MSR设备OSPF外部路由在骨干区域与非骨干区域间的选路规则

陈丹威 2012-07-27 发表

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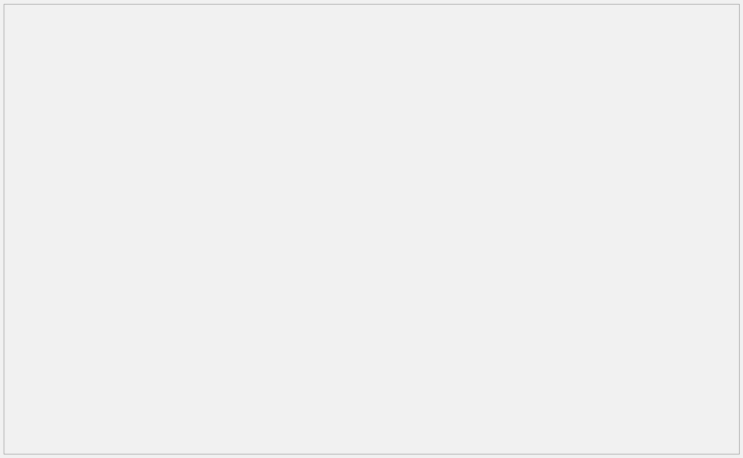
一、 组网：

用四台路由器组网，分别为Router A-D。其中RouterA经B到D的路由开销值为10，所在区域为骨干区域。A经C到D的路由开销为1000，为非骨干区域。



二、 问题描述：

我司路由器在对于某一外部目标网络有经过骨干区域的和经过非骨干区域的区域内路径时，应该优先选择区域0还是区域1的路由，与RFC 2328是否兼容RFC 1583相关。缺省情况下，兼容RFC 1583的选路规则被使能。

三、 过程分析：

在外部目标网络同时有经过骨干区域和非骨干区域的路由可达时，路由选择方式由RFC 2328与RFC1583是否兼容决定。

分别对其兼容与不兼容两种情况进行测试。

(1) 配置路由器A

```
# 在Router A上进行配置
#
interface GigabitEthernet0/0
 port link-mode route
 ip address 10.0.0.1 255.255.255.0
 ospf cost 10
#
interface GigabitEthernet0/1
 port link-mode route
 ip address 20.0.0.1 255.255.255.0
 ospf cost 1000
#
ospf 1
 area 0.0.0.0
  network 10.0.0.0 0.0.0.255
 area 0.0.0.1
  network 20.0.0.0 0.0.0.255
#
[H3C]dis ospf peer
                OSPF Process 1 with Router ID 20.0.0.1
                    Neighbor Brief Information
 Area: 0.0.0.0
 Router ID     Address       Pri  Dead-Time   Interface          State
 10.1.1.98     10.0.0.2      1    38         GE0/0              Full/BDR
 Area: 0.0.0.1
 Router ID     Address       Pri  Dead-Time   Interface          State
 30.1.1.1      20.0.0.2      1    35         GE0/1              Full/DR
 [H3C]dis ospf routing
```

```
        OSPF Process 1 with Router ID 20.0.0.1
                Routing Tables
 Routing for Network
 Destination      Cost     Type    NextHop       AdvRouter       Area
 20.0.0.0/24      1000     Transit 20.0.0.1      30.1.1.1        0.0.0.1
 20.1.1.0/24      1001     Transit 20.0.0.2      1.1.1.1         0.0.0.1
 10.0.0.0/24      10       Transit 10.0.0.1      20.0.0.1        0.0.0.0
 10.1.1.0/24      11       Transit 10.0.0.2      10.1.1.98       0.0.0.0
Routing for ASEs
 Destination     Cost     Type    Tag         NextHop         AdvRouter
40.1.1.1/32       1      Type2    1           10.0.0.2        1.1.1.1
 Total Nets: 5
 Intra Area: 4  Inter Area: 0  ASE: 1  NSSA: 0
```

(2) 配置路由器B

```
#
interface GigabitEthernet0/0
 port link-mode route
 ip address 10.0.0.2 255.255.255.0
 ospf cost 10
#
interface GigabitEthernet0/1
 port link-mode route
ip address 10.1.1.1 255.255.255.0
#
ospf 1
 area 0.0.0.0
  network 10.0.0.0 0.0.0.255
  network 10.1.1.0 0.0.0.255
#
[r2]dis ospf routing
        OSPF Process 1 with Router ID 10.1.1.98
                Routing Tables
 Routing for Network
 Destination        Cost     Type    NextHop         AdvRouter       Area
 20.0.0.0/24        3        Inter   10.1.1.2        1.1.1.1         0.0.0.0
 20.1.1.0/24        2        Inter   10.1.1.2        1.1.1.1         0.0.0.0
 10.0.0.0/24        10       Transit 10.0.0.2        20.0.0.1        0.0.0.0
 10.1.1.0/24        1        Transit 10.1.1.1        10.1.1.98       0.0.0.0
Routing for ASEs
 Destination     Cost     Type    Tag         NextHop       AdvRouter
40.1.1.1/32      1        Type2   1           10.1.1.2        1.1.1.1
 Total Nets: 5
 Intra Area: 2  Inter Area: 2  ASE: 1  NSSA: 0
```

