

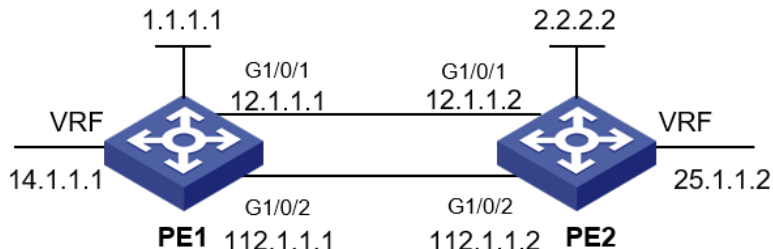
# 知 H3C Comware V7 平台交换机通过 TNL 隧道策略实现 MPLS L3VPN 负载均衡等价转发配置案例

MPLS L3VPN 隧道策略 丁犁 2020-10-26 发表

## 组网及说明

拓扑如下图所示：

- PE1、PE2 为 Comware V7 平台交换机，PE1 与 PE2 之间为 MPLS L3VPN 网络。
- PE1、PE2 各自下游 VRF（VPN实例）的流量，需要中PE1 与 PE2 之间的两条链路上，进行负载均衡转发。



## 配置步骤

PE1关键配置如下：

```
#配置IGP协议(OSPF), 实现PE1与PE2之间互通
#
interface LoopBack0
ip address 1.1.1.1 255.255.255.255
#
ospf 1
area 0.0.0.0
network 1.1.1.1 0.0.0.0
network 12.1.1.1 0.0.0.0
network 112.1.1.1 0.0.0.0
#
#配置MPLS基本能力和MPLS LDP, 建立LDP LSP
#
mpls lsr-id 1.1.1.1
mpls ldp
#
interface GigabitEthernet0/1
port link-mode route
ip address 12.1.1.1 255.255.255.0
mpls enable
mpls ldp enable
#
interface GigabitEthernet0/2
port link-mode route
ip address 112.1.1.1 255.255.255.0
mpls enable
mpls ldp enable
#
#配置VPN实例
#
ip vpn-instance 12
route-distinguisher 1:1
vpn-target 12:12 import-extcommunity
vpn-target 12:12 export-extcommunity
#
interface GigabitEthernet0/0
port link-mode route
```

```

ip binding vpn-instance 12
ip address 14.1.1.1 255.255.255.0
#
#PE之间建立MP-IBGP对等体
#
bgp 12
router-id 1.1.1.1
peer 2.2.2.2 as-number 12
peer 2.2.2.2 connect-interface LoopBack0
#
address-family ipv4 unicast
peer 2.2.2.2 enable
#
address-family vpnv4
peer 2.2.2.2 enable
#
ip vpn-instance 12
#
address-family ipv4 unicast
import-route direct
#
#创建并使能VPN实例的隧道策略，实现VRF转发负载均衡
#
tunnel-policy 12
select-seq lsp load-balance-number 2
#
ip vpn-instance 12
route-distinguisher 1:1
tnl-policy 12 //使能TNL隧道策略
vpn-target 12:12 import-extcommunity
vpn-target 12:12 export-extcommunity
#

```

#### PE2关键配置如下:

```

#配置IGP协议(OSPF), 实现PE2与PE1之间互通
#
interface LoopBack0
ip address 2.2.2.2 255.255.255.255
#
ospf 1
area 0.0.0.0
network 2.2.2.2 0.0.0.0
network 12.1.1.2 0.0.0.0
network 112.1.1.2 0.0.0.0
#
#配置MPLS基本能力和MPLS LDP, 建立LDP LSP
#
mpls lsr-id 2.2.2.2
mpls ldp
#
interface GigabitEthernet0/1
port link-mode route
ip address 12.1.1.2 255.255.255.0
mpls enable
mpls ldp enable
#
interface GigabitEthernet0/2
port link-mode route
ip address 112.1.1.2 255.255.255.0
mpls enable
mpls ldp enable
#
#配置VPN实例

```

```

#
ip vpn-instance 12
route-distinguisher 2:2
vpn-target 12:12 import-extcommunity
vpn-target 12:12 export-extcommunity
#
interface GigabitEthernet0/0
port link-mode route
ip binding vpn-instance 12
ip address 25.1.1.2 255.255.255.0
#
#PE之间建立MP-IBGP对等体
#
bgp 12
router-id 2.2.2.2
peer 1.1.1.1 as-number 12
peer 1.1.1.1 connect-interface LoopBack0
#
address-family ipv4 unicast
peer 1.1.1.1 enable
#
address-family vpnv4
peer 1.1.1.1 enable
#
ip vpn-instance 12
#
address-family ipv4 unicast
import-route direct
#
#创建并使能VPN实例的隧道策略，实现VRF转发负载均衡功能
#
tunnel-policy 12
select-seq lsp load-balance-number 2
#
ip vpn-instance 12
route-distinguisher 2:2
tnl-policy 12 //使能TNL隧道策略
vpn-target 12:12 import-extcommunity
vpn-target 12:12 export-extcommunity
#

```

## 配置关键点

按照上述关键配置部署后，PE设备上可实现去往远端PE VRF流量转发等价负载。PE1 为例，显示转发等价表项：

**<pe1>display fib vpn-instance 12 25.1.1.0**

Destination count: 1 FIB entry count: 2

Flag:

U:Usable G:Gateway H:Host B:Blackhole D:Dynamic S:Static R:Relay F:FRR

Destination/Mask	Nexthop	Flag	OutInterface/Token	Label
25.1.1.0/24	2.2.2.2	UGR	1	1151
25.1.1.0/24	2.2.2.2	UGR	3	1151

**<pe1>display ip routing-table 2.2.2.2**

Summary count : 2

Destination/Mask	Proto	Pre	Cost	NextHop	Interface
2.2.2.2/32	O_INTRA	10	1	12.1.1.2	GE0/1
				112.1.1.2	GE0/2

**<pe1>display mpls forwarding nhlfe**

Total NHLFE entries: 4

Flags: T - Forwarded through a tunnel

N - Forwarded through the outgoing interface to the nexthop IP address

B - Backup forwarding information

A - Active forwarding information

M - P2MP forwarding information

NID	Tnl-Type	Flag	OutLabel	Forwarding	Info
0	LOCAL	NA	-	GE0/1	12.1.1.2
1	LSP	NA	3	GE0/1	12.1.1.2
2	LOCAL	NA	-	GE0/2	112.1.1.2
3	LSP	NA	3	GE0/2	112.1.1.2

**<pe1>display mpls lsp**

FEC	Proto	In/Out Label	Interface/Out NHLFE
1.1.1.1/32	LDP	3/-	-
2.2.2.2/32	LDP	1279/3	GE0/1
2.2.2.2/32	LDP	-/3	GE0/1
2.2.2.2/32	LDP	1279/3	GE0/2
2.2.2.2/32	LDP	-/3	GE0/2
12.1.1.2	Local	-/-	GE0/1
112.1.1.2	Local	-/-	GE0/2