| | |
|---|---|
| 实验名称：OSPF 基本配置 | |
| 实验台号： | 实验时间： |
| 实验小组：张楷 | |

实验目的：

- 理解路由协议的工作原理；
- 掌握在路由器上如何配置 OSPF 路由协议。

实验环境说明：装有 eNSP 的 PC

实验拓扑：

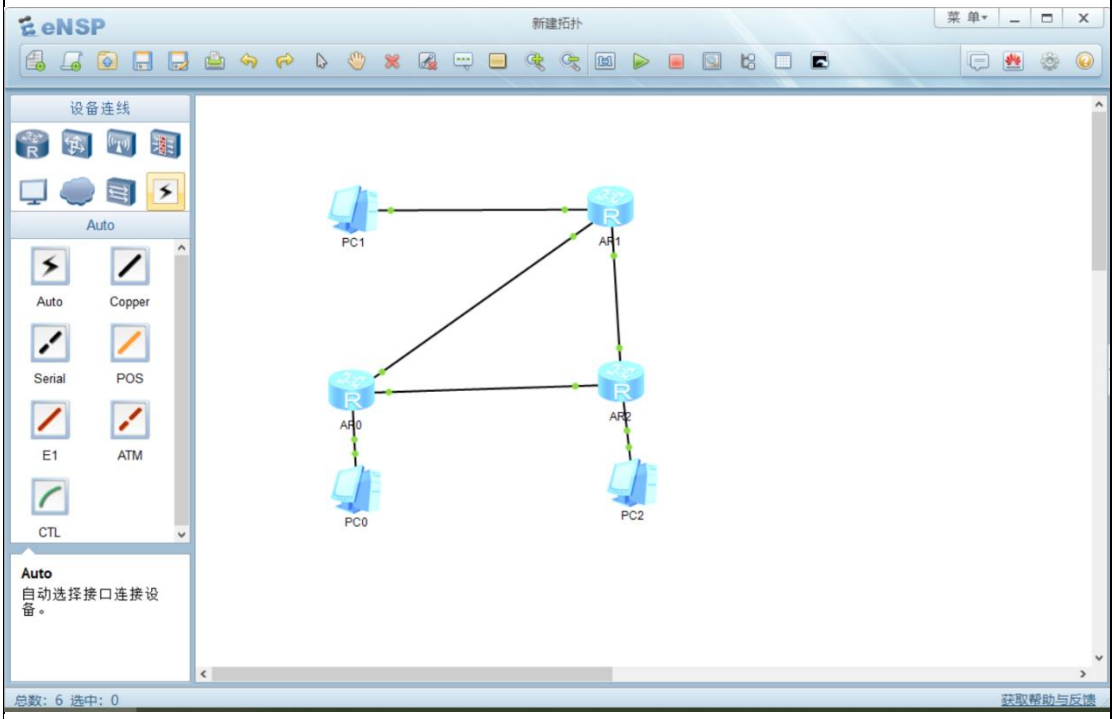


图 1 实验拓扑

实验过程、步骤（可另附页、使用网络拓扑图等辅助说明）及结果：

一、基本配置

1) 对各设备进行基本的 IP 地址配置，并测试连通性，发现可连通。

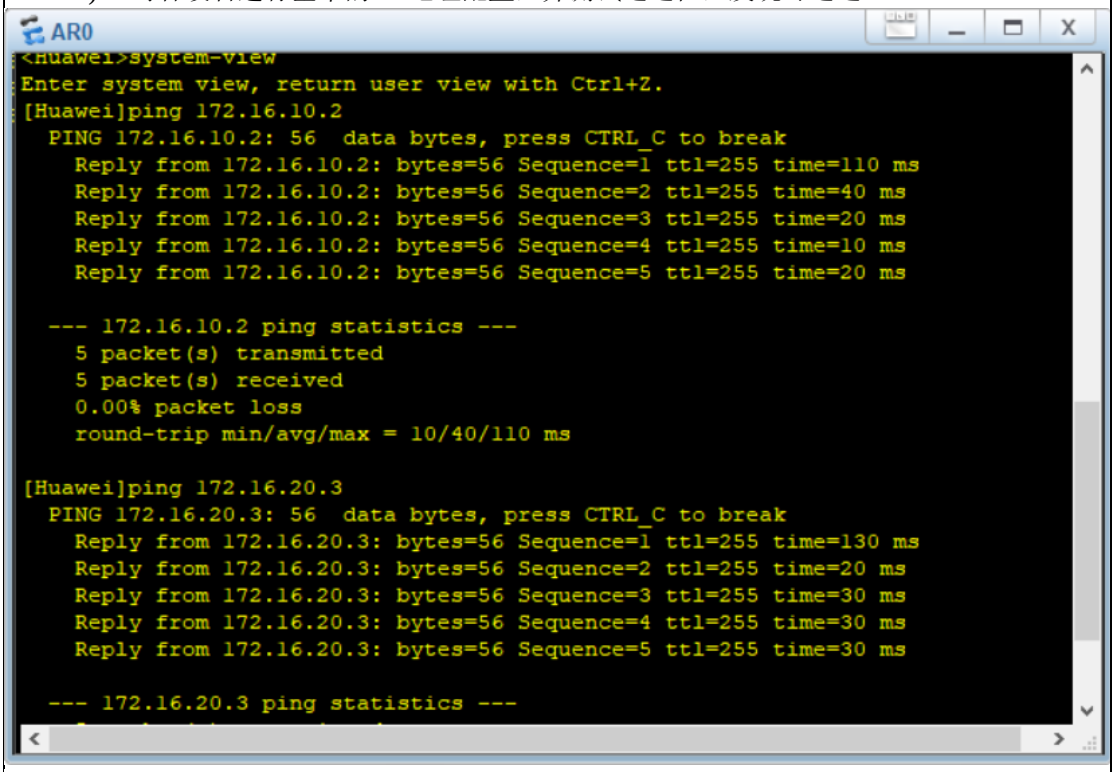


图 2 检查连通性

二、OSPF 单区域配置

1) AR0 的单曲于 OSPF 配置。

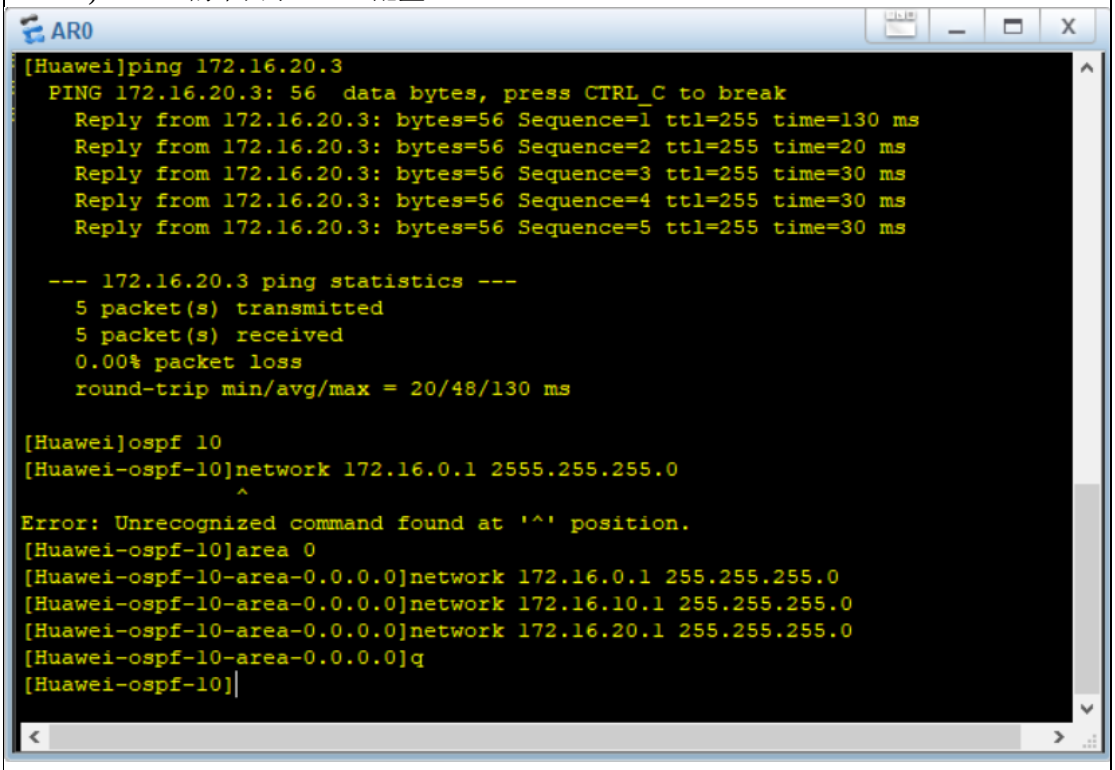


图 3AR0 单区域 OSPF 配置

2) 对 AR1 和 AR2 进行相似操作。

3) 检查 AR0OSPF 配置后各端口状态。

AR0

```
Error: Unrecognized command found at '^' position.
[Huawei-ospf-10]area 0
[Huawei-ospf-10-area-0.0.0.0]network 172.16.0.1 255.255.255.0
[Huawei-ospf-10-area-0.0.0.0]network 172.16.10.1 255.255.255.0
[Huawei-ospf-10-area-0.0.0.0]network 172.16.20.1 255.255.255.0
[Huawei-ospf-10-area-0.0.0.0]q
[Huawei-ospf-10]
<Huawei>sy
<Huawei>system-view
Enter system view, return user view with Ctrl+Z.
[Huawei]dis
[Huawei]display o
[Huawei]display os
[Huawei]display ospf int
[Huawei]display ospf interface

       OSPF Process 10 with Router ID 172.16.0.1
            Interfaces

 Area: 0.0.0.0          (MPLS TE not enabled)
 IP Address      Type          State     Cost    Pri   DR              BDR
 172.16.0.1      Broadcast     DR        1       1     172.16.0.1      0.0.0.0
 172.16.10.1     Broadcast     DR        1       1     172.16.10.1     172.16.10
 172.16.20.1     Broadcast     DR        1       1     172.16.20.1     172.16.20
```

