate threshold 1.0 percent
  priority 1 one-way-delay threshold 150 msec
  priority 3 jitter threshold 30000 usec
  priority 2 byte-loss-rate threshold 1.0 percent
```

Site-Prefixes Also Being Pushed Over SAF Address Family

Site prefixes are inside prefixes for each site. Site prefix database resides on Master Controllers and Border Routers. Site prefixes are learnt when traffic is initiated from each site destined to spoke location. Master Controller and Border router will maintain the Site-Prefix table which should be synchronised at each PFR running site. Flags in site-prefix table will help in understanding how prefixes are being learnt.

L Flag :- Indicates Locally learned prefixes learnt by monitoring the egress traffic on the wan links.

S Flag :- Indicates prefixes learnt via SAF address family.

C Flag :- Indicates prefixes configured on the master using the command "site-prefixes".

T Flag :- Indicates prefixes as enterprise prefix.

In below example prefix 10.2.3.0/24 is learned locally on R3 and it's information is passed to R9 via SAF:

R3#sh domain one master site-prefix

```
Change will be published between 5-60 seconds
Next Publish 01:54:04 later
Prefix DB Origin: 10.3.3.3
Prefix Flag: S-From SAF; L-Learned; T-Top Level; C-Configured;
```

Site-id	Site-prefix	Last Updated	Flag
10.3.3.3	10.2.3.0/24	1w1d ago	L,
10.9.9.9	10.20.20.0/24	00:06:30 ago	S,

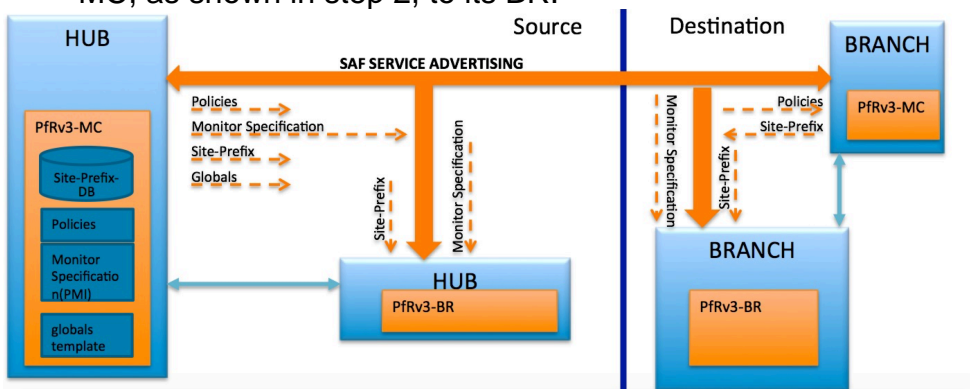
R9#sh domain one master site-prefix

```
Change will be published between 5-60 seconds
Next Publish 01:55:53 later
Prefix DB Origin: 10.9.9.9
Prefix Flag: S-From SAF; L-Learned; T-Top Level; C-Configured;
```

Site-id	Site-prefix	Last Updated	Flag
10.3.3.3	10.2.3.0/24	00:11:41 ago	S,
10.9.9.9	10.20.20.0/24	00:04:06 ago	L,

Below diagram shows various attributes being pushed over EIGRP SAF family:

1. Site prefix database, monitoring specification and the global templates on Hub MC are pushed by the EIGRP SAF to all hub border devices.
2. Master Hub also pushes site-prefixes and global template to the Border Master using the SAF.
3. Border Master then pushes its local site-prefixes as well as attributes it subscribed from hub MC, as shown in step 2, to its BR.



Below is the output from Master Hub Router which shows that it is publishing the services

R3#show domain one master peering

Peering state: Enabled
Origin: Loopback0(10.3.3.3)
Peering type: Listener
Subscribed service:
cent-policy (2) :
site-prefix (1) :
Last Notification Info: 01:06:33 ago, Size: 242, Compressed size: 160, Status: No Error,
Count: 31
service-provider (4) :
globals (5) :
pmi (3) :

Published service:

site-prefix (1) :
Last Publish Info: 01:06:33 ago, Size: 168, Compressed size: 132, Status: No Error
cent-policy (2) :
Last Publish Info: 1w0d ago, Size: 1380, Compressed size: 345, Status: No Error
pmi (3) :
Last Publish Info: 1w0d ago, Size: 1535, Compressed size: 432, Status: No Error
globals (5) :
Last Publish Info: 1w0d ago, Size: 325, Compressed size: 197, Status: No Error

Below is the output from Hub Border router

R5#show domain one border peering

Peering state: Enabled
Origin: Loopback0(10.5.5.5)
Peering type: Peer(With 10.3.3.3)
Subscribed service:
pmi (3) :
Last Notification Info: 01:30:58 ago, Size: 1535, Compressed size: 452, Status: No Error,
Count: 47
site-prefix (1) :
Last Notification Info: 01:07:09 ago, Size: 242, Compressed size: 160, Status: No Error,
Count: 464
globals (5) :
Last Notification Info: 01:30:58 ago, Size: 325, Compressed size: 217, Status: No Error,
Count: 47

Published service:

So it is only Subscribing the services being offered from Hub Master Router .

R9#show domain one maste peering

Peering state: Enabled
Origin: Loopback0(10.9.9.9)
Peering type: Listener, Peer(With 10.3.3.3)
Subscribed service:
cent-policy (2) :
Last Notification Info: 01:35:29 ago, Size: 1380, Compressed size: 365, Status: No Error,
Count: 25
site-prefix (1) :
Last Notification Info: 01:11:39 ago, Size: 242, Compressed size: 160, Status: No Error,
Count: 339
service-provider (4) :
globals (5) :
Last Notification Info: 01:35:29 ago, Size: 325, Compressed size: 217, Status: No Error,
Count: 50

Published service:

site-prefix (1) :

Last Publish Info: 01:11:40 ago, Size: 242, Compressed size: 140, Status: No Error

R9#show domain one border peering

Peering state: Enabled

Origin: Loopback0(10.9.9.9)

Peering type: Peer(With 10.9.9.9)

Subscribed service:

pmi (3) :

Last Notification Info: 01:36:26 ago, Size: 1535, Compressed size: 452, Status: No Error,
Count: 25

site-prefix (1) :

Last Notification Info: 01:12:36 ago, Size: 242, Compressed size: 160, Status: No Error,
Count: 339

globals (5) :

Last Notification Info: 01:36:26 ago, Size: 325, Compressed size: 217, Status: No Error,
Count: 50

Published service: