

# 配置PfRv2有BGP或EIGRP的数据流控制控制机制

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## 简介

根据PfRv2政策决策描述的如何性能路由版本2 (PfRv2)控制数据流本文。方法和标准用于控制流量依靠parent路由学习的底层协议。在本文中，当parent路由通过BGP和EIGRP时，学习PfRv2数据流控制控制活动demonstarted。

## 先决条件

### 要求

思科建议您有基础知识性能路由(PfR)。

### 使用的组件

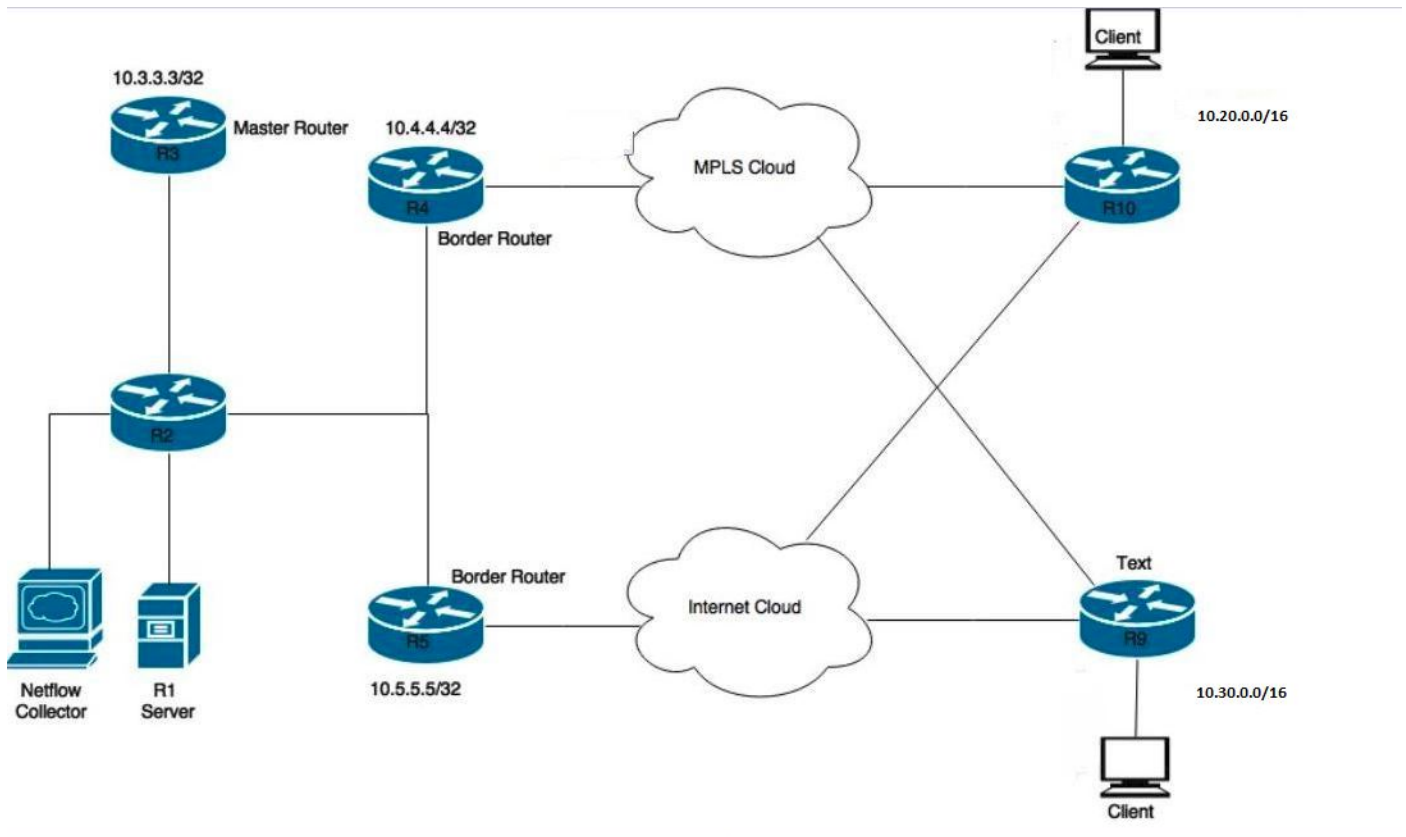
## 配置

PfRv2允许网络管理员配置学习列表分组流量，运用已配置的策略和选择满足某一套参数类似延迟、在策略等定义的抖动，利用率的最好的边界router(BR)。有PfRv2控制数据流和取决于协议目的地前缀的parent路由学习的多种模式。PfRv2能够更改路由信息库(RIB)由操作的路由协议，注入静态路由或通过动态策略基于路由。下面优点路由多种协议的控制方法的表。

| Parent route  | Prefix control method                    |
|---------------|--|
| BGP           | BGP via modifying local preference       |
| EIGRP         | EIGRP via injecting more specific route  |
| Static        | Static via injecting more specific route |
| RIP,OSPF,ISIS | Dynamic policy based routing             |

## 网络图

本文将参考跟随的镜像作为topolgy的示例为本文的其余。



R1-  
R3- PfR  
R4&R5- PfR  
R9 & R10R1

## 配置

```
!
key chain pfr
  key 0
  key-string cisco
pfr master
  policy-rules PFR
  !
border 10.4.4.4 key-chain pfr
interface Ethernet1/0 external
interface Ethernet1/2 internal
link-group MPLS
!
border 10.5.5.5 key-chain pfr
```

```

interface Ethernet1/3 internal
interface Ethernet1/0 external
  link-group INET
!
learn
traffic-class filter access-list DENY-ALL
  list seq 10 refname APPLICATION-LEARN-LIST
  traffic-class prefix-list APPLICATION
  throughput
list seq 20 refname DATA-LEARN-LIST
  traffic-class prefix-list DATA
  throughput
!
pfr-map PFR 10
  match pfr learn list APPLICATION-LEARN-LIST
