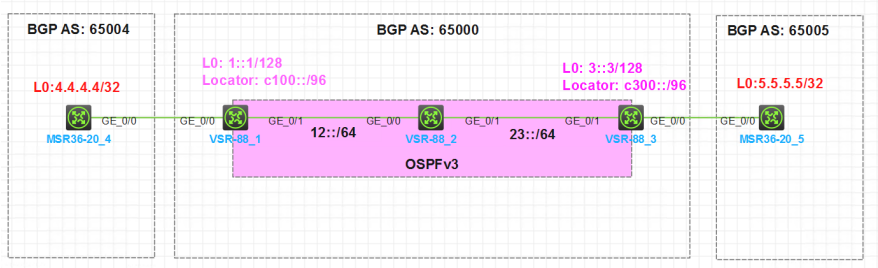
EVPN L3VPNv4 over OSPFv3 SRv6 BE典型配置案例

MPLS L3VPN　会话同步　孔凡安　2024-09-21 发表

组网及说明



配置步骤

1、配置IGP　互通（OSPFv3），PE之间环回口IPv6路由可达；
2、配置PE和CE之间建立EBGP邻居，CE引入路由到PE的VPN实例路由表；
3、PE之间建立MP-IBGP邻居；
4、配置SRv6 BE隧道，并发布EVPN路由

配置步骤

关键配置

```
#
 sysname pe_01
#
ip vpn-instance v1
 route-distinguisher 100:1
 vpn-target 101:1 import-extcommunity
 vpn-target 101:1 export-extcommunity
#
ospfv3 1
 router-id 1.1.1.1
 segment-routing ipv6 locator pe_01
 area 0.0.0.0
#
interface LoopBack0
 ip address 1.1.1.1 255.255.255.0
 ospfv3 1 area 0.0.0.0
 ipv6 address 1::1/128
#
interface GigabitEthernet0/0/0
 port link-mode route
 combo enable copper
 ip binding vpn-instance v1
 ip address 14.1.1.1 255.255.255.0
#
interface GigabitEthernet0/0/1
 port link-mode route
 combo enable copper
 ospfv3 1 area 0.0.0.0
 ipv6 address 12::1/64
#
bgp 65000
 peer 3::3 as-number 65000
 peer 3::3 connect-interface LoopBack0
 #
 address-family l2vpn evpn
  peer 3::3 enable
  peer 3::3 advertise encap-type srv6
 #
 ip vpn-instance v1
  peer 14.1.1.4 as-number 65004
  #
  address-family ipv4 unicast
   segment-routing ipv6 best-effort evpn
   segment-routing ipv6 locator pe_01 evpn
   peer 14.1.1.4 enable
#
segment-routing ipv6
 encapsulation source-address 1::1
 #
 locator pe_01 ipv6-prefix C100:: 96 static 8
#
```

```
#
 sysname pe_03
#
ip vpn-instance v1
 route-distinguisher 100:1
 vpn-target 101:1 import-extcommunity
 vpn-target 101:1 export-extcommunity
#
ospfv3 1
 router-id 3.3.3.3
 segment-routing ipv6 locator pe_03
 area 0.0.0.0
#
interface LoopBack0
 ip address 3.3.3.3 255.255.255.255
 ospfv3 1 area 0.0.0.0
 ipv6 address 3::3/128
#
interface GigabitEthernet0/0/0
 port link-mode route
 combo enable copper
 ip binding vpn-instance v1
 ip address 35.1.1.3 255.255.255.0
#
interface GigabitEthernet0/0/1
 port link-mode route
 combo enable copper
 ospfv3 1 area 0.0.0.0
 ipv6 address 23::3/64
#
bgp 65000
 peer 1::1 as-number 65000
 peer 1::1 connect-interface LoopBack0
  #
 address-family l2vpn evpn
  peer 1::1 enable
  peer 1::1 advertise encap-type srv6
 #
 ip vpn-instance v1
  peer 35.1.1.5 as-number 65005
  #
  address-family ipv4 unicast
   segment-routing ipv6 best-effort evpn
   segment-routing ipv6 locator pe_03 evpn
   peer 35.1.1.5 enable
#
segment-routing ipv6
 encapsulation source-address 3::3
 #
 locator pe_03 ipv6-prefix C300:: 96 static 8
#
```

Locator和Local-SID信息

<pe_01>disp segment-routing ipv6 locator

Locator configuration table

Locator name : pe_01 Flag(A) : 0
IPv6 prefix : C100:: Prefix length : 96
Static length : 8 Args length : 0
Common prefix length: 0
Algorithm : 0
Auto SID start : C100::100
Auto SID end : C100::FFFF:FFFF
Static SID start : C100::1
Static SID end : C100::FF ----静态段长度为8
Compressed Auto SID count : 0
Compressed Static SID count : 0
Non-compressed Auto SID count : 3
Non-compressed Static SID count: 0

