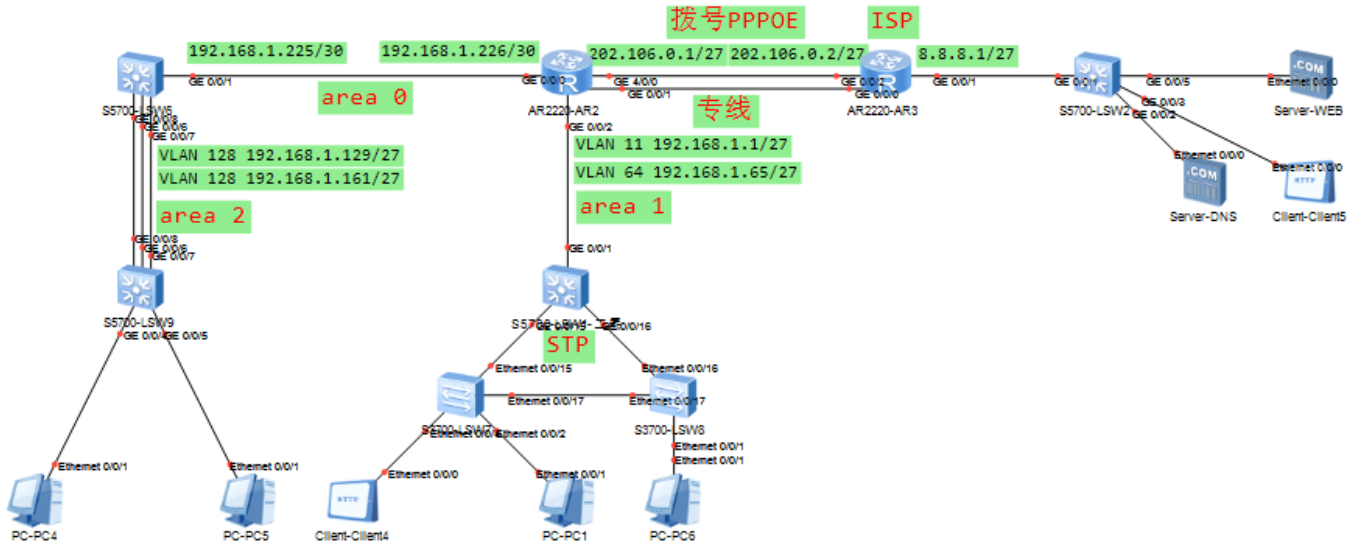
部署某企业小型局域网内网网络环境

一、项目拓扑



二、项目需求：

1、地址规划：

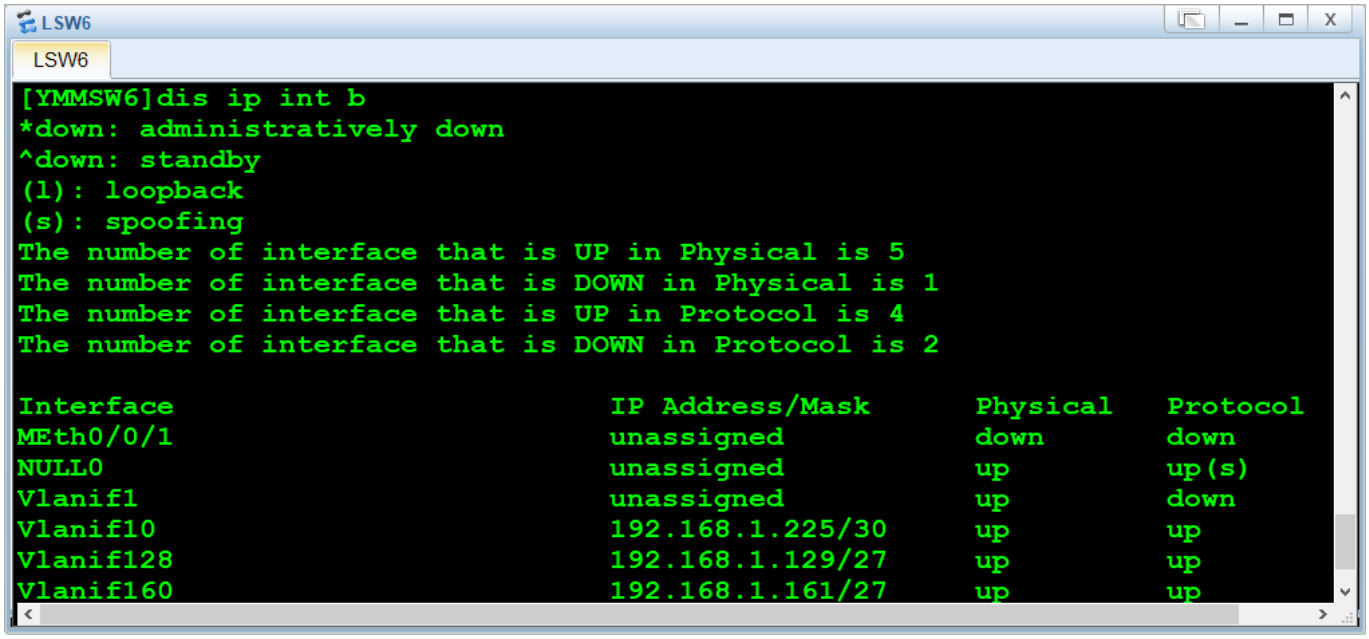
1.1、用 192.168.1.0/24　划分子网为 8 个网段；使用 4 个网段，保留 4 个网段；

