某局点利用OSPF实现路由主备切换典型案例

OSPF 路由策略 zhiliao_2EyGq 2018-11-09 发表

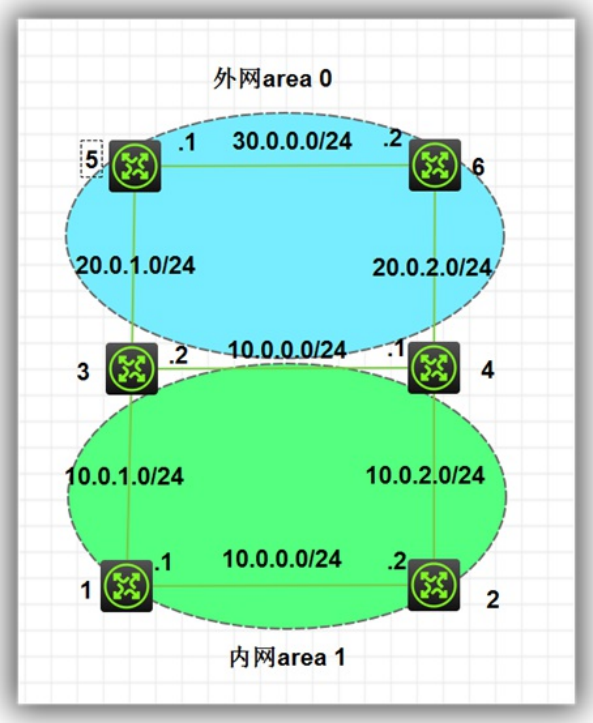
组网及说明

一、组网需求

如下图为网络拓扑，当设备无故障时，业务走主设备，当主设备或设备间链路故障时启用备份设备。要求内网设备中路由表规模及路由信息传递的数量尽可能少，不需要知道外部明细路由。

二、组网拓扑

六台路由设备，分别命名为1/2/3/4/5/6。1/3/5为主设备，2/4/6为备份设备。网段及路由分配如图所示（如路由器1的两个接口IP分别为10.0.0.1/24 、10.0.1.1/24 ）。内外网之间通过OSPF划分区域进行区分，对网络进行备份保护的同时，使用totally stub区域配置对内网设备隐藏外部明细路由，减少内网设备中路由表规模及路由信息传递的数量。