<pe_03>disp segment-routing ipv6 locator

Locator configuration table

Locator name : pe_03 Flag(A) : 0
IPv6 prefix : C300:: Prefix length : 96
Static length : 8 Args length : 0
Common prefix length: 0
Algorithm : 0
Auto SID start : C300::100
Auto SID end : C300::FFFF:FFFF
Static SID start : C300::1
Static SID end : C300::FF
Compressed Auto SID count : 0
Compressed Static SID count : 0
Non-compressed Auto SID count : 3
Non-compressed Static SID count: 0

<pe_01>disp segment-routing ipv6 local-sid

Local SID forwarding table

Total SIDs: 3

SID : C100::101/96
Function type : End Flavor : PSP
Locator name : pe_01 Allocation type: Dynamic
Owner : OSPFV3-1 State : Active
Create Time : Sep 15 15:34:51.463 2024

SID : C100::102/96
Function type : End.X Flavor : PSP
Interface : GE0/0/1 Interface index: 0x2
Next hop : FE80::54CC:AEFF:FE36:205 Allocation type: Dynamic
Locator name : pe_01
Owner : OSPFV3-1 State : Active
Create Time : Sep 15 15:34:51.469 2024

SID : C100::100/96
Function type : End.DT4 Flavor : PSP
VPN instance : v1 Allocation type: Dynamic
Network type : EVPN L3VPN
Locator name : pe_01
Owner : BGP State : Active
Create Time : Sep 15 15:25:06.143 2024

<pe_03>disp segment-routing ipv6 local-sid

Local SID forwarding table

Total SIDs: 3

SID : C300::100/96
Function type : End Flavor : PSP
Locator name : pe_03 Allocation type: Dynamic
Owner : OSPFV3-1 State : Active
Create Time : Sep 15 15:38:04.172 2024

SID : C300::101/96
Function type : End.X Flavor : PSP
Interface : GE0/0/1 Interface index: 0x2
Next hop : FE80::54CC:AEFF:FE36:206 Allocation type: Dynamic
Locator name : pe_03
Owner : OSPFV3-1 State : Active
Create Time : Sep 15 15:38:04.180 2024

SID : C300::102/96
Function type : End.DT4 Flavor : PSP
VPN instance : v1 Allocation type: Dynamic
Network type : EVPN L3VPN
Locator name : pe_03
Owner : BGP State : Active
Create Time : Sep 15 15:40:10.715 2024