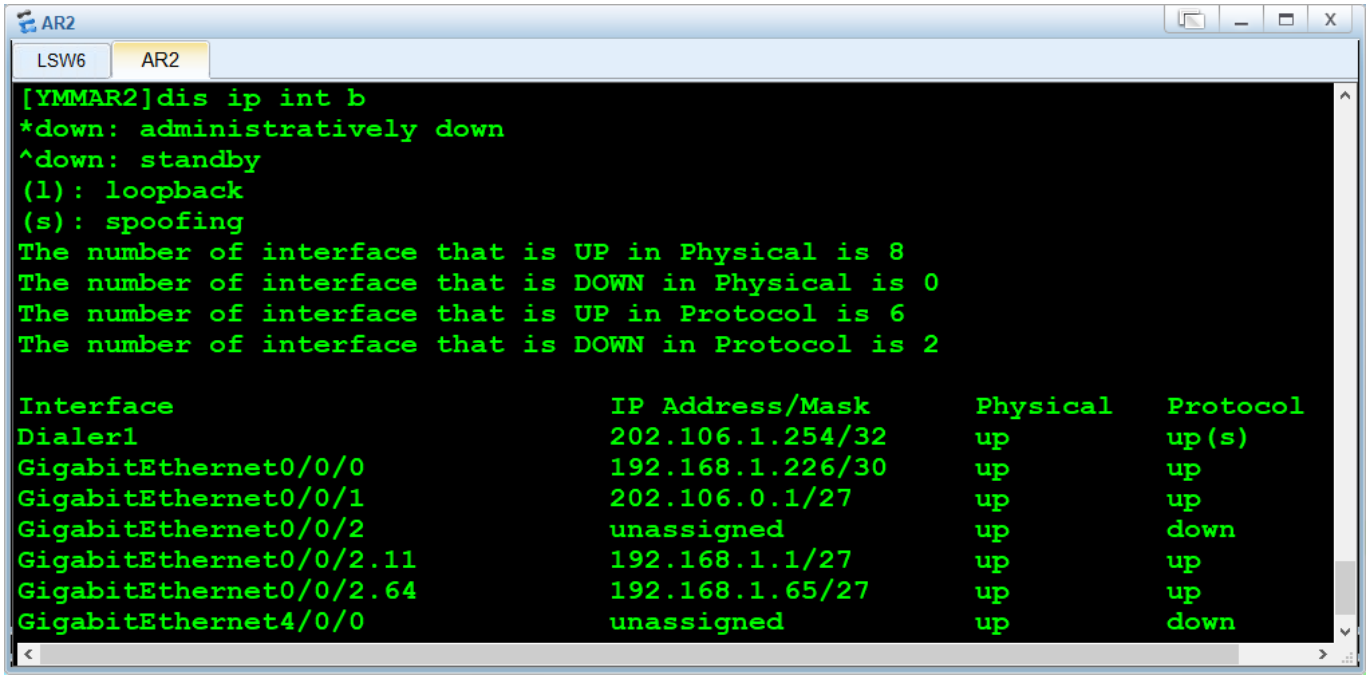
部门	网络位	广播位	有效主机范围	网关地址
1	192.168.1.0/27	192.168.1.31/27	192.168.1.1-30/27	192.168.1.1/27
2	192.168.1.32/27	192.168.1.63/27	192.168.1.33-62/27	192.168.1.33/27
3	192.168.1.64/27	192.168.1.95/27	192.168.1.65-94/27	192.168.1.65/27
4	192.168.1.96/27	192.168.1.127/27	192.168.1.97-126/27	192.168.1.97/27
5	192.168.1.128/27	192.168.1.159/27	192.168.1.127-158/27	192.168.1.129/27
6	192.168.1.160/27	192.168.1.191/27	192.168.1.159-190/27	192.168.1.161/27
7	192.168.1.192/27	192.168.1.223/27	192.168.1.193-222/27	192.168.1.193/27
8	192.168.1.224/27	192.168.1.255/27	192.168.1.225-254/27	192.168.1.225/27

1.2、在保留 4 个网段中，最后一个，再划分 8 个子网段，用户设备互联使用。

网络	网络位	广播位	有效主机范围	设备名称	接口编号	IP 地址
1	192.168.1.224/30	192.168.1.227/30	192.168.1.225-226/30			
2	192.168.1.228/30	192.168.1.231/30	192.168.1.229-230/30			
3	192.168.1.232/30	192.168.1.235/30	192.168.1.233-234/30			
4	192.168.1.236/30	192.168.1.239/30	192.168.1.237-238/30			
5	192.168.1.240/30	192.168.1.243/30	192.168.1.241-242/30			
6	192.168.1.244/30	192.168.1.247/30	192.168.1.245-246/30			
7	192.168.1.248/30	192.168.1.251/30	192.168.1.249-250/30			
8	192.168.1.252/30	192.168.1.255/27	192.168.1.253-254/30			