  set periodic 90
  set delay threshold 25
  set mode monitor active
  set active-probe echo 10.20.21.1
  set probe frequency 5
  set link-group MPLS fallback INET
!
pfr-map PFR 20
  match pfr learn list DATA-LEARN-LIST
  set periodic 90
  set delay threshold 25
  set mode monitor active
  set active-probe echo 10.30.31.1
  set probe frequency 5
  set link-group INET fallback MPLS
!
ip prefix-list APPLICATION: 1 entries
  seq 5 permit 10.20.0.0/16
!
ip prefix-list DATA: 1 entries
  seq 5 permit 10.30.0.0/16
!

```

## 验证

### 1 BGP

10.20.0.0/16 10.30.0.0/16 parent BGP parent (R4 R5)

R4#show ip route

--output suppressed--

```

B       10.20.0.0/16 [20/0] via 10.0.46.6, 01:26:58
B       10.30.0.0/16 [20/0] via 10.0.46.6, 01:26:58

```

R5#show ip route

--output suppressed--

```

B       10.20.0.0/16 [20/0] via 10.0.57.7, 00:42:37
B       10.30.0.0/16 [20/0] via 10.0.57.7, 00:42:37

```

IN POLICY R4 10.20.20.0/24 R5 10.30.30.0/24

R3#show pfr master traffic-class

OER Prefix Statistics:

Pas - Passive, Act - Active, S - Short term, L - Long term, Dly - Delay (ms),

P - Percentage below threshold, Jit - Jitter (ms),  
MOS - Mean Opinion Score  
Los - Packet Loss (percent/10000), Un - Unreachable (flows-per-million),  
E - Egress, I - Ingress, Bw - Bandwidth (kbps), N - Not applicable  
U - unknown, \* - uncontrolled, + - control more specific, @ - active probe all  
# - Prefix monitor mode is Special, & - Blackholed Prefix  
% - Force Next-Hop, ^ - Prefix is denied

