AR28/AR46系列路由器跨域VPN-OptionC典型配置
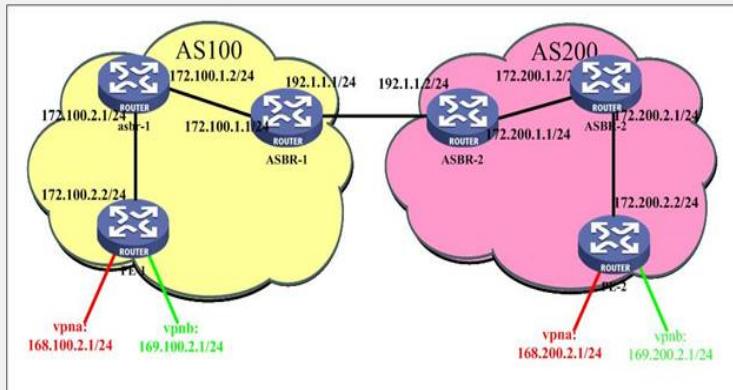
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AR28/AR46系列路由器跨域VPN-OptionC典型配置

【需求】

采用OptionC方式实现跨域的BGP/MPLS VPN业务的互通。

【组网图】

【配置脚本】

PE-1配置脚本

```
#
sysname PE-1
#
router id 202.100.1.3
#
mpls lsr-id 202.100.1.3
#
radius scheme system
#
mpls
#
mpls ldp
#
ip vpn-instance vpna
route-distinguisher 100:1
vpn-target 100:1 export-extcommunity
vpn-target 100:1 import-extcommunity
#
ip vpn-instance vpnb
route-distinguisher 101:1
vpn-target 101:1 export-extcommunity
vpn-target 101:1 import-extcommunity
#
domain system
#
interface Serial2/0/0
link-protocol ppp
ip address 172.100.2.2 255.255.255.0
mpls
mpls ldp enable
#
interface NULL0
#
interface LoopBack0
ip address 202.100.1.3 255.255.255.255
#
interface LoopBack10
ip binding vpn-instance vpna
ip address 168.100.2.1 255.255.255.0
#
interface LoopBack11
ip binding vpn-instance vpnb
ip address 169.100.2.1 255.255.255.0
#
bgp 100
undo synchronization
group in internal
```
peer in label-route-capability   /使能对等体组处理
带标签的IPv4路由的能力/
```
peer in connect-interface LoopBack0
```
peer 202.100.1.2 group in   /和asbr-1建立iBGP/
```
#
ipv4-family vpn-instance vpna
import-route direct
undo synchronization
#
ipv4-family vpn-instance vpnb
import-route direct
undo synchronization
#
ipv4-family vpnv4
peer in enable
peer 202.100.1.2 group in
#
ospf 1
area 0.0.0.0
network 172.100.2.0 0.0.0.255
network 202.100.1.3 0.0.0.0
#
user-interface con 0
user-interface vty 0 4
#
return
```