IPv4路由传递过程（控制平面）

<ce_04>disp bgp routing-table ipv4 4.4.4.4 BGP local router ID: 4.4.4.4 Local AS number: 65004 Paths: 1 available, 1 best BGP routing table information of 4.4.4.4/32: Imported route. Original nexthop: 127.0.0.1 OutLabel : NULL AS-path : (null) Origin : igp Attribute value : MED 0, pref-val 32768 State : valid, local, best IP precedence : N/A QoS local ID : N/A Traffic index : N/A VPN-Peer UserID : N/A DSCP : N/A EXP : N/A Tunnel policy : NULL Rely tunnel IDs : N/A	<pe_01>disp bgp routing-table vpnv4 4.4.4.4 BGP local router ID: 1.1.1.1 Local AS number: 65000 Route distinguisher: 100:1(v1) Total number of routes: 1 Paths: 1 available, 1 best BGP routing table information of 4.4.4.4/32: From : 14.1.1.4 (4.4.4.4) Rely nexthop : 14.1.1.4 Original nexthop: 14.1.1.4 Out interface : GigabitEthernet0/0/0 Route age : 01h36m47s OutLabel : NULL Ext-Community : <RT: 101:1> RxPathID : 0x0 TxPathID : 0x0 AS-path : 65004 Origin : igp Attribute value : MED 0, pref-val 0 State : valid, external, best Source type : local IP precedence : N/A QoS local ID : N/A Traffic index : N/A Tunnel policy : NULL Rely tunnel IDs : N/A	<pe_01>disp bgp l2vpn evpn [5][0][32][4.4.4.4]/80 BGP local router ID: 1.1.1.1 Local AS number: 65000 Route distinguisher: 100:1(v1) Total number of routes: 1 Paths: 1 available, 1 best BGP routing table information of [5][0][32][4.4.4.4]/80: From : 14.1.1.4 (4.4.4.4) Rely nexthop : 14.1.1.4 Original nexthop: 14.1.1.4 Out interface : GigabitEthernet0/0/0 Route age : 01h24m50s OutLabel : NULL Ext-Community : <RT: 101:1> RxPathID : 0x0 TxPathID : 0x0 PrefixSID : End.DT4 SID <C100::100> AS-path : 65004 Origin : igp Attribute value : MED 0, pref-val 0 State : valid, external, best, localredist Source type : local-import IP precedence : N/A QoS local ID : N/A Traffic index : N/A EVPN route type : IP prefix advertisement route ESI : 0000.0000.0000.0000.0000 Ethernet tag ID : 0 IP prefix : 4.4.4.4/32 Gateway address : 0.0.0.0 MPLS label : 4294967295 Tunnel policy : NULL Rely tunnel IDs : N/A

```
<pe_03>disp bgp l2vpn evpn [5][0][32][4.4.4.4]/80

BGP local router ID: 3.3.3.3
Local AS number: 65000

Route distinguisher: 100:1(v1)
Total number of routes: 1
Paths:   1 available, 1 best

BGP routing table information of [5][0][32][4.4.4.4]/80:
From            : 1::1 (1.1.1.1)
Rely nexthop    : FE80::54CC:AEFF:FE36:206
Original nexthop: 1::1
Out interface   : GigabitEthernet0/0/1
Route age       : 01h24m13s
OutLabel        : 3
Ext-Community   : <RT: 101:1>
RxPathID        : 0x0
TxPathID        : 0x0
PrefixSID       : End.DT4 SID <C100::100>
AS-path         : 65004
Origin          : igp
Attribute value : MED 0, localpref 100, pref-val 0
State           : valid, internal, best
Source type     : local
IP precedence   : N/A
QoS local ID    : N/A
Traffic index   : N/A
EVPN route type : IP prefix advertisement route
ESI             : 0000.0000.0000.0000.0000
Ethernet tag ID : 0
IP prefix       : 4.4.4.4/32
Gateway address : 0.0.0.0
MPLS label      : 3
Tunnel policy   : NULL
Rely tunnel IDs : N/A
Re-orignination : Disable
```

```
<pe_03>disp bgp routing-table vpnv4 4.4.4.4

BGP local router ID: 3.3.3.3
Local AS number: 65000

Route distinguisher: 100:1(v1)
Total number of routes: 1
Paths:   1 available, 1 best

BGP routing table information of 4.4.4.4/32:
From            : 1::1 (1.1.1.1)
Rely nexthop    : FE80::54CC:AEFF:FE36:206
Original nexthop: 1::1
Out interface   : GigabitEthernet0/0/1
Route age       : 01h24m54s
OutLabel        : 3
Ext-Community   : <RT: 101:1>
RxPathID        : 0x0
TxPathID        : 0x0
PrefixSID       : End.DT4 SID <C100::100>
AS-path         : 65004
Origin          : igp
Attribute value : MED 0, localpref 100, pref-val 0
State           : valid, internal, best, remoteredist
Source type     : evpn remote-import
IP precedence   : N/A
QoS local ID    : N/A
Traffic index   : N/A
Tunnel policy   : NULL
Rely tunnel IDs : N/A
```

```
<ce_05> disp bgp rou ipv4 4.4.4.4

BGP local router ID: 5.5.5.5
Local AS number: 65005

Paths:   1 available, 1 best

BGP routing table information of 4.4.4.4/32:
From            : 35.1.1.3 (3.3.3.3)
Rely nexthop    : 35.1.1.3
Original nexthop: 35.1.1.3
OutLabel        : NULL
AS-path         : 65000 65004
Origin          : igp
Attribute value : pref-val 0
State           : valid, external, best
IP precedence   : N/A
QoS local ID    : N/A
Traffic index   : N/A
VPN-Peer UserID : N/A
DSCP            : N/A
EXP             : N/A
Tunnel policy   : NULL
Rely tunnel IDs : N/A
```

数据转发

```
<ce_05>disp ip rou 4.4.4.4

Summary count : 1

Destination/Mask   Proto   Pre Cost      NextHop         Interface
4.4.4.4/32         BGP     255 0         35.1.1.3        GE0/0
```

```
<pe_03>disp fib v v1 4.4.4.4
FIB entry count: 1

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

Destination/Mask   Nexthop         Flag     OutInterface/Token      Label
4.4.4.4/32         FE80::54CC:AEFF UGHR     GE0/0/1                 Null
                   :FE36:206
<pe_03>disp ip rou v v1 4.4.4.4

Summary count : 1

Destination/Mask   Proto   Pre Cost      NextHop         Interface
4.4.4.4/32         BGP     255 0         C100::          GE0/0/1
<pe_03>disp ipv6 rou c100::

Summary count : 1

Destination: C100::/96                      Protocol  : O_INTRA
NextHop    : FE80::54CC:AEFF:FE36:206       Preference: 10
Interface  : GE0/0/1                        Cost      : 2
```

```
<p_02>disp ipv6 rou c100::

Summary count : 1

Destination: C100::/96                      Protocol  : O_INTRA
NextHop    : FE80::54CC:A9FF:FE73:106       Preference: 10
Interface  : GE0/0/0                        Cost      : 1
```

```
<pe_01>disp ipv6 routing-table c100::

Summary count : 2

Destination: C100::/96                  Protocol  : O_INTRA
NextHop    : ::                         Preference: 10
Interface  : NULL0                      Cost      : 0

Destination: C100::/128                 Protocol  : SRv6
NextHop    : ::1                        Preference: 4
Interface  : InLoop0                    Cost      : 0
<pe_01>disp fib v v1 4.4.4.4
FIB entry count: 1

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

Destination/Mask   Nexthop        Flag     OutInterface/Token       Label
4.4.4.4/32         14.1.1.4       UGHR     GE0/0/0                  Null
<pe_01>disp ip rou v v1 4.4.4.4

Summary count : 1

Destination/Mask   Proto   Pre Cost       NextHop         Interface
4.4.4.4/32         BGP     255 0          14.1.1.4        GE0/0/0
```

配置关键点

不涉及