| DstPrefix     | Appl_ID | Dscp     | Prot   | SrcPort | DstPort  | SrcPrefix |          |  |     |
|---------------|---------|----------|--------|---------|----------|-----------|----------|--|-----|
| Flags         | State   |          |        | Time    | CurrBR   | CurrI/F   | Protocol |  |     |
| PasSDly       | PasLDly | PasSUn   | PasLUn | PasSLos | PasLLos  | EBw       | IBw      |  |     |
| ActSDly       | ActLDly | ActSUn   | ActLUn | ActSJit | ActPMOS  | ActSLos   | ActLLos  |  |     |
| -----         |         |          |        |         |          |           |          |  |     |
| 10.20.20.0/24 |         | N        | N      | N       |          | N         | N        |  |     |
|               |         | INPOLICY |        | 56      | 10.4.4.4 | Et1/0     |          |  | BGP |
|               | N       | N        | N      | N       | N        | N         | N        |  |     |
|               | 1       | 2        | 0      | 0       | N        | N         | N        |  |     |
| 10.30.30.0/24 |         | N        | N      | N       |          | N         | N        |  |     |
|               |         | INPOLICY |        | 59      | 10.5.5.5 | Et1/0     |          |  | BGP |
|               | N       | N        | N      | N       | N        | N         | N        |  |     |
|               | 3       | 2        | 0      | 0       | N        | N         | N        |  |     |

因为R4由Pfrv2选择作为10.20.20.0/24的退出路由器，R4注入一个路由以10.20.20.0/24的更高的本地首选如下所示。被注入的路由属性由parent路由继承。

```
R4#show ip bgp 10.20.20.0/24
BGP routing table entry for 10.20.20.0/24, version 60
Paths: (1 available, best #1, table default, not advertised to EBGP peer)
  Advertised to update-groups:
    10
  Refresh Epoch 1
  200, (injected path from 10.20.0.0/16)
    10.0.46.6 from 10.0.46.6 (10.6.6.6)
      Origin incomplete, metric 0, localpref 100, valid, external, best
      Community: no-export
      rx pathid: 0, tx pathid: 0x0
```

### iBGPBRR510.20.20.0/24

```
R5#show ip bgp 10.20.20.0/24
BGP routing table entry for 10.20.20.0/24, version 17
Paths: (1 available, best #1, table default)
  Advertised to update-groups:
    6
  Refresh Epoch 1
  200
    10.0.45.4 from 10.0.45.4 (10.4.4.4)
      Origin incomplete, metric 0, localpref 5000, valid, internal, best
      rx pathid: 0, tx pathid: 0x0
```

### 10.20.20.0/24 R5R4Pfrv2BR

```
R4#show pfr border routes bgp
BGP table version is 60, local router ID is 10.4.4.4
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
```

x best-external, a additional-path, c RIB-compressed,  
 Origin codes: i - IGP, e - EGP, ? - incomplete  
 RPKI validation codes: V valid, I invalid, N Not found  
 OER Flags: C - Controlled, X - Excluded, E - Exact, N - Non-exact, I - Injected

| Network          | Next Hop  | OER | LocPrf | Weight | Path  |
|------------------|-----------|-----|--------|--------|-------|
| *> 10.20.20.0/24 | 10.0.46.6 | CEI | 5000   | 0      | 200 ? |
| *>i10.30.30.0/24 | 10.0.45.5 | XN  | 5000   | 0      | 300 ? |

10.20.20.0/24'C' ('E' )BGP" ( )

10.30.30.0/24'X' ( )BRR5'X' 'N'

5000BGP5000

#### R4#show pfr border routes bgp

BGP table version is 60, local router ID is 10.4.4.4  
 Status codes: s suppressed, d damped, h history, \* valid, > best, i - internal,  
 r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,  
 x best-external, a additional-path, c RIB-compressed,  
 Origin codes: i - IGP, e - EGP, ? - incomplete  
 RPKI validation codes: V valid, I invalid, N Not found  
 OER Flags: C - Controlled, X - Excluded, E - Exact, N - Non-exact, I - Injected

| Network          | Next Hop  | OER | LocPrf | Weight | Path  |
|------------------|-----------|-----|--------|--------|-------|
| *> 10.20.20.0/24 | 10.0.46.6 | CEI | 5000   | 0      | 200 ? |
| *>i10.30.30.0/24 | 10.0.45.5 | XN  | 5000   | 0      | 300 ? |