asbr-1配置脚本

```
#
sysname asbr-1
#
router id 202.100.1.2
#
mpls lsr-id 202.100.1.2
#
radius scheme system
#
mpls
#
mpls ldp
#
```

```
ip vpn-instance vpna
route-distinguisher 100:1
vpn-target 100:1 export-extcommunity
vpn-target 100:1 import-extcommunity
#
ip vpn-instance vpnb
route-distinguisher 101:1
vpn-target 101:1 export-extcommunity
vpn-target 101:1 import-extcommunity
#
domain system
#
interface Serial2/0/0
link-protocol ppp
ip address 172.100.1.2 255.255.255.0
mpls
mpls ldp enable
#
interface Serial2/0/1
link-protocol ppp
ip address 172.100.2.1 255.255.255.0
mpls
mpls ldp enable
#
interface NULL0
#
interface LoopBack0
ip address 202.100.1.2 255.255.255.255
#
interface LoopBack10
ip binding vpn-instance vpna
ip address 168.100.1.1 255.255.255.0
#
interface LoopBack11
ip binding vpn-instance vpnb
ip address 169.100.1.1 255.255.255.0
#
bgp 100
undo synchronization
group ASBR1 internal
peer ASBR1 label-route-capability              /使能对等体组处理带
标签的IPv4路由的能力/
peer ASBR1 connect-interface LoopBack0
peer 202.100.1.1 group ASBR1                    /和ASBR-1建立iBG
P/
group PE1 internal
peer PE1 label-route-capability                 /使能对等体组处理带
标签的IPv4路由的能力/
peer PE1 reflect-client
peer PE1 advertise-community                    /将团体属性传给对等
体组/
peer PE1 connect-interface LoopBack0
peer 202.100.1.3 group PE1                       /和PE-1建立iBGP/
group ex external
peer ex ebgp-max-hop
peer ex connect-interface LoopBack0
peer 202.200.1.2 group ex as-number 200         /和asbr-2建立多跳eB
GP/
#
ipv4-family vpn-instance vpna
import-route direct
undo synchronization
#
ipv4-family vpn-instance vpnb
import-route direct
undo synchronization
#
ipv4-family vpnv4
peer PE1 enable
peer PE1 reflect-client
peer 202.100.1.3 group PE1
peer ex enable
peer ex next-hop-invariable                     /向EBGP对等体发送
路由时，不改变路由的下一跳/
peer 202.200.1.2 group ex
#
ospf 1
area 0.0.0.0
network 172.100.1.0 0.0.0.255
network 172.100.2.0 0.0.0.255
network 202.100.1.2 0.0.0.0
#
user-interface con 0
user-interface vty 0 4
#
return
```

ASBR-1配置脚本

```
#
sysname ASBR-1
#
router id 202.100.1.1
#
mpls lsr-id 202.100.1.1
#
radius scheme system
#
mpls
#
mpls ldp
#
domain system
#
acl number 2000
rule 0 permit source 202.100.1.3 0
#
interface Ethernet1/0/0
ip address 192.1.1.1 255.255.255.0
mpls
mpls ldp enable
#
interface Serial2/0/0
link-protocol ppp
ip address 172.100.1.1 255.255.255.0
mpls
mpls ldp enable
#
interface NULL0
#
interface LoopBack0
ip address 202.100.1.1 255.255.255.255
#
bgp 100
network 202.100.1.2 255.255.255.255
network 202.100.1.3 255.255.255.255
network 202.100.1.1 255.255.255.255
undo synchronization
group in internal
peer in label-route-capability        /使能对等体组处理带标签的IPv4路由的能力/
peer in next-hop-local                /指定下一跳为自己/
peer in route-policy rr export         /应用rr策略/
peer in connect-interface LoopBack0
peer 202.100.1.2 group in              /和asbr-2建立iBGP/
group ex external
peer ex as-number 200
peer ex label-route-capability        /使能对等体组处理带标签的IPv4路由的能力/
peer ex route-policy asbr export        /应用asbr策略/
peer 192.1.1.2 group ex              /和ASBR-2建立eBGP/
#
ospf 1
area 0.0.0.0
network 172.100.1.0 0.0.0.255
network 202.100.1.1 0.0.0.0
#
route-policy asbr permit node 10
if-match acl 2000
apply mpls-label
route-policy asbr permit node 20
route-policy rr permit node 10
if-match mpls-label
apply mpls-label
route-policy rr permit node 20
#
user-interface con 0
user-interface vty 0 4
#
return
```