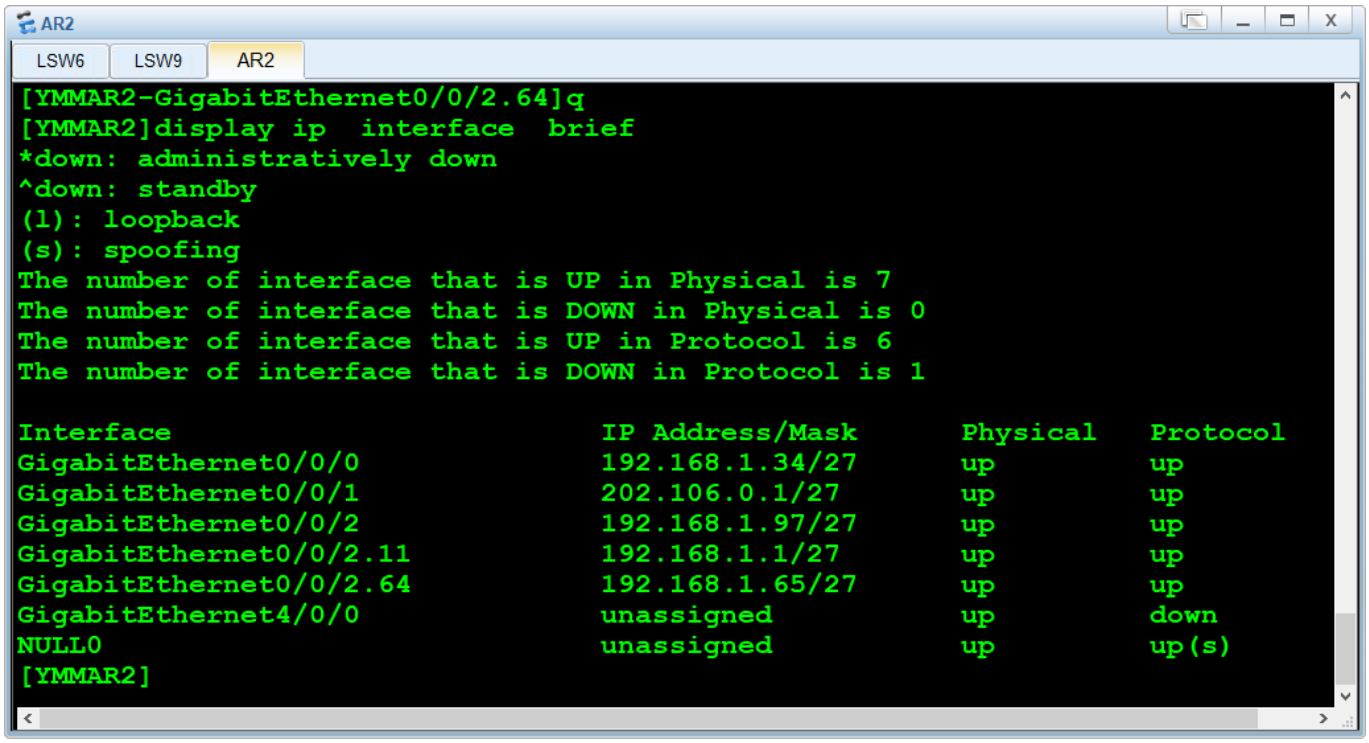
1.3、查看 2 台设备 LSW6 和 AR2 地址配置，display ip interface brief