## 2 EIGRP

10.20.0.0/1610.30.0.0/16 parent routeaEIGRPparent(R4R5)eigrp parent

#### R4#show ip route

```
--output suppressed--
D EX    10.20.0.0/16 [170/25651200] via 10.0.46.6, 00:04:25, Ethernet1/0
D EX    10.30.0.0/16 [170/25651200] via 10.0.46.6, 00:04:25, Ethernet1/0
```

#### R5#show ip route

```
--output suppressed--
D EX    10.20.0.0/16 [170/25651200] via 10.0.57.7, 00:05:46, Ethernet1/0
D EX    10.30.0.0/16 [170/25651200] via 10.0.57.7, 00:05:46, Ethernet1/0
```

如上一个案件所显示，有流量活动流两数据流类别的，并且两个可能在INPOLICY状态被看到在输出之下。R4为前缀10.20.0.0/24选择，并且R5为前缀10.30.0.0/24选择。这是根据已配置的林克组首选为每学习列表。

#### R3#show pfr master traffic-class

OER Prefix Statistics:  
 Pas - Passive, Act - Active, S - Short term, L - Long term, Dly - Delay (ms),  
 P - Percentage below threshold, Jit - Jitter (ms),  
 MOS - Mean Opinion Score  
 Los - Packet Loss (percent/10000), Un - Unreachable (flows-per-million),  
 E - Egress, I - Ingress, Bw - Bandwidth (kbps), N - Not applicable  
 U - unknown, \* - uncontrolled, + - control more specific, @ - active probe all  
 # - Prefix monitor mode is Special, & - Blackholed Prefix  
 % - Force Next-Hop, ^ - Prefix is denied

| DstPrefix | Appl_ID | Dscp | Prot | SrcPort | DstPort | SrcPrefix |
|-----------|---------|------|------|---------|---------|-----------|
|-----------|---------|------|------|---------|---------|-----------|

| Flags         |         | State    |        | Time    |         | CurrBR   | CurrI/F | Protocol |       |
|---------------|---------|----------|--------|---------|---------|----------|---------|----------|-------|
| PasSDly       | PasLDly | PasSUn   | PasLUn | PasSLos | PasLLos |          | EBw     | IBw      |       |
| ActSDly       | ActLDly | ActSUn   | ActLUn | ActSJit | ActPMOS |          | ActSLos | ActLLos  |       |
| -----         |         |          |        |         |         |          |         |          |       |
| 10.20.20.0/24 |         | N        | N      | N       |         | N        | N       |          |       |
|               |         | INPOLICY |        | 31      |         | 10.4.4.4 | Et1/0   |          | EIGRP |
|               | N       | N        | N      | N       | N       | N        | N       | N        | N     |
|               | 1       | 2        | 0      | 0       | N       | N        | N       | N        | N     |
| -----         |         |          |        |         |         |          |         |          |       |
| 10.30.30.0/24 |         | N        | N      | N       |         | N        | N       |          |       |
|               |         | INPOLICY |        | 24      |         | 10.5.5.5 | Et1/0   |          | EIGRP |
|               | N       | N        | N      | N       | N       | N        | N       | N        | N     |
|               | 2       | 2        | 0      | 0       | N       | N        | N       | N        | N     |

因为R4由PfRv2选择作为10.20.20.0/24的最好的退出路由器，R4注入与标记5000的一具体的路由如下所示。此被注入的路由总是EIGRP内部路由，即使parent路由外部。并且，如果parent路由运送一个标记值，那没有由被注入的路由继承。

### Note:parent

R4#show ip route 10.20.20.0 255.255.255.0

```
Routing entry for 10.20.20.0/24
  Known via "eigrp 100", distance 90, metric 25651200
  Tag 5000, type internal
  Redistributing via eigrp 100
  Last update from 10.0.46.6 on Ethernet1/0, 00:17:04 ago
  Routing Descriptor Blocks:
  * 10.0.46.6, from 0.0.0.0, 00:17:04 ago, via Ethernet1/0
    Route metric is 25651200, traffic share count is 1
    Total delay is 2000 microseconds, minimum bandwidth is 100 Kbit
    Reliability 255/255, minimum MTU 1500 bytes
    Loading 12/255, Hops 0
    Route tag 5000
```

