

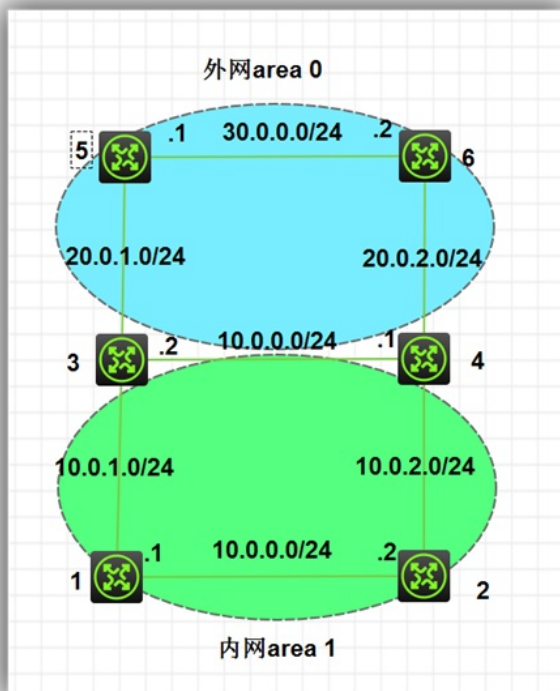
### 组网及说明

#### 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costi设为100，得链路无故障情况下路由
                优先使用主设备，即使用-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，并无外部路由明细
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可控制路由选路