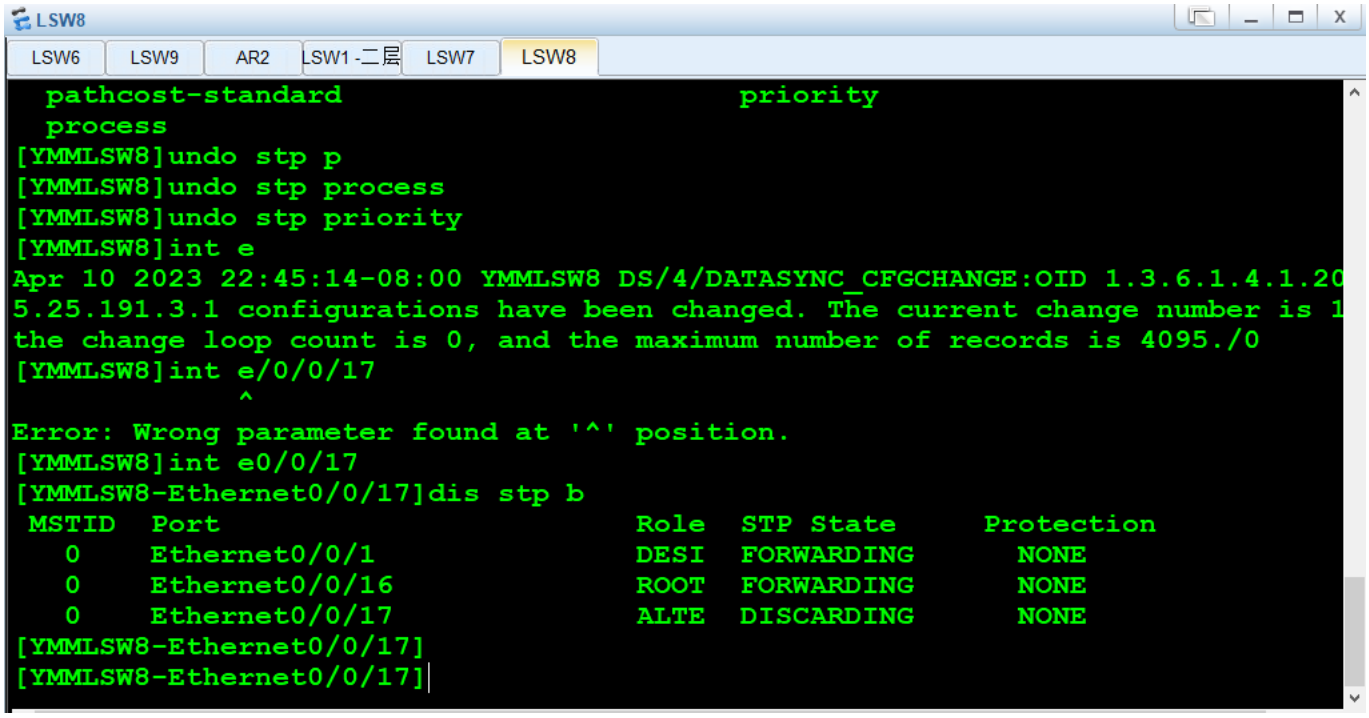


2、STP 和单臂实现 VLAN 间通

2.1、AR2 使用单臂路由，为 VLAN 11 和 VLAN 64 创建子接口；g0/0/2.11 和 G0/0/2.64 子接口。

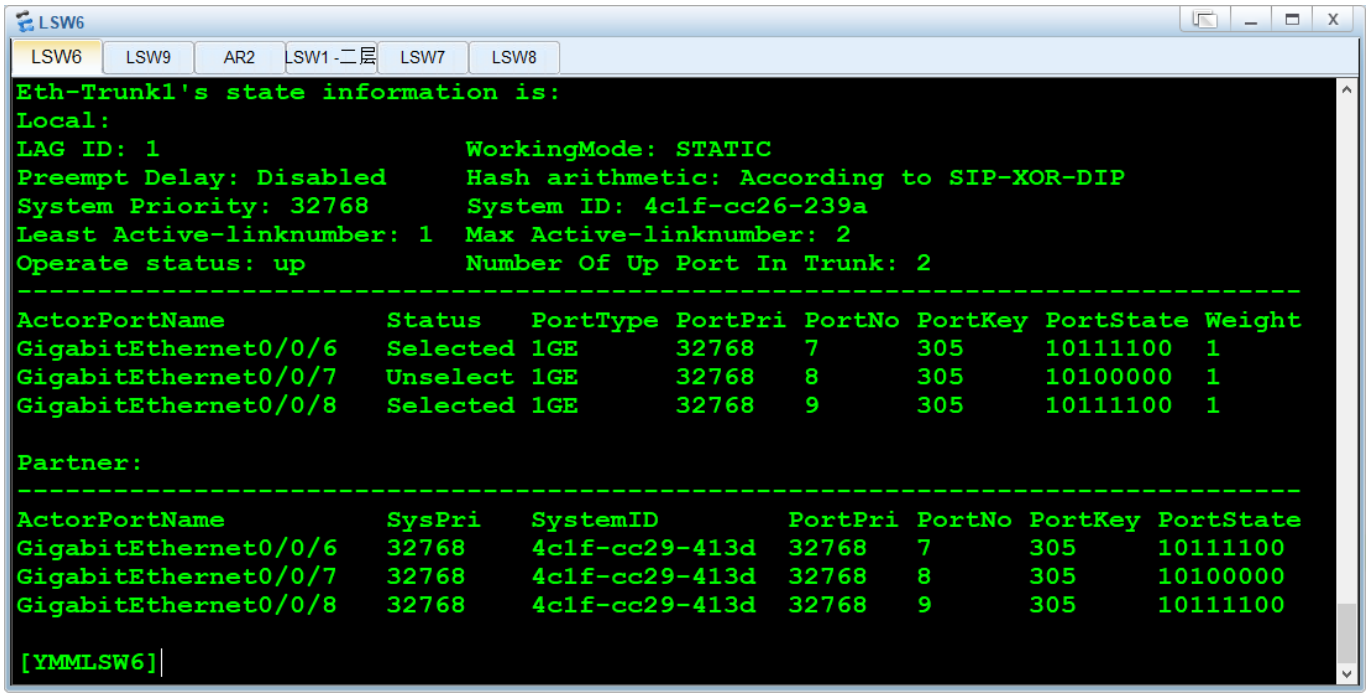


2.2、生成树 LSW1、LSW7、LSW8 使用 STP 增加备份链接；查验 LSW8 的 E0/0/17 接口堵塞。

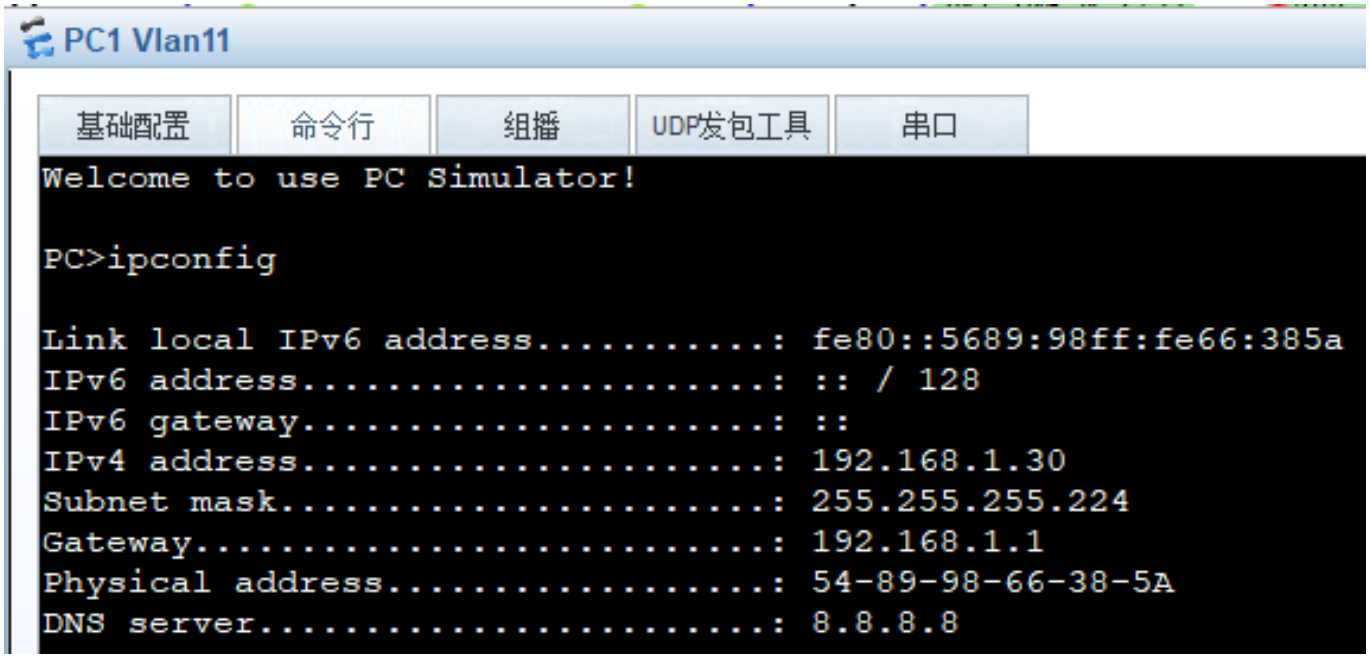


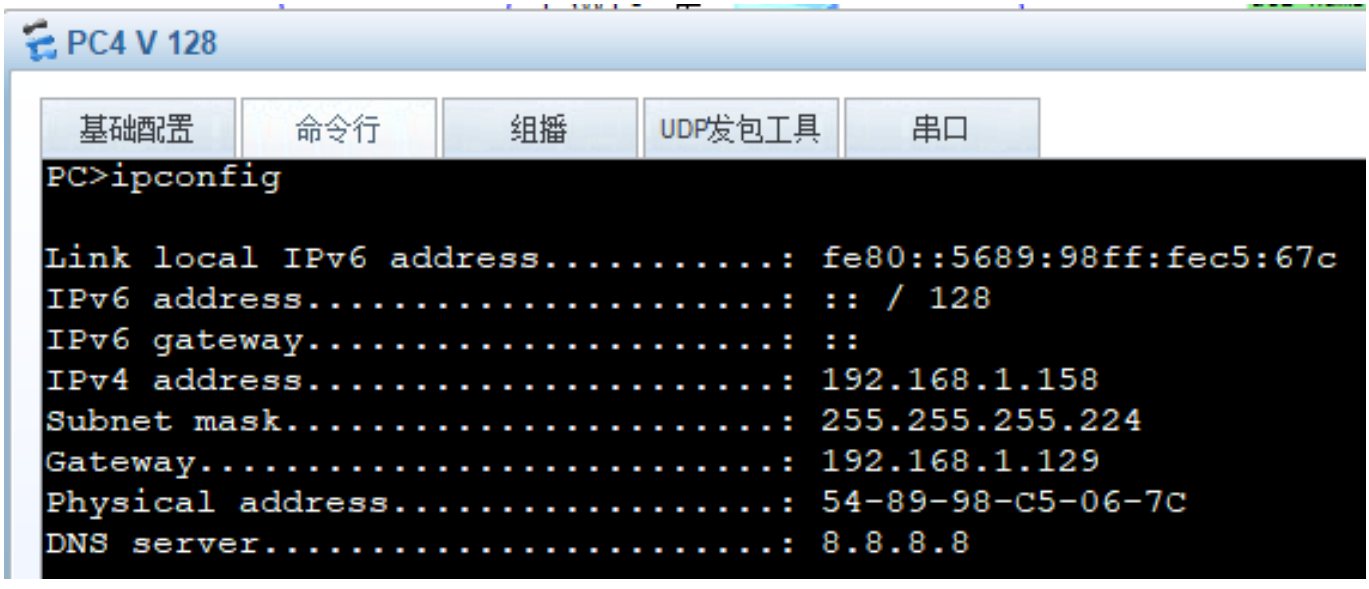
3、VLANIF 和链路聚合结合实现 VLAN 间通信：

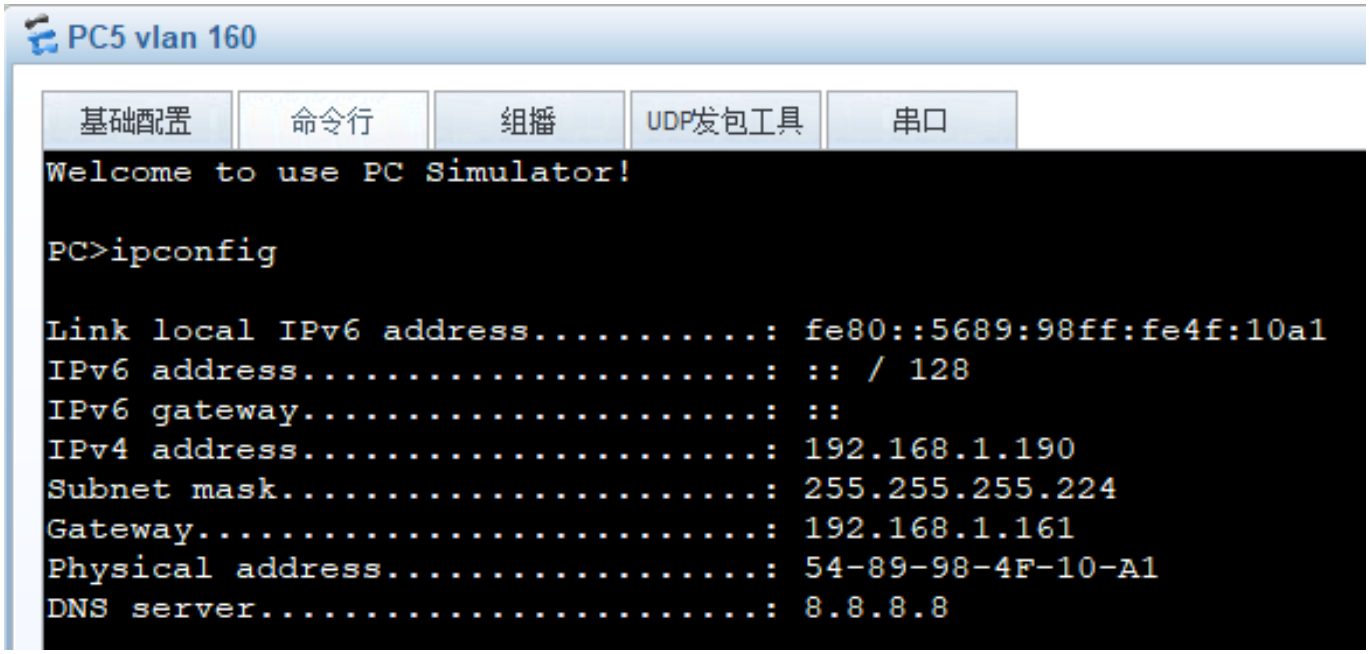
3.1、LSW9 到 LSW6 增加链路带宽和可靠性 G6-8 接口使用链接聚合，同时活跃 2 个接口；查验任何一台交换机，G0/0/6 和 G0/0/7 为活动接口，G0/0/8 非活动接口。



3.2、配置 Access 和 Trunk 接口保障，单臂路由 VLAN 通信；PC1、PC4、PC5、PC6 动态自动获得地址，PC1 ping 通 PC6；PC4 ping 通 PC5。


PC1 Vlan11
基础配置
命令行
组播
UDP发包工具
串口
Welcome to use PC Simulator!
PC>ipconfig
Link local IPv6 address.....: fe80::5689:98ff:fe66:385a
IPv6 address.....: :: / 128
IPv6 gateway.....: ::