图 4AR0OSPF 端口状态

4) 检查 AR0OSPF 配置后邻居状态。

AR0

```
[Huawei]display ospf peer

       OSPF Process 10 with Router ID 172.16.0.1
            Neighbors

 Area 0.0.0.0 interface 172.16.10.1(GigabitEthernet0/0/1)'s neighbors
 Router ID: 172.16.10.2      Address: 172.16.10.2
   State: Full  Mode:Nbr is  Master  Priority: 1
   DR: 172.16.10.1  BDR: 172.16.10.2  MTU: 0
   Dead timer due in 40  sec
   Retrans timer interval: 5
   Neighbor is up for 00:05:39
   Authentication Sequence: [ 0 ]

            Neighbors

 Area 0.0.0.0 interface 172.16.20.1(GigabitEthernet0/0/2)'s neighbors
 Router ID: 172.16.20.3      Address: 172.16.20.3
   State: Full  Mode:Nbr is  Master  Priority: 1
   DR: 172.16.20.1  BDR: 172.16.20.3  MTU: 0
   Dead timer due in 35  sec
   Retrans timer interval: 5
   Neighbor is up for 00:03:31
   Authentication Sequence: [ 0 ]
```

图 5AR0OSPF 邻居状态

5) 检查 AR0OSPF 配置转发表状态

AR0

```
Destination/Mask    Proto   Pre  Cost      Flags NextHop         Interface

        127.0.0.0/8   Direct  0    0           D   127.0.0.1       InLoopBack0
        127.0.0.1/32  Direct  0    0           D   127.0.0.1       InLoopBack0
127.255.255.255/32  Direct  0    0           D   127.0.0.1       InLoopBack0
      172.16.0.0/24   Direct  0    0           D   172.16.0.1      GigabitEtherne
0/0/0
      172.16.0.1/32   Direct  0    0           D   127.0.0.1       GigabitEtherne
0/0/0
    172.16.0.255/32   Direct  0    0           D   127.0.0.1       GigabitEtherne
0/0/0
      172.16.1.0/24   OSPF    10   2           D   172.16.10.2     GigabitEtherne
0/0/1
      172.16.2.0/24   OSPF    10   2           D   172.16.20.3     GigabitEtherne
0/0/2
     172.16.10.0/24   Direct  0    0           D   172.16.10.1     GigabitEtherne
0/0/1
     172.16.10.1/32   Direct  0    0           D   127.0.0.1       GigabitEtherne
0/0/1
   172.16.10.255/32   Direct  0    0           D   127.0.0.1       GigabitEtherne
0/0/1
     172.16.20.0/24   Direct  0    0           D   172.16.20.1     GigabitEtherne
0/0/2
     172.16.20.1/32   Direct  0    0           D   127.0.0.1       GigabitEtherne
```

图 6AR0 转发表状态

6) 检查 PC0 与 PC1 和 PC2 的连通性，发现可连通。

PC0

基础配置 | 命令行 | 组播 | UDP发包工具 | 串口

```
Ping 172.16.1.3: 32 data bytes, Press Ctrl_C to break
From 172.16.1.3: bytes=32 seq=1 ttl=126 time=31 ms
From 172.16.1.3: bytes=32 seq=2 ttl=126 time=16 ms
From 172.16.1.3: bytes=32 seq=3 ttl=126 time=31 ms
From 172.16.1.3: bytes=32 seq=4 ttl=126 time=31 ms
From 172.16.1.3: bytes=32 seq=5 ttl=126 time=31 ms

--- 172.16.1.3 ping statistics ---
  5 packet(s) transmitted
  5 packet(s) received
  0.00% packet loss
  round-trip min/avg/max = 16/28/31 ms

PC>ping 172.16.2.4

Ping 172.16.2.4: 32 data bytes, Press Ctrl_C to break
From 172.16.2.4: bytes=32 seq=1 ttl=126 time=15 ms
From 172.16.2.4: bytes=32 seq=2 ttl=126 time=16 ms
From 172.16.2.4: bytes=32 seq=3 ttl=126 time=31 ms
From 172.16.2.4: bytes=32 seq=4 ttl=126 time=16 ms
From 172.16.2.4: bytes=32 seq=5 ttl=126 time=31 ms

--- 172.16.2.4 ping statistics ---
  5 packet(s) transmitted
  5 packet(s) received
  0.00% packet loss
  round-trip min/avg/max = 15/21/31 ms
```

图 7 连通性检测

| | |
|---|---|
| 实验总结（遇到的问题及解决办法、体会）：<br>了解 OSPF 如何实现 | |
| 器材、工具领用及归还负责人： 张楷 | 实验记录人：（签名）张楷 |
| 实验执笔人：（签名）张楷 | 报告协助人：（签名）张楷 |
| 小组成员签名：（签名）<br>张楷 | |
| 验收人： | 成绩评定： |