配置步骤

三、配置步骤

[1]

```
interface LoopBack0
 ip address 1.1.1.1 255.255.255.255
#
interface GigabitEthernet0/0
 port link-mode route
 combo enable copper
 ip address 10.0.0.1 255.255.255.0
#
interface GigabitEthernet0/1
 port link-mode route
 combo enable copper
 ip address 10.0.1.1 255.255.255.0
#
ospf 1
 area 0.0.0.1
  network 1.1.1.1 0.0.0.0
  network 10.0.0.0 0.0.0.255
  network 10.0.1.0 0.0.0.255
```

```
 stub no-summary     //配置stub no-summary区域，减小内部网络路由表数量
#
[2]
interface LoopBack0
 ip address 2.2.2.2 255.255.255.255
#
interface GigabitEthernet0/0
 port link-mode route
 combo enable copper
 ip address 10.0.0.2 255.255.255.0
#
interface GigabitEthernet0/1
 port link-mode route
 combo enable copper
 ip address 10.0.2.2 255.255.255.0
#
ospf 1
 area 0.0.0.1
  network 2.2.2.2 0.0.0.0
  network 10.0.0.0 0.0.0.255
  network 10.0.2.0 0.0.0.255
  stub no-summary              //配置stub no-summary区域
#
[3]
 interface LoopBack0
 ip address 3.3.3.3 255.255.255.255
#
interface GigabitEthernet0/0
 port link-mode route
 combo enable copper
 ip address 20.0.0.2 255.255.255.0
#
interface GigabitEthernet0/1
 port link-mode route
 combo enable copper
 ip address 10.0.1.2 255.255.255.0
#
interface GigabitEthernet0/2
 port link-mode route
 combo enable copper
 ip address 20.0.1.2 255.255.255.0
#
ospf 1
 area 0.0.0.0
  network 3.3.3.3 0.0.0.0
  network 20.0.0.0 0.0.0.255
  network 20.0.1.0 0.0.0.255
 area 0.0.0.1
  network 10.0.1.0 0.0.0.255
  stub no-summary              //配置stub no-summary区域

[4]
interface LoopBack0
 ip address 4.4.4.4 255.255.255.255
#
interface GigabitEthernet0/0
 port link-mode route
 combo enable copper
 ip address 20.0.0.1 255.255.255.0
#
interface GigabitEthernet0/1
 port link-mode route
 combo enable copper
 ip address 10.0.2.1 255.255.255.0
```

```
#
interface GigabitEthernet0/2
 port link-mode route
 combo enable copper
 ip address 20.0.2.1 255.255.255.0
 ospf cost 100        //将路由4-6间的链路接口cost设为100，得链路无故障情况下路由
                        优先使用主设备，即使用4-3之间的链路，通过路由3访问外网。
#
ospf 1
 area 0.0.0.0
  network 4.4.4.4 0.0.0.0
  network 20.0.0.0 0.0.0.255
  network 20.0.2.0 0.0.0.255
 area 0.0.0.1
  network 10.0.2.0 0.0.0.255
  stub no-summary             //配置stub no-summary区域
#

[5]
 interface GigabitEthernet0/0
 port link-mode route
 combo enable copper
 ip address 30.0.0.1 255.255.255.0
#
interface GigabitEthernet0/1
 port link-mode route
 combo enable copper
 ip address 20.0.1.1 255.255.255.0
#
#
ospf 1
 area 0.0.0.0
  network 5.5.5.5 0.0.0.0
  network 20.0.1.0 0.0.0.255
  network 30.0.0.0 0.0.0.255
#

[6]
interface LoopBack0
 ip address 6.6.6.6 255.255.255.255
#
interface GigabitEthernet0/0
 port link-mode route
 combo enable copper
 ip address 30.0.0.2 255.255.255.0
#
interface GigabitEthernet0/1
 port link-mode route
 combo enable copper
 ip address 20.0.2.2 255.255.255.0
#
ospf 1
 area 0.0.0.0
  network 6.6.6.6 0.0.0.0
  network 20.0.2.0 0.0.0.255
  network 30.0.0.0 0.0.0.255
#
```

四、组网测试

1、正常的路由信息

ABR（路由器3/4）学习到的路由信息：

```
[3]dis ospf rou

        OSPF Process 1 with Router ID 3.3.3.3
                Routing Table

             Topology base (MTID 0)

Routing for network
Destination        Cost     Type    NextHop         AdvRouter       Area
20.0.0.0/24        1        Transit 0.0.0.0         4.4.4.4         0.0.0.0
20.0.1.0/24        1        Transit 0.0.0.0         5.5.5.5         0.0.0.0
20.0.2.0/24        3        Transit 20.0.1.1        6.6.6.6         0.0.0.0
6.6.6.6/32         2        Stub    20.0.1.1        6.6.6.6         0.0.0.0
5.5.5.5/32         1        Stub    20.0.1.1        5.5.5.5         0.0.0.0
4.4.4.4/32         1        Stub    20.0.0.1        4.4.4.4         0.0.0.0
10.0.0.0/24        2        Transit 10.0.1.1        2.2.2.2         0.0.0.1
10.0.1.0/24        1        Transit 0.0.0.0         3.3.3.3         0.0.0.1
3.3.3.3/32         0        Stub    0.0.0.0         3.3.3.3         0.0.0.0
10.0.2.0/24        3        Transit 10.0.1.1        2.2.2.2         0.0.0.1
2.2.2.2/32         2        Stub    10.0.1.1        2.2.2.2         0.0.0.1
30.0.0.0/24        2        Transit 20.0.1.1        5.5.5.5         0.0.0.0
1.1.1.1/32         1        Stub    10.0.1.1        1.1.1.1         0.0.0.1
```

```
[4]dis ospf rou

        OSPF Process 1 with Router ID 4.4.4.4
                Routing Table

             Topology base (MTID 0)

Routing for network
Destination        Cost     Type    NextHop         AdvRouter       Area
20.0.0.0/24        1        Transit 0.0.0.0         4.4.4.4         0.0.0.0
20.0.1.0/24        2        Transit 20.0.0.2        5.5.5.5         0.0.0.0
20.0.2.0/24        100      Transit 0.0.0.0         6.6.6.6         0.0.0.0
6.6.6.6/32         3        Stub    20.0.0.2        6.6.6.6         0.0.0.0
5.5.5.5/32         2        Stub    20.0.0.2        5.5.5.5         0.0.0.0
4.4.4.4/32         0        Stub    0.0.0.0         4.4.4.4         0.0.0.0
10.0.0.0/24        2        Transit 10.0.2.2        2.2.2.2         0.0.0.1
10.0.1.0/24        3        Transit 10.0.2.2        3.3.3.3         0.0.0.1
3.3.3.3/32         1        Stub    20.0.0.2        3.3.3.3         0.0.0.0
10.0.2.0/24        1        Transit 0.0.0.0         2.2.2.2         0.0.0.1
2.2.2.2/32         1        Stub    10.0.2.2        2.2.2.2         0.0.0.1
30.0.0.0/24        3        Transit 20.0.0.2        5.5.5.5         0.0.0.0
1.1.1.1/32         2        Stub    10.0.2.2        1.1.1.1         0.0.0.1
```

