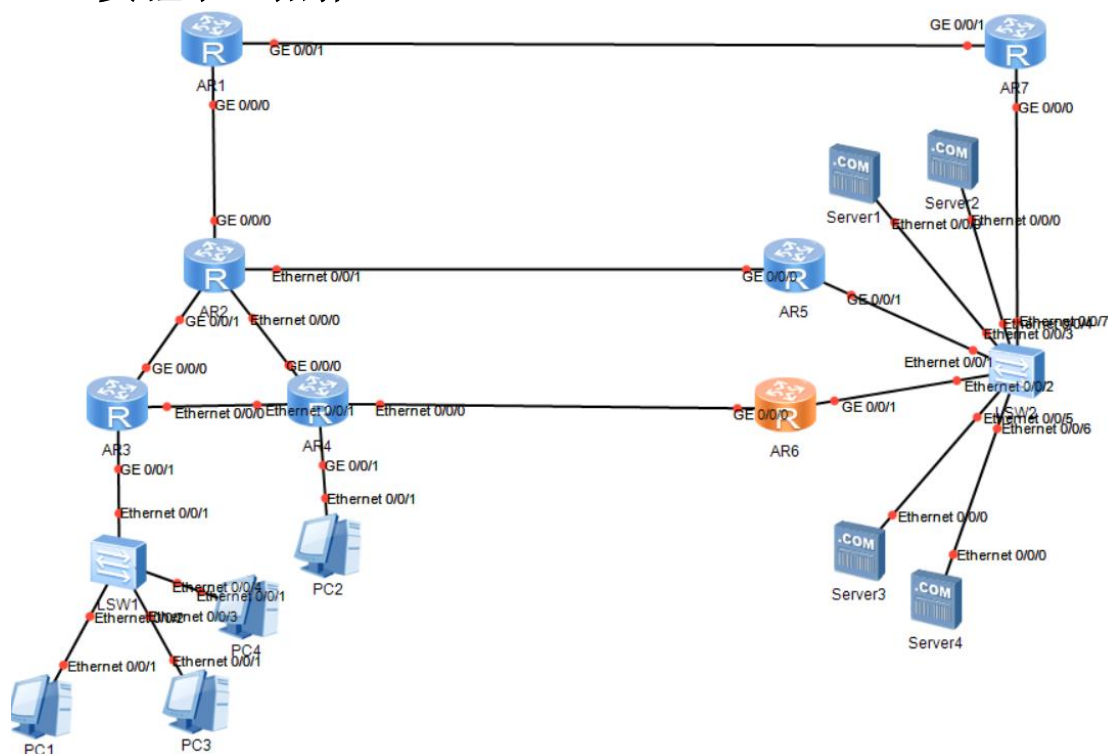


# 实验报告 B301 第八组 B

Hollow Man

(以下内容提交版本, 不保证完全正确)

## 一、实验小组拓扑



## 二、实验准备

首先使用华为 eNSP 模拟器搭建拓扑图, 然后做以下工作:

### (一) 网络地址划分

分析图示网路可知, 该拓扑结构共有 10 个网络, 不算交换机, 每个网络最大连接数是 7, 最小连接数是 2, 该网络总共需要 8 个二位的主机位, 1 个四位主机位, 1 个三位的主机位。因为获得 198.161.36.0/26 主机位, 所以共需  $4*8+16+8=56$  个网络地址, 划分如下:

#### 1、路由器网络地址方案设计

	E0	E1	E2	E3	S0
Y		198.161.36.29/30			198.161.36.