IPv4 address.....: 192.168.1.30
Subnet mask.....: 255.255.255.224
Gateway.....: 192.168.1.1
Physical address.....: 54-89-98-66-38-5A
DNS server.....: 8.8.8.8


PC4 V 128
基础配置
命令行
组播
UDP发包工具
串口
PC>ipconfig
Link local IPv6 address.....: fe80::5689:98ff:fec5:67c
IPv6 address.....: :: / 128
IPv6 gateway.....: ::
IPv4 address.....: 192.168.1.158
Subnet mask.....: 255.255.255.224
Gateway.....: 192.168.1.129
Physical address.....: 54-89-98-C5-06-7C
DNS server.....: 8.8.8.8


PC5 vlan 160
基础配置
命令行
组播
UDP发包工具
串口
Welcome to use PC Simulator!
PC>ipconfig
Link local IPv6 address.....: fe80::5689:98ff:fe4f:10a1
IPv6 address.....: :: / 128
IPv6 gateway.....: ::
IPv4 address.....: 192.168.1.190
Subnet mask.....: 255.255.255.224
Gateway.....: 192.168.1.161
Physical address.....: 54-89-98-4F-10-A1
DNS server.....: 8.8.8.8

PC6 Vlan 64

基础配置 | 命令行 | 组播 | UDP发包工具 | 串口

```
Welcome to use PC Simulator!

PC>ipconfig

Link local IPv6 address.....: fe80::5689:98ff:fe46:211d
IPv6 address.....: :: / 128
IPv6 gateway.....: ::
IPv4 address.....: 192.168.1.94
Subnet mask.....: 255.255.255.224
Gateway.....: 192.168.1.65
Physical address.....: 54-89-98-46-21-1D
DNS server.....: 8.8.8.8
```

PC4 V 128

基础配置 | 命令行 | 组播 | UDP发包工具 | 串口

```
DNS server.....: 8.8.8.8


PC>ping 192.168.1.190

Ping 192.168.1.190: 32 data bytes, Press Ctrl_C to break
Request timeout!
From 192.168.1.190: bytes=32 seq=2 ttl=127 time=78 ms
From 192.168.1.190: bytes=32 seq=3 ttl=127 time=93 ms
From 192.168.1.190: bytes=32 seq=4 ttl=127 time=79 ms
From 192.168.1.190: bytes=32 seq=5 ttl=127 time=78 ms
```