内部设备（路由器1/2）学习的路由信息如下图，可以看到并无外部明细路由。

```
[1]dis ospf rou

        OSPF Process 1 with Router ID 1.1.1.1
                Routing Table
                                只有一条缺省路由，并无外部理由明细
             Topology base (MTID 0)

Routing for network
Destination        Cost     Type    NextHop         AdvRouter       Area
0.0.0.0/0          2        Inter   10.0.1.2        3.3.3.3         0.0.0.1
10.0.0.0/24        1        Transit 0.0.0.0         2.2.2.2         0.0.0.1
10.0.1.0/24        1        Transit 0.0.0.0         3.3.3.3         0.0.0.1
10.0.2.0/24        2        Transit 10.0.0.2        2.2.2.2         0.0.0.1
2.2.2.2/32         1        Stub    10.0.0.2        2.2.2.2         0.0.0.1
1.1.1.1/32         0        Stub    0.0.0.0         1.1.1.1         0.0.0.1
```

2、由于模拟器上没有tracert功能，当1-3间链路故障时，通过下一跳可以看到，路由从10.0.0.2经过路由器2-4-3转发。

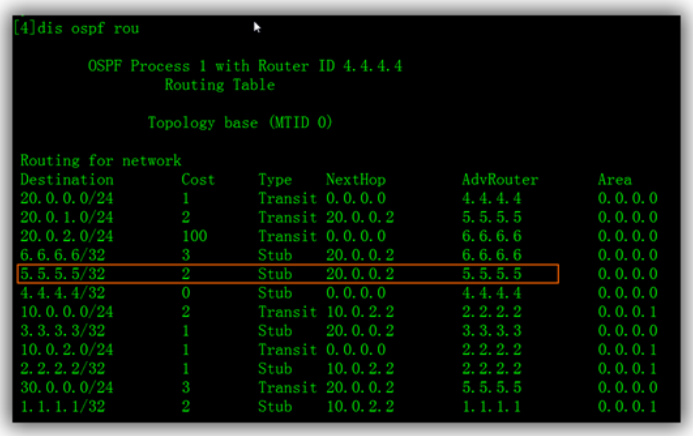
```
[1-GigabitEthernet0/1]dis ospf rou

        OSPF Process 1 with Router ID 1.1.1.1
                Routing Table

             Topology base (MTID 0)

Routing for network
Destination        Cost     Type    NextHop         AdvRouter       Area
0.0.0.0/0          3        Inter   10.0.0.2        4.4.4.4         0.0.0.1
10.0.0.0/24        1        Transit 0.0.0.0         2.2.2.2         0.0.0.1
10.0.2.0/24        2        Transit 10.0.0.2        2.2.2.2         0.0.0.1
2.2.2.2/32         1        Stub    10.0.0.2        2.2.2.2         0.0.0.1
1.1.1.1/32         0        Stub    0.0.0.0         1.1.1.1         0.0.0.1

Total nets: 5
Intra area: 4  Inter area: 1  ASE: 0  NSSA: 0
[1-GigabitEthernet0/1]
Inactive timeout reached, logging out.
```