					25/30
W		198.161.3 6.30/30	198.161.3 6.7/28		
B	198.161.3 6.37/30	198.161.3 6.33/30	198.161.3 6.41/30		198.1 61.36. 26/30
D		198.161.3 6.34/30	198.161.3 6.5/28		
A	198.161.3 6.20/29	198.161.3 6.45/30	198.161.3 6.42/30		
C	198.161.3 6.38/30	198.161.3 6.46/30	198.161.3 6.50/30	198.16 1.36.53 /30	
E		198.161.3 6.6/28	198.161.3 6.49/30		

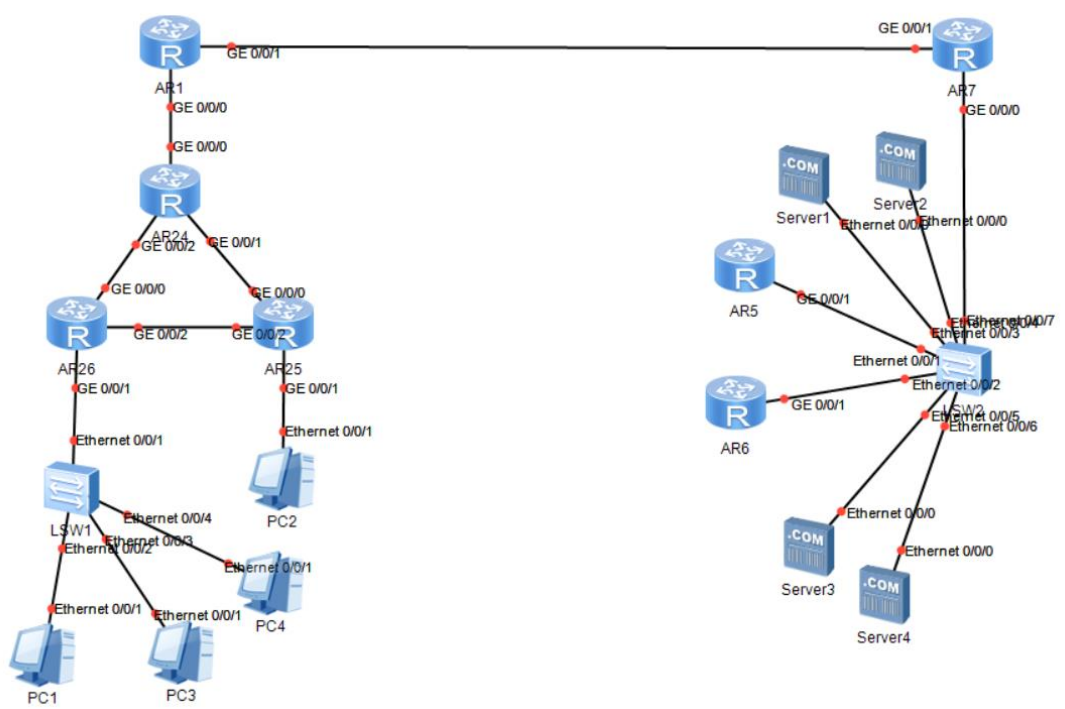
## 2、PC 机和服务器设置方案

主机序号	IP 地址
PC1	198.161.36.17/29
PC2	198.161.36.54/30
PC3	198.161.36.18/29
PC4	198.161.36.19/29
FTP	198.161.36.4/28
TELNET	198.161.36.1/28
DHCP	198.161.36.2/28
WWW	198.161.36.3/28

### (二) B 路由器的配置脚本和路由表内容

受华为模拟器中的最多链接 GE 端口限制为 3，我只能将拓扑图简化为如下，即将 B 的 E1 端口和 D 的 E1 端口之间的连线，C 的 E2 端口和 E 的 E2 端

