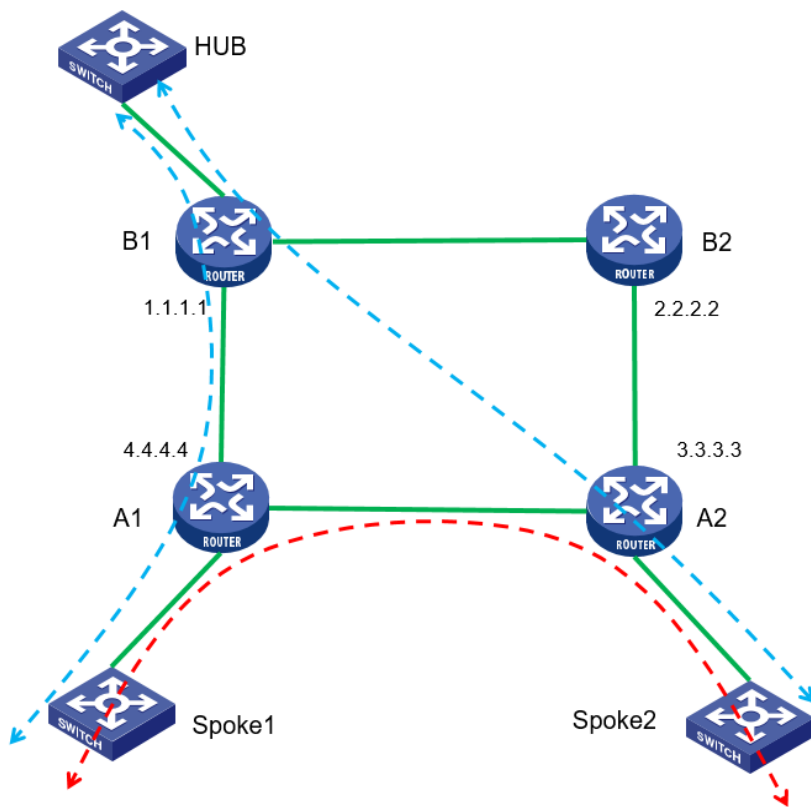


某地市已经部署了我司IP-RAN环网，现在客户希望在环网上增加某政企客户的二层专线业务，从而实现该客户同城总部与两个办公楼之间的业务二层互通。

同时分支之间可直接进行互访。



如图所示，总部CE设备挂在B1设备上，两个分支节点分别位于A1/A2下；要求分支站点之间可以直接通信互访；

实现该需求直接在IP-RAN环网上部署VPLS技术实现。

配置点到多点L2VPN业务之前，请先确保IP-RAN环网上路由可达，MPLS及MPLS LDP已经使能；

```

B1配置
l2vpn enable
#
pw-class vpls
pw-type ethernet
vccv cc router-alert
vccv bfd
#
vsi vpls
pwsignaling ldp
peer 3.3.3.3 pw-id 13 pw-class vpls
peer 4.4.4.4 pw-id 14 pw-class vpls

interface GigabitEthernet0/0
port link-mode route
combo enable copper
xconnect vsi vpls-hub hub
    
```

A1配置

<pre> l2vpn enable # pw-class vpls pw-type ethernet vccv cc router-alert vccv bfd  vsi vpls pwsignaling ldp peer 1.1.1.1 pw-id 14 pw-class vpls peer 3.3.3.3 pw-id 34 pw-class vpls  interface GigabitEthernet0/2 port link-mode route combo enable copper xconnect vsi vpls </pre>
<pre> A2配置 l2vpn enable # pw-class vpls pw-type ethernet vccv cc router-alert vccv bfd #  vsi vpls pwsignaling ldp peer 1.1.1.1 pw-id 13 pw-class vpls peer 4.4.4.4 pw-id 34 pw-class vpls  interface GigabitEthernet0/2 port link-mode route combo enable copper xconnect vsi vpls </pre>

业务验证:

HUB地址: 192.168.1.1 Spoke1:192.168.1.2 Spoke2:192.168.1.3

总部ping分支互通正常:

```

<HUB>ping 192.168.1.3
Ping 192.168.1.3 (192.168.1.3): 56 data bytes, press CTRL_C to break
56 bytes from 192.168.1.3: icmp_seq=0 ttl=255 time=2.761 ms
56 bytes from 192.168.1.3: icmp_seq=1 ttl=255 time=2.779 ms
56 bytes from 192.168.1.3: icmp_seq=2 ttl=255 time=1.766 ms
56 bytes from 192.168.1.3: icmp_seq=3 ttl=255 time=2.419 ms
56 bytes from 192.168.1.3: icmp_seq=4 ttl=255 time=3.031 ms

--- Ping statistics for 192.168.1.3 ---
5 packets transmitted, 5 packets received, 0.0% packet loss
round-trip min/avg/max/std-dev = 1.766/2.551/3.031/0.438 ms
<HUB>Nov 4 07:57:59:275 2015 HUB PING/6/PING_STATISTICS: Ping statist
ted, 5 packets received, 0.0% packet loss, round-trip min/avg/max/std-d
ping 192.168.1.2
Ping 192.168.1.2 (192.168.1.2): 56 data bytes, press CTRL_C to break
56 bytes from 192.168.1.2: icmp_seq=0 ttl=255 time=1.637 ms
56 bytes from 192.168.1.2: icmp_seq=1 ttl=255 time=1.980 ms
56 bytes from 192.168.1.2: icmp_seq=2 ttl=255 time=1.862 ms
56 bytes from 192.168.1.2: icmp_seq=3 ttl=255 time=1.276 ms
56 bytes from 192.168.1.2: icmp_seq=4 ttl=255 time=1.687 ms

--- Ping statistics for 192.168.1.2 ---
5 packets transmitted, 5 packets received, 0.0% packet loss
round-trip min/avg/max/std-dev = 1.276/1.688/1.980/0.240 ms

```

分支Spoke1 ping HUB正常, 分支之间互访正常:

```

<SPOKE1>ping 192.168.1.1
Ping 192.168.1.1 (192.168.1.1): 56 data bytes, press CTRL_C to break
56 bytes from 192.168.1.1: icmp_seq=0 ttl=255 time=2.000 ms
56 bytes from 192.168.1.1: icmp_seq=1 ttl=255 time=3.000 ms
56 bytes from 192.168.1.1: icmp_seq=2 ttl=255 time=2.000 ms
56 bytes from 192.168.1.1: icmp_seq=3 ttl=255 time=2.000 ms
56 bytes from 192.168.1.1: icmp_seq=4 ttl=255 time=1.000 ms

--- Ping statistics for 192.168.1.1 ---
5 packets transmitted, 5 packets received, 0.0% packet loss
round-trip min/avg/max/std-dev = 1.000/2.000/3.000/0.632 ms
<SPOKE1>Nov 5 08:59:25:337 2015 SPOKE1 PING/6/PING_STATISTICS: Ping stat
ansmitted, 5 packets received, 0.0% packet loss, round-trip min/avg/max,
ping 192.168.1.3
Ping 192.168.1.3 (192.168.1.3): 56 data bytes, press CTRL_C to break
56 bytes from 192.168.1.3: icmp_seq=0 ttl=254 time=5.000 ms
56 bytes from 192.168.1.3: icmp_seq=1 ttl=254 time=4.000 ms
56 bytes from 192.168.1.3: icmp_seq=2 ttl=254 time=4.000 ms
56 bytes from 192.168.1.3: icmp_seq=3 ttl=254 time=5.000 ms
56 bytes from 192.168.1.3: icmp_seq=4 ttl=254 time=3.000 ms

--- Ping statistics for 192.168.1.3 ---
5 packets transmitted, 5 packets received, 0.0% packet loss
round-trip min/avg/max/std-dev = 3.000/4.200/5.000/0.748 ms

```

分支Spoke2 ping HUB正常, 分支之间互访正常:

```

<SPOKE2>ping 192.168.1.1
Ping 192.168.1.1 (192.168.1.1): 56 data bytes, press CTRL_C to break
56 bytes from 192.168.1.1: icmp_seq=0 ttl=255 time=3.071 ms
56 bytes from 192.168.1.1: icmp_seq=1 ttl=255 time=2.225 ms
56 bytes from 192.168.1.1: icmp_seq=2 ttl=255 time=1.849 ms
56 bytes from 192.168.1.1: icmp_seq=3 ttl=255 time=2.937 ms
56 bytes from 192.168.1.1: icmp_seq=4 ttl=255 time=2.485 ms

--- Ping statistics for 192.168.1.1 ---
5 packets transmitted, 5 packets received, 0.0% packet loss
round-trip min/avg/max/std-dev = 1.849/2.513/3.071/0.451 ms
<SPOKE2>Nov 5 09:04:45:479 2015 SPOKE2 PING/6/PING_STATISTICS: Ping stat
ansmitted, 5 packets received, 0.0% packet loss, round-trip min/avg/max/st
ping 192.168.1.2
Ping 192.168.1.2 (192.168.1.2): 56 data bytes, press CTRL_C to break
56 bytes from 192.168.1.2: icmp_seq=0 ttl=254 time=5.911 ms
56 bytes from 192.168.1.2: icmp_seq=1 ttl=254 time=3.901 ms
56 bytes from 192.168.1.2: icmp_seq=2 ttl=254 time=4.053 ms
56 bytes from 192.168.1.2: icmp_seq=3 ttl=254 time=4.607 ms
56 bytes from 192.168.1.2: icmp_seq=4 ttl=254 time=3.301 ms

--- Ping statistics for 192.168.1.2 ---
5 packets transmitted, 5 packets received, 0.0% packet loss
round-trip min/avg/max/std-dev = 3.301/4.355/5.911/0.882 ms