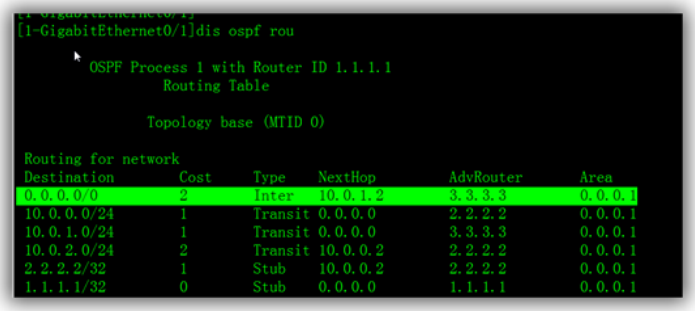
```
[4]dis ospf rou

        OSPF Process 1 with Router ID 4.4.4.4
                Routing Table

            Topology base (MTID 0)

Routing for network
Destination        Cost     Type     NextHop         AdvRouter       Area
20.0.0.0/24        1        Transit  0.0.0.0         4.4.4.4         0.0.0.0
20.0.1.0/24        2        Transit  20.0.0.2        5.5.5.5         0.0.0.0
20.0.2.0/24        100      Transit  0.0.0.0         6.6.6.6         0.0.0.0
6.6.6.6/32         3        Stub     20.0.0.2        6.6.6.6         0.0.0.0
5.5.5.5/32         2        Stub     20.0.0.2        5.5.5.5         0.0.0.0
4.4.4.4/32         0        Stub     0.0.0.0         4.4.4.4         0.0.0.0
10.0.0.0/24        2        Transit  10.0.2.2        2.2.2.2         0.0.0.1
3.3.3.3/32         1        Stub     20.0.0.2        3.3.3.3         0.0.0.0
10.0.2.0/24        1        Transit  0.0.0.0         2.2.2.2         0.0.0.1
2.2.2.2/32         1        Stub     10.0.2.2        2.2.2.2         0.0.0.1
30.0.0.0/24        3        Transit  20.0.0.2        5.5.5.5         0.0.0.0
1.1.1.1/32         2        Stub     10.0.2.2        1.1.1.1         0.0.0.1
```

2、当路由器3-5间的路由发生故障时，通过下一跳可以看到，数据通过3-4-6-5转发。

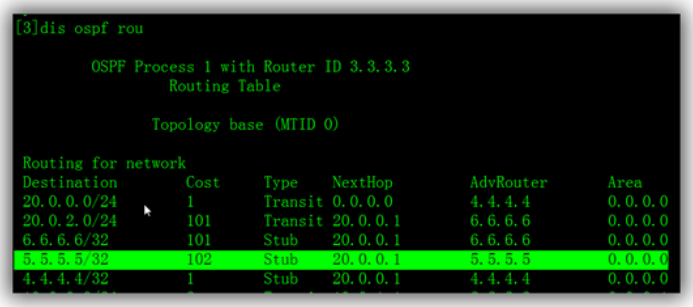


```
[1-GigabitEthernet0/1]dis ospf rou

        OSPF Process 1 with Router ID 1.1.1.1
                Routing Table

            Topology base (MTID 0)

Routing for network
Destination        Cost     Type     NextHop         AdvRouter       Area
0.0.0.0/0          2        Inter    10.0.1.2        3.3.3.3         0.0.0.1
10.0.0.0/24        1        Transit  0.0.0.0         2.2.2.2         0.0.0.1
10.0.1.0/24        1        Transit  0.0.0.0         3.3.3.3         0.0.0.1
10.0.2.0/24        2        Transit  10.0.0.2        2.2.2.2         0.0.0.1
2.2.2.2/32         1        Stub     10.0.0.2        2.2.2.2         0.0.0.1
1.1.1.1/32         0        Stub     0.0.0.0         1.1.1.1         0.0.0.1
```



```
[3]dis ospf rou

        OSPF Process 1 with Router ID 3.3.3.3
                Routing Table

            Topology base (MTID 0)

Routing for network
Destination        Cost     Type     NextHop         AdvRouter       Area
20.0.0.0/24        1        Transit  0.0.0.0         4.4.4.4         0.0.0.0
20.0.2.0/24        101      Transit  20.0.0.1        6.6.6.6         0.0.0.0
6.6.6.6/32         101      Stub     20.0.0.1        6.6.6.6         0.0.0.0
5.5.5.5/32         102      Stub     20.0.0.1        5.5.5.5         0.0.0.0
4.4.4.4/32         1        Stub     20.0.0.1        4.4.4.4         0.0.0.0
```

配置关键点

1、内网不可设为area 0 否则无法配置stub属性

2、totally stub区域路由器需要全部配置totally stub树形

3、通过cost可控制理由选路