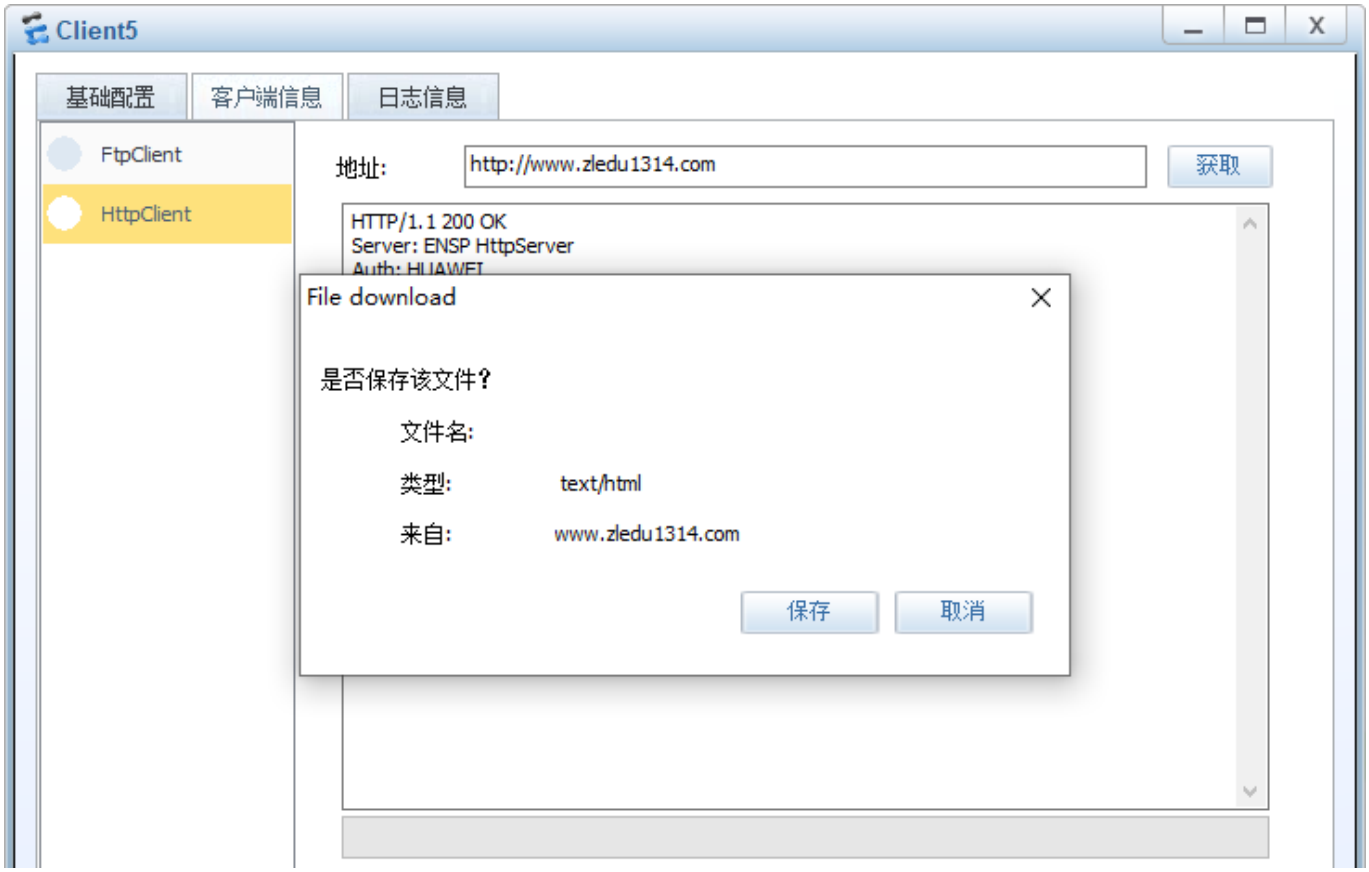
PC1 Vlan11

基础配置 | 命令行 | 组播 | UDP发包工具 | 串口

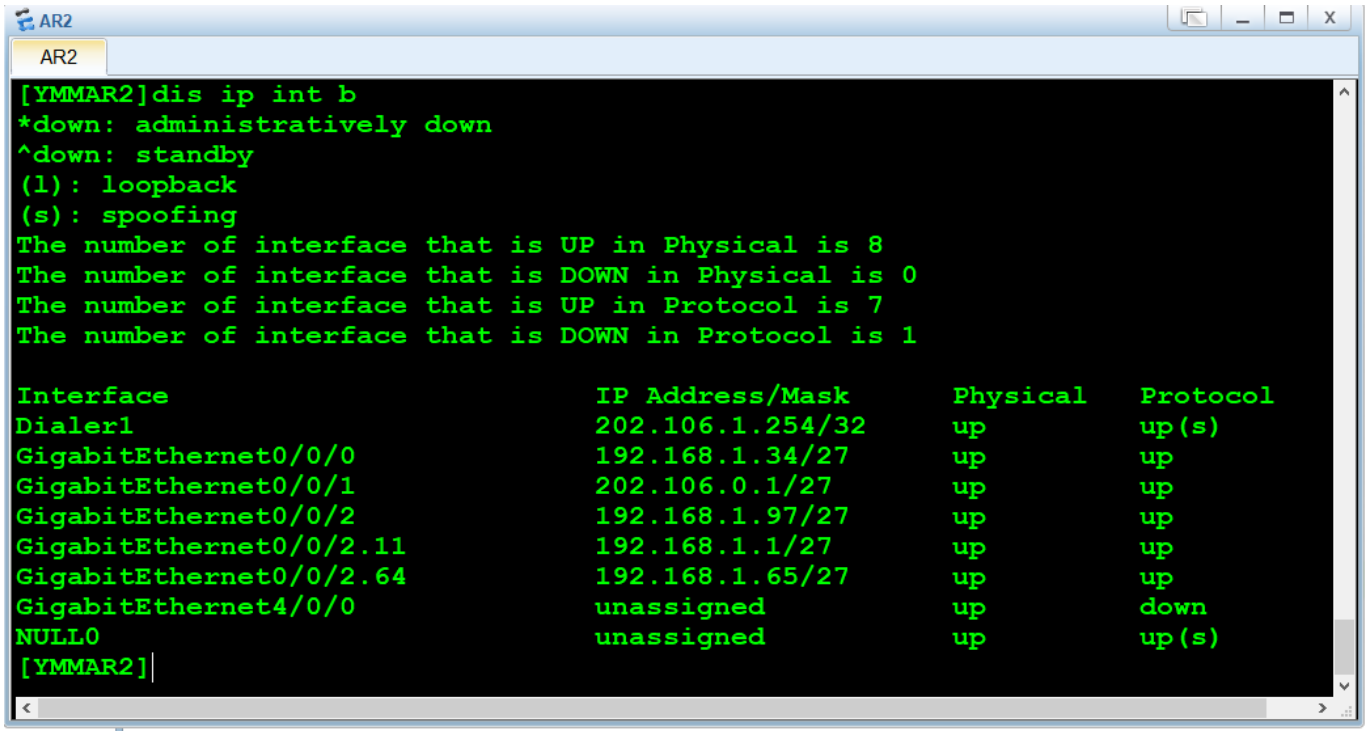
```
PC>ping 192.168.1.94

Ping 192.168.1.94: 32 data bytes, Press Ctrl_C to break
Request timeout!
From 192.168.1.94: bytes=32 seq=2 ttl=127 time=109 ms
From 192.168.1.94: bytes=32 seq=3 ttl=127 time=109 ms
From 192.168.1.94: bytes=32 seq=4 ttl=127 time=141 ms
From 192.168.1.94: bytes=32 seq=5 ttl=127 time=125 ms
```