```

在B1/A1/A2上查看PW状态:

```

<B1>dis l2v pw verbose
VSI Name: vpls
Peer: 3.3.3.3          PW ID: 13
  Signaling Protocol  : LDP
  Link ID             : 8           PW State : Up
  In Label            : 917630      Out Label: 917630
  MTU                 : 1500
  PW Attributes       : Main
  VCCV CC             : Router-Alert
  VCCV BFD            : Fault Detection with BFD
  Tunnel Group ID     : 0x1000000130000001
  Tunnel NHLFE IDs    : 1025
Peer: 4.4.4.4          PW ID: 14
  Signaling Protocol  : LDP
  Link ID             : 9           PW State : Up
  In Label            : 917631      Out Label: 917628
  MTU                 : 1500
  PW Attributes       : Main
  VCCV CC             : Router-Alert
  VCCV BFD            : Fault Detection with BFD
  Tunnel Group ID     : 0x1000000030000000
  Tunnel NHLFE IDs    : 1026

```

```

<A1>dis l2v pw verbose
VSI Name: vpls
Peer: 1.1.1.1          FW ID: 14
  Signaling Protocol : LDP
  Link ID             : 8           FW State : Up
  In Label            : 917628     Out Label: 917631
  MTU                 : 1500
  PW Attributes       : Main
  VCCV CC             : Router-Alert
  VCCV BFD            : Fault Detection with BFD
  Tunnel Group ID    : 0x1000000330000000
  Tunnel NHLFE IDs   : 1029
Peer: 3.3.3.3          FW ID: 34
  Signaling Protocol : LDP
  Link ID             : 9           FW State : Up
  In Label            : 917629     Out Label: 917629
  MTU                 : 1500
  PW Attributes       : Main
  VCCV CC             : Router-Alert
  VCCV BFD            : Fault Detection with BFD
  Tunnel Group ID    : 0x1000000230000001
  Tunnel NHLFE IDs   : 1028

```

在B1/A1/A2上查看VPLS MAC地址转发表:

```

<B1>dis l2v mac
MAC Address      State   VSI Name      Link ID/Name  Aging
189f-4404-0500  Dynamic vpls        0             Aging
189f-4404-0502  Dynamic vpls        0             Aging
189f-4cf4-0602  Dynamic vpls        9             Aging
189f-563b-0702  Dynamic vpls        8             Aging

```

```

<A1>dis l2v mac
MAC Address      State   VSI Name      Link ID/Name  Aging
189f-4404-0500  Dynamic vpls        8             Aging
189f-4404-0502  Dynamic vpls        8             Aging
189f-4cf4-0602  Dynamic vpls        0             Aging
189f-563b-0702  Dynamic vpls        9             Aging
--- 4 mac address(es) found ---

```

```

<A1>dis l2v mac
MAC Address      State   VSI Name      Link ID/Name  Aging
189f-4404-0500  Dynamic vpls        8             Aging
189f-4404-0502  Dynamic vpls        8             Aging
189f-4cf4-0602  Dynamic vpls        0             Aging
189f-563b-0702  Dynamic vpls        9             Aging

```

1. 配置L2VPN是需要考虑PW封装以及AC接入类型，不通的组合会对报文的Tag产生不同的影响；
2. 配置VPLS业务前，首先要保证IPRAN环网路由可达，公网MPLS隧道正常建立；
3. 无特殊需求IPRAN网络重均采用Martini方式及LDP作为L2VPN信令协议；
4. A设备AC接口配置需要切换为二层接口配置服务实例，B设备使用三层接口；因为实验室用模拟器，所以配置使用三层接口配置，服务实例配置请参见相关配置手册；