ASBR-2配置脚本

```
#
sysname ASBR-2
#
router id 202.200.1.1
#
mpls lsr-id 202.200.1.1
#
radius scheme system
#
mpls
#
mpls ldp
#
domain system
#
acl number 2000
rule 0 permit source 202.200.1.3 0
#
interface Ethernet1/0/0
ip address 192.1.1.2 255.255.255.0
mpls
mpls ldp enable
#
interface Serial2/0/0
link-protocol ppp
ip address 172.200.1.1 255.255.255.0
mpls
mpls ldp enable
#
interface NULL0
#
interface LoopBack0
ip address 202.200.1.1 255.255.255.255
#
bgp 200
network 202.200.1.2 255.255.255.255
network 202.200.1.3 255.255.255.255
network 202.200.1.1 255.255.255.255
undo synchronization
group ex external
peer ex as-number 100
peer ex label-route-capability
   /使能对等体组处理带标签的IPv4路由的能力/
peer ex route-policy asbr export          /应用asbr策略/
peer 192.1.1.1 group ex                /和ASBR-1建立eBGP/
group in internal
peer in label-route-capability         /使能对等体组处理带标签的IPv4路由的能力/
peer in next-hop-local                /指定下一跳为自己/
peer in route-policy rr export          /应用rr策略/
peer in connect-interface LoopBack0
peer 202.200.1.2 group in             /和asbr-2建立eBGP/
#
ospf 1
import-route direct
area 0.0.0.0
network 172.200.1.0 0.0.0.255
network 202.200.1.1 0.0.0.0
#
route-policy asbr permit node 10
if-match acl 2000
apply mpls-label
route-policy asbr permit node 20
route-policy rr permit node 10
if-match mpls-label
apply mpls-label
route-policy rr permit node 20
#
user-interface con 0
user-interface vty 0 4
#
return
```

asbr-2配置脚本

```
#
sysname asbr-2
#
router id 202.200.1.2
#
mpls lsr-id 202.200.1.2
#
radius scheme system
#
mpls
#
mpls ldp
#
ip vpn-instance vpna
route-distinguisher 100:1
vpn-target 100:1 export-extcommunity
```

```
vpn-target 100:1 import-extcommunity
#
ip vpn-instance vpnb
route-distinguisher 101:1
vpn-target 101:1 export-extcommunity
vpn-target 101:1 import-extcommunity
#
domain system
#
interface Serial2/0/0
link-protocol ppp
ip address 172.200.1.2 255.255.255.0
mpls
mpls ldp enable
#
interface Serial2/0/1
link-protocol ppp
ip address 172.200.2.1 255.255.255.0
mpls
mpls ldp enable
#
interface NULL0
#
interface LoopBack0
ip address 202.200.1.2 255.255.255.255
#
interface LoopBack10
ip binding vpn-instance vpna
ip address 168.200.1.1 255.255.255.0
#
interface LoopBack11
ip binding vpn-instance vpnb
ip address 169.200.1.1 255.255.255.0
#
bgp 200
undo synchronization
group ex external
peer ex ebgp-max-hop
peer ex connect-interface LoopBack0
peer 202.100.1.2 group ex as-number 100      /和asbr-1建立多跳eBGP/
group ASBR2 internal
peer ASBR2 label-route-capability        /使能对等体组处理带标签的IPv4路由的能
力/
peer ASBR2 connect-interface LoopBack0
peer 202.200.1.1 group ASBR2
group PE2 internal
peer PE2 label-route-capability
/使能对等体组处理带标签的IPv4路由的能力/
peer PE2 reflect-client
peer PE2 advertise-community              /将团体属性传给对等体组/
peer PE2 connect-interface LoopBack0
peer 202.200.1.3 group PE2              /和PE-2建立iBGP/
#
ipv4-family vpn-instance vpna
import-route direct
undo synchronization
#
ipv4-family vpn-instance vpnb
import-route direct
undo synchronization
#
ipv4-family vpnv4
peer ex enable
peer ex next-hop-invariable             /向EBGP对等体发送路由时，不改变路由的下
一跳/
peer 202.100.1.2 group ex
peer PE2 enable
peer PE2 reflect-client
peer 202.200.1.3 group PE2
#
ospf 1
area 0.0.0.0
network 172.200.1.0 0.0.0.255
network 172.200.2.0 0.0.0.255
network 202.200.1.2 0.0.0.0
#
user-interface con 0
user-interface vty 0 4
#
return
```

