

实验二十七、OSPF 在 NBMA 环境中点到点的配置

一、 实验目的

1. 掌握 NBMA 环境中点到点的配置
2. 理解 NBMA 环境中点到点网络类型的意义

二、 应用环境

在帧中继的网络中, OSPF 的路由更新不能正常进行, 需要配置点到点的网络类型保证 OSPF 协议的正常运行

三、 实验设备

1. DCR-1751 两台
2. CR-V35MT 一条
3. CR-V35FC 一条

四、 实验拓扑



五、 实验要求

配置表

ROUTER-A

S1/1 (DCE)	192.168.1.1/24
F0/0	192.168.0.1

ROUTER-B

S1/0 (DTE)	192.168.1.2/24
F0/0	192.169.2.1/24

在路由器的之间的接口封装帧中继。

六、 实验步骤

第一步: 参照实验 14, 配置帧中继, 并测试连通性

第二步: 配置 OSPF 协议

Router-A#conf

```
Router-A_config#router ospf 2
Router-A_config_ospf_2#net 192.168.0.0 255.255.255.0 area 0
Router-A_config_ospf_2#net 192.168.1.0 255.255.255.0 area 0
```

```
Router-B#conf
Router-B_config#router ospf 10
Router-B_config_ospf_10#net 192.168.1.0 255.255.255.0 area 0
Router-B_config_ospf_10#net 192.168.2.0 255.255.255.0 area 0
```

第三步：查看路由表

```
Router-A#sh ip route
```

Codes: C - connected, S - static, R - RIP, B - BGP, BC - BGP connected
D - DEIGRP, DEX - external DEIGRP, O - OSPF, OIA - OSPF inter area
ON1 - OSPF NSSA external type 1, ON2 - OSPF NSSA external type 2
OE1 - OSPF external type 1, OE2 - OSPF external type 2
DHCP - DHCP type

VRF ID: 0

```
C      192.168.0.0/24      is directly connected, FastEthernet0/0
C      192.168.1.0/24      is directly connected, Serial1/1
```

```
Router-B#sh ip route
```

Codes: C - connected, S - static, R - RIP, B - BGP, BC - BGP connected
D - DEIGRP, DEX - external DEIGRP, O - OSPF, OIA - OSPF inter area
ON1 - OSPF NSSA external type 1, ON2 - OSPF NSSA external type 2
OE1 - OSPF external type 1, OE2 - OSPF external type 2
DHCP - DHCP type

VRF ID: 0

```
C      192.168.1.0/24      is directly connected, Serial1/0
C      192.168.2.0/24      is directly connected, FastEthernet0/0
```

！都没有得到 **OSPF** 路由

第四步：修改网络类型

```
Router-A#conf
```

```
Router-A_config#int s1/1
```

```
Router-A_config_s1/1#ip ospf net point-to-point      ！配置网络类型为点到点
```

```
Router-B#conf
```

```
Router-B_config#int s1/0
```

```
Router-B_config_s1/0#ip ospf net point-to-point      ！配置网络类型为点到点
```

第五步: 再次查看路由表

Router-A#sh ip route

Codes: C - connected, S - static, R - RIP, B - BGP, BC - BGP connected

D - DEIGRP, DEX - external DEIGRP, O - OSPF, OIA - OSPF inter area

ON1 - OSPF NSSA external type 1, ON2 - OSPF NSSA external type 2

OE1 - OSPF external type 1, OE2 - OSPF external type 2

DHCP - DHCP type

VRF ID: 0

```
C      192.168.0.0/24      is directly connected, FastEthernet0/0
C      192.168.1.0/24      is directly connected, Serial1/1
O      192.168.2.0/24      [110,1601] via 192.168.1.2(on Serial1/1)
```

Router-B#sh ip route

Codes: C - connected, S - static, R - RIP, B - BGP, BC - BGP connected

D - DEIGRP, DEX - external DEIGRP, O - OSPF, OIA - OSPF inter area

ON1 - OSPF NSSA external type 1, ON2 - OSPF NSSA external type 2

OE1 - OSPF external type 1, OE2 - OSPF external type 2

DHCP - DHCP type

VRF ID: 0

```
O      192.168.0.0/24      [110,1601] via 192.168.1.1(on Serial1/0)
C      192.168.1.0/24      is directly connected, Serial1/0
C      192.168.2.0/24      is directly connected, FastEthernet0/0
```