R4#show ip eigrp topology 10.20.20.0/24

```
EIGRP-IPv4 Topology Entry for AS(100)/ID(10.4.4.4) for 10.20.20.0/24
  State is Passive, Query origin flag is 1, 1 Successor(s), FD is 25651200
  Descriptor Blocks:
  10.0.46.6 (Ethernet1/0), from 0.0.0.0, Send flag is 0x0
    Composite metric is (25651200/0), route is Internal
    Vector metric:
      Minimum bandwidth is 100 Kbit
      Total delay is 2000 microseconds
      Reliability is 255/255
      Load is 12/255
      Minimum MTU is 1500
      Hop count is 0
      Originating router is 10.4.4.4
      Internal tag is 5000
```

R4#show pfr border routes eigrp

```
Flags: C - Controlled by oer, X - Path is excluded from control,
       E - The control is exact, N - The control is non-exact
```

| Flags | Network       | Parent       | Tag  |
|-------|---------------|--------------|------|
| CE    | 10.20.20.0/24 | 10.20.0.0/16 | 5000 |
| XN    | 10.30.30.0/24 |              |      |

sepcific 10.20.0.0/16parent10.20.20.0/24R5R4PfRv2BR

R5#show ip route 10.20.20.0

```
Routing entry for 10.20.20.0/24
  Known via "eigrp 100", distance 90, metric 26931200
  Tag 5000, type internal
  Redistributing via eigrp 100
  Last update from 10.0.45.4 on Tunnel10, 00:25:34 ago
  Routing Descriptor Blocks:
  * 10.0.45.4, from 10.0.45.4, 00:25:34 ago, via Tunnel10 // 10.0.45.4 is R4 IP.
    Route metric is 26931200, traffic share count is 1
    Total delay is 52000 microseconds, minimum bandwidth is 100 Kbit
    Reliability 255/255, minimum MTU 1476 bytes
    Loading 28/255, Hops 1
    Route tag 5000
```

parent/24 R4/24parent

R4#show ip eigrp topology 10.20.20.0/24

```
EIGRP-IPv4 Topology Entry for AS(100)/ID(10.4.4.4) for 10.20.20.0/24
  State is Passive, Query origin flag is 1, 1 Successor(s), FD is 25600000
  Descriptor Blocks:
  10.0.46.6 (Ethernet1/0), from 0.0.0.0, Send flag is 0x0
    Composite metric is (25600000/0), route is Internal
    Vector metric:
      Minimum bandwidth is 100 Kbit
      Total delay is 1 microseconds // Injected route with a delay of 1.
      Reliability is 255/255
      Load is 102/255
      Minimum MTU is 1500
      Hop count is 0
      Originating router is 10.4.4.4
      Internal tag is 5000
  10.0.45.5 (Tunnel10), from 10.0.45.5, Send flag is 0x0
    Composite metric is (26931200/25651200), route is External
    Vector metric:
      Minimum bandwidth is 100 Kbit
      Total delay is 52000 microseconds
      Reliability is 255/255
      Load is 99/255
      Minimum MTU is 1476
      Hop count is 2
      Originating router is 10.0.78.7
  External data&colon;
    AS number of route is 0
    External protocol is Static, external metric is 0
    Administrator tag is 0 (0x00000000)
  10.0.46.6 (Ethernet1/0), from 10.0.46.6, Send flag is 0x0 //Parent route
    Composite metric is (25651200/281600), route is External
    Vector metric:
      Minimum bandwidth is 100 Kbit
      Total delay is 2000 microseconds
      Reliability is 255/255
      Load is 102/255
      Minimum MTU is 1500
      Hop count is 1
      Originating router is 10.0.68.6
  External data&colon;
    AS number of route is 0
    External protocol is Static, external metric is 0
    Administrator tag is 0 (0x00000000)
```

parentparentMTUBR R5Pfrv2 R5R4R4