PE-2配置脚本

```
#
sysname PE-2
#
router id 202.200.1.3
#
mpls lsr-id 202.200.1.3
#
radius scheme system
#
mpls
#
mpls ldp
#
ip vpn-instance vpna
route-distinguisher 100:1
vpn-target 100:1 export-extcommunity
vpn-target 100:1 import-extcommunity
#
ip vpn-instance vpnb
route-distinguisher 101:1
vpn-target 101:1 export-extcommunity
vpn-target 101:1 import-extcommunity
#
domain system
#
interface Serial2/0/0
link-protocol ppp
ip address 172.200.2.2 255.255.255.0
mpls
mpls ldp enable
#
interface NULL0
#
interface LoopBack0
ip address 202.200.1.3 255.255.255.255
#
interface LoopBack10
ip binding vpn-instance vpna
ip address 168.200.2.1 255.255.255.0
#
interface LoopBack11
ip binding vpn-instance vpnb
ip address 169.200.2.1 255.255.255.0
#
bgp 200
undo synchronization
group in internal
peer in label-route-capability          /使能对等体组处理带标签的IPv4路由的能
力/
peer in connect-interface LoopBack0
peer 202.200.1.2 group in               /和asbr-2建立iBGP/
#
ipv4-family vpn-instance vpna
import-route direct
undo synchronization
#
ipv4-family vpn-instance vpnb
import-route direct
undo synchronization
#
ipv4-family vpnv4
peer in enable
peer 202.200.1.2 group in
#
ospf 1
area 0.0.0.0
network 172.200.2.0 0.0.0.255
network 202.200.1.3 0.0.0.0
#
user-interface con 0
user-interface vty 0 4
#
return
```

【验证】

asbr-1分别和PE1、ASBR-1建立MP-iBGP连接，和asbr-2建立MP-eBGP连接。

```
<asbr-1>disp bgp peer

Peer          AS-num Ver  Queued-Tx  Msg-Rx  Msg-Tx  Up/Down   State
-------------------------------------------------------------------------------
202.200.1.2   200    4    0          422     424     06:58:21  Established
202.100.1.1   100    4    0          429     421     06:59:07  Established
202.100.1.3   100    4    0          420     425     06:59:14  Established
```

PE-1私网路由：

```
<PE-1>disp ip routing-table vpn-instance vpna
vpna   Route Information
Routing Table: vpna   Route-Distinguisher:  100:1
Destination/Mask  Protocol Pre Cost      Nexthop       Interface
168.100.1.0/24    BGP    256 0       202.100.1.2   InLoopBack0
168.100.2.0/24    DIRECT  0   0       168.100.2.1    LoopBack10
168.100.2.1/32    DIRECT  0   0       127.0.0.1     InLoopBack0
168.200.1.0/24    BGP    256 0       202.200.1.2   InLoopBack0
168.200.2.0/24    BGP    256 0       202.200.1.3   InLoopBack0


PE-1私网标签：
<PE-1>disp mpls l3vpn-lsp vpn-instance vpna
---------------------------------------------------------------------
LSP Information: L3vpn Ingress Lsp
---------------------------------------------------------------------
TOTAL:  3 Record(s) Found.
Vpn-instance Name: vpna    Route Distinguisher: 100:1
NO    FEC            NEXTHOP      OUTER-LABEL OUT-INTERFACE
1    168.100.1.0/24    172.100.2.1      3(vpn)         S2/0/0
2    168.200.2.0/24    172.100.2.1      1030(vpn)       S2/0/0
3    168.200.1.0/24    172.100.2.1      1031(vpn)       S2/0/0
---------------------------------------------------------------------
LSP Information: L3vpn Egress Lsp
---------------------------------------------------------------------
TOTAL:  1 Record(s) Found.
NO    VRFNAME         INNER-LABEL NEXTHOP      OUT-INTERFACE
1     vpna            1024        0.0.0.0         InLoop0
---------------------------------------------------------------------
LSP Information: L3vpn Transit Lsp
---------------------------------------------------------------------
TOTAL:  0 Record(s) Found.
```

【提示】
以上配置为"不改变私网PE下一跳"的配置。