第六步: 查看 OSPF 网络类型

Router-A#sh ip ospf interface

FastEthernet0/0 is up, line protocol is up

Internet Address: 192.168.0.1/24

Nettype: Broadcast

OSPF process is 2, AREA: 0, Router ID: 192.168.1.1

Cost: 1, Transmit Delay is 1 sec, Priority 1

Hello interval is 10, Dead timer is 40, Retransmit is 5

OSPF INTF State is IDr

Designated Router ID: 192.168.1.1, Interface address 192.168.0.1

Neighbor Count is 0, Adjacent neighbor count is 0

Serial1/1 is up, line protocol is up

Internet Address: 192.168.1.1/24

Nettype: Point-to-Point

OSPF process is 2, AREA: 0, Router ID: 192.168.1.1

Cost: 1600, Transmit Delay is 1 sec, Priority 1

Hello interval is 10, Dead timer is 40, Retransmit is 5

OSPF INTF State is IPOINT_TO_POINT

Neighbor Count is 1, Adjacent neighbor count is 1

Adjacent with neighbor 192.168.1.2

Router-A#**sh ip ospf neighbor**

OSPF process: 2

AREA: 0

Neighbor ID	Pri	State	DeadTime	Neighbor Addr	Interface
192.168.2.1	1	FULL/-	31	192.168.1.2	Serial1/1

！ 注意到没有 **DR** 的选举过程

七、 注意事项和排错

1. 在帧中继接口上修改网络类型
2. 如果是一个物理接口对应多条 PVC，可以采用点到多点的网络类型；或者划分子接口，继续采用点到点的网络类型

八、 配置序列

Router-A#sh run

Building configuration...

Current configuration:

!

!version 1.3.2E

service timestamps log date

service timestamps debug date

no service password-encryption

!

hostname Router-A

!

!

!

!

!

!

!

interface FastEthernet0/0

ip address 192.168.0.1 255.255.255.0

no ip directed-broadcast

```
!  
interface Serial1/0  
  no ip address  
  no ip directed-broadcast  
  physical-layer speed 64000  
!  
interface Serial1/1  
  ip address 192.168.1.1 255.255.255.0  
  no ip directed-broadcast  
  encapsulation frame-relay  
  frame-relay local-dlci 100  
  frame-relay map 192.168.1.2 pvc 100 broadcast  
  frame-relay intf-type dce  
  physical-layer speed 64000  
  ip ospf network point-to-point  
!  
interface Async0/0  
  no ip address  
  no ip directed-broadcast  
!  
!  
!  
router ospf 2  
  network 192.168.0.0 255.255.255.0 area 0  
  network 192.168.1.0 255.255.255.0 area 0  
!  
!  
!  
!  
!
```

九、 共同思考

1. 为什么在帧中继环境下默认的网络类型导致无法得到 OSPF 路由?
2. 如果是一个物理接口对应多条 PVC, 应该如何配置?

十、 课后练习

请将地址改为 10.0.0.0/24 重复以上实验



十一、 相关命令详解

ip ospf network

设置接口的网络类型。no ip ospf network 取消设置。

ip ospf network { broadcast | nonbroadcast | point_to_multipoint | point-to-point }

no ip ospf network { broadcast | nonbroadcast | point_to_multipoint | point-to-point }

参数

参数	参数说明
broadcast	设置接口的网络类型为广播类型。
nonbroadcast	设置接口的网络类型为非广播NBMA类型。
point-to-point	设置接口的网络类型为点到点
point-to-multipoint	设置接口的网络类型为点到多点

命令模式

接口配置态

使用说明

在有多址访问能力的广播网上，应该将接口配置成 NBMA 方式。当一个 NBMA 网络中，不能保证任意两台路由器之间都是直接可达的话，应将网络设置为点到多点的方式。

示例

配置接口 Serial1/0 为非广播 NBMA 类型。

```
router_config_S1/0#ip ospf network nonbroadcast
```