(3) 配置路由器C

```
#
interface GigabitEthernet0/0
 port link-mode route
 ip address 20.0.0.2 255.255.255.0
#
interface GigabitEthernet0/1
 port link-mode route
 ip address 20.1.1.1 255.255.255.0
#
ospf 1
 area 0.0.0.1
  network 20.0.0.0 0.0.0.255
  network 20.1.1.0 0.0.0.255
#
[H3C]dis ospf peer
                OSPF Process 1 with Router ID 30.1.1.1
                    Neighbor Brief Information
 Area: 0.0.0.1
 Router ID     Address        Pri  Dead-Time   Interface          State
 20.0.0.1      20.0.0.1       1    31         GE0/0              Full/BDR
```

```
 1.1.1.1         20.1.1.2        1    34         GE0/1           Full/DR
```

(4) 配置路由器D

```
#
interface LoopBack0
 ip address 40.1.1.1 255.255.255.255
#
interface GigabitEthernet0/0
 port link-mode route
 ip address 10.1.1.2 255.255.255.0
#
interface GigabitEthernet0/1
 port link-mode route
 ip address 20.1.1.2 255.255.255.0
#
ospf 1
 import-route direct
 area 0.0.0.0
  network 10.1.1.0 0.0.0.255
 area 0.0.0.1
  network 20.1.1.0 0.0.0.255
#
```

查看OSPF邻居信息

```
[R1]dis ospf peer
                OSPF Process 1 with Router ID 1.1.1.1
                    Neighbor Brief Information
 Area: 0.0.0.0
 Router ID     Address        Pri  Dead-Time  Interface          State
 10.1.1.98     10.1.1.1         1    34         GE0/0           Full/DR
 Area: 0.0.0.1
 Router ID     Address        Pri  Dead-Time  Interface          State
 30.1.1.1      20.1.1.1         1    34         GE0/1           Full/BDR
```

四、 解决方法：

查看选路结果

```
[H3C]ping -r 40.1.1.1
  PING 40.1.1.1: 56  data bytes, press CTRL_C to break
    Reply from 40.1.1.1: bytes=56 Sequence=1 ttl=254 time=1 ms
      Record Route:
        10.1.1.1
        40.1.1.1
        10.0.0.2
        10.0.0.1
  --- 40.1.1.1 ping statistics ---
    5 packet(s) transmitted
    5 packet(s) received
    0.00% packet loss
round-trip min/avg/max = 1/1/1 ms
```

五次ping包的路径，都是优先选择骨干区域路由。

在RFC 2328不兼容RFC1583时，会优先选择非骨干区域的区域内的路由。

```
[H3C-ospf-1]undo rfc1583 compatible
[H3C-ospf-1]ping -r 40.1.1.1
  PING 40.1.1.1: 56  data bytes, press CTRL_C to break
    Reply from 40.1.1.1: bytes=56 Sequence=1 ttl=254 time=1 ms
      Record Route:
        10.1.1.1
        40.1.1.1
        10.0.0.2
        10.0.0.1
    Reply from 40.1.1.1: bytes=56 Sequence=2 ttl=254 time=1 ms
      Record Route:
        10.1.1.1
        40.1.1.1
        10.0.0.2
        10.0.0.1
    Reply from 40.1.1.1: bytes=56 Sequence=3 ttl=254 time=1 ms
```

```
    Record Route:
      20.1.1.1
      40.1.1.1
      20.0.0.2
      20.0.0.1
  Reply from 40.1.1.1: bytes=56 Sequence=4 ttl=254 time=1 ms
    Record Route:
      20.1.1.1
      40.1.1.1
      20.0.0.2
      20.0.0.1
  Reply from 40.1.1.1: bytes=56 Sequence=5 ttl=254 time=1 ms
    Record Route:
      20.1.1.1
      40.1.1.1
      20.0.0.2
      20.0.0.1
 --- 40.1.1.1 ping statistics ---
  5 packet(s) transmitted
  5 packet(s) received
  0.00% packet loss
round-trip min/avg/max = 1/1/1 ms
```

初始阶段，由于默认状态下RFC 2328兼容RFC1583，配置的不兼容命令尚未生效，前两个ping包依然选择骨干区域的路由。当配置生效后，选择非骨干区域的路由。

即缺省状态下，优选骨干区的区域内路由；当RFC 2328不兼容RFC 1583时，优选非骨干区的区域内路由，这样做的目的是尽量减少骨干区的负担。

在实际组网中，根据网络所需的选路方式，适当的选择是否让RFC 2328兼容RFC 1583，以满足用户实际的组网需求。