口之间的连线删去，得到如下拓扑图：



然后开始配置。  
下图是 B 路由器的配置图示：

```
AR24
The device is running!
#####
<Huawei>sys
Enter system view, return user view with Ctrl+Z.
[Huawei]int gi0/0/0
[Huawei-GigabitEthernet0/0/0]ip address 198.161.36.37 30
Dec 27 2019 20:24:59-08:00 Huawei %%01IFNET/4/LINK_STATE(1)[0]:The line protocol
IP on the interface GigabitEthernet0/0/0 has entered the UP state.
[Huawei-GigabitEthernet0/0/0]int gi0/0/1
[Huawei-GigabitEthernet0/0/1]int gi0/0/0
[Huawei-GigabitEthernet0/0/0]undo ip address 198.161.36.37 30
Dec 27 2019 20:25:43-08:00 Huawei %%01IFNET/4/LINK_STATE(1)[1]:The line protocol
IP on the interface GigabitEthernet0/0/0 has entered the DOWN state.
[Huawei-GigabitEthernet0/0/0]ip address 198.161.36.26 30
Dec 27 2019 20:26:01-08:00 Huawei %%01IFNET/4/LINK_STATE(1)[2]:The line protocol
IP on the interface GigabitEthernet0/0/0 has entered the UP state.
[Huawei-GigabitEthernet0/0/0]int gi0/0/1
[Huawei-GigabitEthernet0/0/1]ip address 198.161.36.37 30
Dec 27 2019 20:26:27-08:00 Huawei %%01IFNET/4/LINK_STATE(1)[3]:The line protocol
IP on the interface GigabitEthernet0/0/1 has entered the UP state.
[Huawei-GigabitEthernet0/0/1]int gi0/0/2
[Huawei-GigabitEthernet0/0/2]ip address 198.161.36.41 30
Dec 27 2019 20:26:58-08:00 Huawei %%01IFNET/4/LINK_STATE(1)[4]:The line protocol
IP on the interface GigabitEthernet0/0/2 has entered the UP state.
[Huawei-GigabitEthernet0/0/2]q
[Huawei]rip
[Huawei-rip-1]version 2
[Huawei-rip-1]network 198.161.36.0
[Huawei-rip-1]
<Huawei>save
The current configuration will be written to the device.
Are you sure to continue? (y/n)[n]:y
It will take several minutes to save configuration file, please wait.....
Configuration file had been saved successfully
Note: The configuration file will take effect after being activated
<Huawei>
```

系统视图下使用 display ip routing-table 查看路由表:

```
AR24
round-trip min/avg/max = 20/35/50 ms

<Huawei>sys
Enter system view, return user view with Ctrl+Z.
[Huawei]display ip routing-table
Route Flags: R - relay, D - download to fib
-----
Routing Tables: Public
      Destinations : 18          Routes : 19

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
      198.161.36.0/28  RIP      100    2           D    198.161.36.25     GigabitEthernet
0/0/0
      198.161.36.16/29  RIP      100    1           D    198.161.36.42     GigabitEthernet
0/0/2
      198.161.36.24/30  Direct   0     0           D    198.161.36.26     GigabitEthernet
0/0/0
      198.161.36.26/32  Direct   0     0           D    127.0.0.1         GigabitEthernet
0/0/0
      198.161.36.27/32  Direct   0     0           D    127.0.0.1         GigabitEthernet
0/0/0
      198.161.36.28/30  RIP      100    1           D    198.161.36.25     GigabitEthernet
0/0/0
      198.161.36.36/30  Direct   0     0           D    198.161.36.37     GigabitEthernet
0/0/1
      198.161.36.37/32  Direct   0     0           D    127.0.0.1         GigabitEthernet
0/0/1
      198.161.36.39/32  Direct   0     0           D    127.0.0.1         GigabitEthernet
0/0/1
      198.161.36.40/30  Direct   0     0           D    198.161.36.41     GigabitEthernet
0/0/2
      198.161.36.41/32  Direct   0     0           D    127.0.0.1         GigabitEthernet
0/0/2
      198.161.36.43/32  Direct   0     0           D    127.0.0.1         GigabitEthernet
0/0/2
      198.161.36.44/30  RIP      100    1           D    198.161.36.42     GigabitEthernet
0/0/2
                        RIP      100    1           D    198.161.36.38     GigabitEthernet
0/0/1
      198.161.36.52/30  RIP      100    1           D    198.161.36.38     GigabitEthernet
0/0/1
255.255.255.255/32    Direct   0     0           D    127.0.0.1         InLoopBack0

[Huawei]
```

可见路由表中除了 RIP 协议产生的路由表记录，还有 Direct 直连的路由表记录和回环地址记录。

### (三) 配置 FTP 服务器

如下图所示：

Server1

Basic Config | Server Info | Log Info

MAC Address: 54-89-98-66-47-18 (Format:00-01-02-03-04-05)

IPv4 Config

Local Address: 198 . 161 . 36 . 4 Subnet Mask: 255 . 255 . 255 . 240

Gateway: 198 . 161 . 36 . 7 DNS: 0 . 0 . 0 . 0

Ping Test

IPv4 Address: 0 . 0 . 0 . 0 Times: Send

Local State: Device boot ping success: 0 failed: 0

Save

启动成功:

Server1

Basic Config | Server Info | Log Info

DNSServer

**FtpServer**

HttpServer

Service

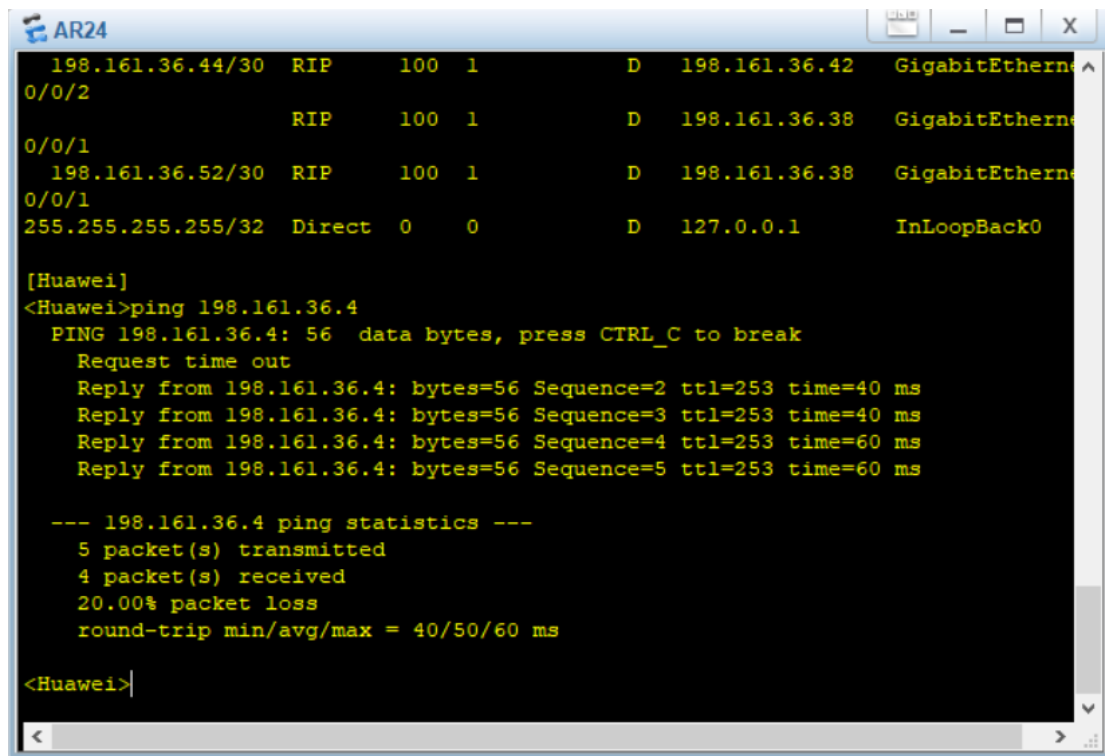
Port: 21 Start Stop

Configuration

Root Path: D:\

\$RECYCLE.BIN  
db  
QQMusicCache  
qqpcmgr\_docpro  
Recovery  
SQLServer2017Media  
System Volume Information  
下载  
文档  
照片  
视频  
软件  
迅雷下载  
音乐

链接正常:



#### (四) ICMP 三种状态

监听 B 的 S0 端口，在 FTP 服务器开启的情况下，在 B 路由器上使用 PING 命令测试可达状态：

3 25.031000	198.161.36.26	224.0.0.9	RIPv2	146 Response
4 27.094000	198.161.36.25	224.0.0.9	RIPv2	86 Response
5 52.047000	198.161.36.26	224.0.0.9	RIPv2	146 Response
6 55.109000	198.161.36.25	224.0.0.9	RIPv2	86 Response
7 64.719000	198.161.36.25	198.161.36.4	ICMP	98 Echo (ping) request id=0xd1ab, seq=256/1, ttl=253 (reply in 8)
8 64.750000	198.161.36.4	198.161.36.26	ICMP	98 Echo (ping) reply id=0xd1ab, seq=256/1, ttl=253 (request in 7)
9 65.219000	198.161.36.26	198.161.36.4	ICMP	98 Echo (ping) request id=0xd1ab, seq=512/2, ttl=253 (reply in 10)
10 65.250000	198.161.36.4	198.161.36.26	ICMP	98 Echo (ping) reply id=0xd1ab, seq=512/2, ttl=253 (request in 9)
11 65.719000	198.161.36.26	198.161.36.4	ICMP	98 Echo (ping) request id=0xd1ab, seq=768/3, ttl=253 (reply in 12)
12 65.750000	198.161.36.4	198.161.36.26	ICMP	98 Echo (ping) reply id=0xd1ab, seq=768/3, ttl=253 (request in 11)
13 66.219000	198.161.36.26	198.161.36.4	ICMP	98 Echo (ping) request id=0xd1ab, seq=1024/4, ttl=253 (reply in 14)
14 66.250000	198.161.36.4	198.161.36.26	ICMP	98 Echo (ping) reply id=0xd1ab, seq=1024/4, ttl=253 (request in 13)
15 66.703000	198.161.36.26	198.161.36.4	ICMP	98 Echo (ping) request id=0xd1ab, seq=1280/5, ttl=253 (reply in 16)
16 66.719000	198.161.36.4	198.161.36.26	ICMP	98 Echo (ping) reply id=0xd1ab, seq=1280/5, ttl=253 (request in 15)
17 86.070000	198.161.36.26	224.0.0.9	RIPv2	146 Response
18 90.141000	198.161.36.25	224.0.0.9	RIPv2	86 Response

> Frame 7: 98 bytes on wire (784 bits), 98 bytes captured (784 bits) on interface 0  
> Ethernet II, Src: HuaweiTe\_68:47:e9 (00:e0:fc:68:47:e9), Dst: HuaweiTe\_05:75:6c (00:e0:fc:05:75:6c)  
> Internet Protocol Version 4, Src: 198.161.36.26, Dst: 198.161.36.4  
> Internet Control Message Protocol

0000	00 e0 fc 05 75 6c 00 e0 fc 68 47 e9 00 00 45 00	.....h6...E..
0010	00 54 00 00 00 ff 01 e5 9a c6 a1 24 1a c6 a1	...T.....\$. .
0020	24 04 08 00 4d d1 ab 01 00 dc 9e 1b 00 b8 ea	\$.PM.....
0030	3d 79 50 49 4e dc b7 28 16 24 00 01 02 03 04 05	=yPIN...(. \$.
0040	06 07 08 09 0a 0b 0c 0d 0e 0f 10 11 12 13 14 15	.....l*%\$%
0050	16 17 18 19 1a 1b 1c 1d 1e 1f 20 21 22 23 24 25	.....8'
0060	26 27	

可见此种状态下主机向被 PING 对象发送一个 request 请求，然后被 PING 对象向主机返回一个 reply 请求。

No.	Time	Source	Destination	Protocol	Length	Info
5	52.047000	198.161.36.26	224.0.0.9	RIPv2	146	Response
6	53.100000	198.161.36.26	224.0.0.9	RIPv2	86	Response
7	64.719000	198.161.36.26	198.161.36.4	ICMP	98	Echo (ping) request id=8xd1ab, seq=256/1, ttl=255 (reply in 8)
8	64.750000	198.161.36.4	198.161.36.26	ICMP	98	Echo (ping) reply id=8xd1ab, seq=256/1, ttl=253 (request in 7)
9	65.219000	198.161.36.26	198.161.36.4	ICMP	98	Echo (ping) request id=8xd1ab, seq=512/2, ttl=255 (reply in 10)
10	65.250000	198.161.36.4	198.161.36.26	ICMP	98	Echo (ping) reply id=8xd1ab, seq=512/2, ttl=253 (request in 9)
11	65.719000	198.161.36.26	198.161.36.4	ICMP	98	Echo (ping) request id=8xd1ab, seq=768/3, ttl=255 (reply in 12)
12	65.750000	198.161.36.4	198.161.36.26	ICMP	98	Echo (ping) reply id=8xd1ab, seq=768/3, ttl=253 (request in 11)
13	66.219000	198.161.36.26	198.161.36.4	ICMP	98	Echo (ping) request id=8xd1ab, seq=1024/4, ttl=255 (reply in 14)
14	66.250000	198.161.36.4	198.161.36.26	ICMP	98	Echo (ping) reply id=8xd1ab, seq=1024/4, ttl=253 (request in 13)
15	66.703000	198.161.36.26	198.161.36.4	ICMP	98	Echo (ping) request id=8xd1ab, seq=1280/5, ttl=255 (reply in 16)
16	66.719000	198.161.36.4	198.161.36.26	ICMP	98	Echo (ping) reply id=8xd1ab, seq=1280/5, ttl=253 (request in 15)
17	86.070000	198.161.36.26	224.0.0.9	RIPv2	146	Response
18	90.141000	198.161.36.25	224.0.0.9	RIPv2	86	Response
19	115.172000	198.161.36.25	224.0.0.9	RIPv2	86	Response
20	120.070000	198.161.36.26	224.0.0.9	RIPv2	146	Response

> Frame 8: 98 bytes on wire (784 bits), 98 bytes captured (784 bits) on interface 0  
> Ethernet II, Src: HuaweiTe\_05:75:6c (00:e0:fc:05:75:6c), Dst: HuaweiTe\_68:47:e9 (00:e0:fc:68:47:e9)  
> Internet Protocol Version 4, Src: 198.161.36.4, Dst: 198.161.36.26  
> Internet Control Message Protocol

0000 00 e0 fc 68 47 e9 00 e0 fc 05 75 6c 08 00 45 00 --HG-- --ul-E  
0010 00 54 00 ad 00 00 fd 01 e7 9a c6 a1 24 04 c6 a1 -T----- \$-  
0020 24 1a 00 00 55 d4 d1 ab 01 00 dc 9e 1b 00 b8 ea \$-LPI-  
0030 34 79 50 49 4e dc b7 28 16 24 00 01 02 03 04 05 myPIN- ( \$-  
0040 06 07 00 05 0a 0b 0c 0d 0e 0f 10 11 12 13 14 15 -----  
0050 16 17 18 19 1a 1b 1c 1d 1e 1f 20 21 22 23 24 25 ----- !"#%&  
0060 26 27 &

## 关闭 FTP 服务器，测试超时状态：

46	190.219000	198.161.36.25	224.0.0.9	RIPv2	86	Response
47	199.391000	198.161.36.26	198.161.36.4	ICMP	98	Echo (ping) request id=8xd4ab, seq=512/2, ttl=255 (no response found!)
48	201.391000	198.161.36.26	198.161.36.4	ICMP	98	Echo (ping) request id=8xd4ab, seq=768/3, ttl=255 (no response found!)
49	203.406000	198.161.36.26	198.161.36.4	ICMP	98	Echo (ping) request id=8xd4ab, seq=1024/4, ttl=255 (no response found!)
50	205.422000	198.161.36.26	198.161.36.4	ICMP	98	Echo (ping) request id=8xd4ab, seq=1280/5, ttl=255 (no response found!)
51	206.109000	198.161.36.26	224.0.0.9	RIPv2	146	Response

> Frame 47: 98 bytes on wire (784 bits), 98 bytes captured (784 bits) on interface 0  
> Ethernet II, Src: HuaweiTe\_68:47:e9 (00:e0:fc:68:47:e9), Dst: HuaweiTe\_05:75:6c (00:e0:fc:05:75:6c)  
> Internet Protocol Version 4, Src: 198.161.36.26, Dst: 198.161.36.4  
> Internet Control Message Protocol

可见此种状态下主机向被 PING 对象发送一个 request 请求，但是无法收到回复。

PING 一个未被划分进网络的 ip 地址，测试不可达状态，实验显示未捕获到任何 ICMP 内容，只有 ARP 的广播请求。

16	226.906000	HuaweiTe_68:47:e9	Broadcast	ARP	60	Who has 198.161.36.4? Tell 198.161.36.41
----	------------	-------------------	-----------	-----	----	--