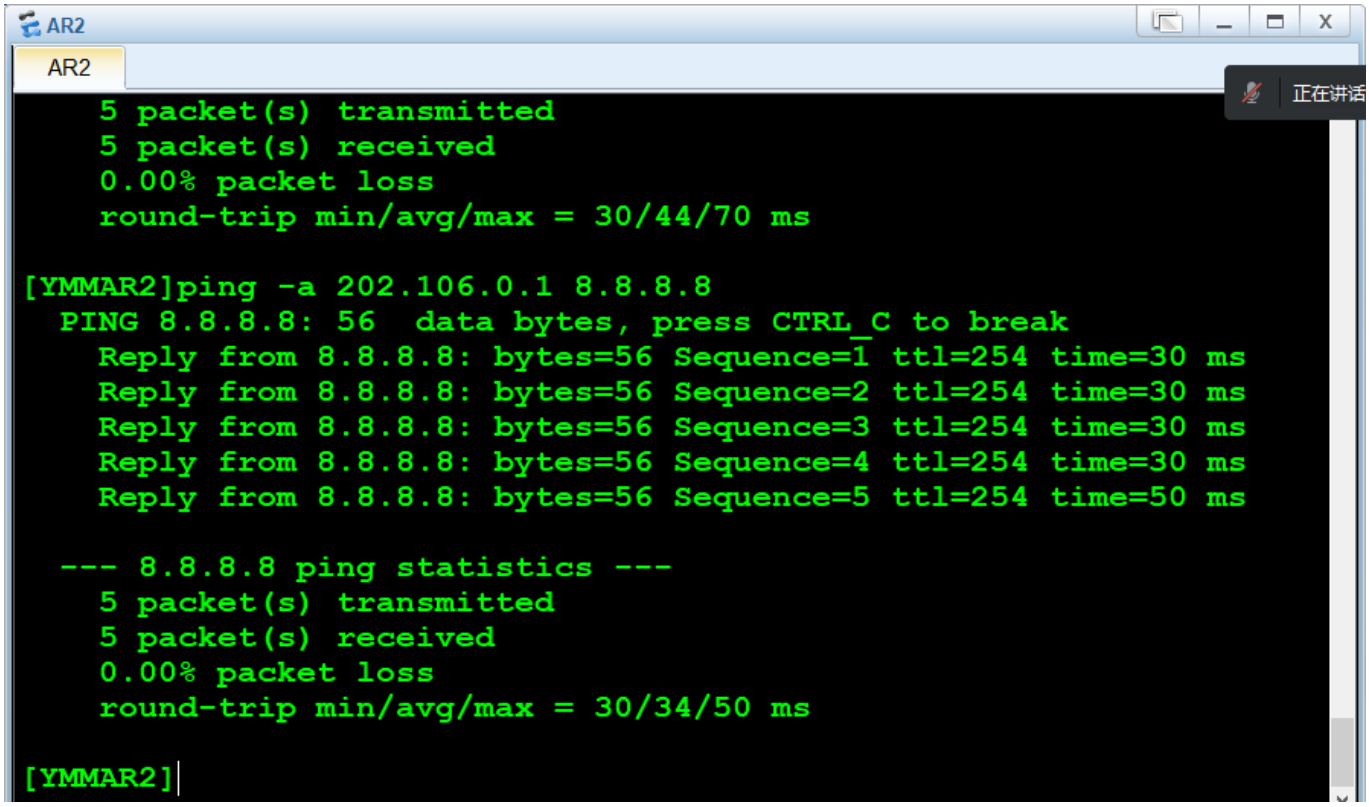
4、广域网：专线和增加广域网带宽使用 PPPOE 拨号线路和专线同时传输数据；

4.1、ISP 运营商测试环境配置：AR3 PPPOE 服务器和 WEB、DNS 服务搭建，CLient5 成功访问。

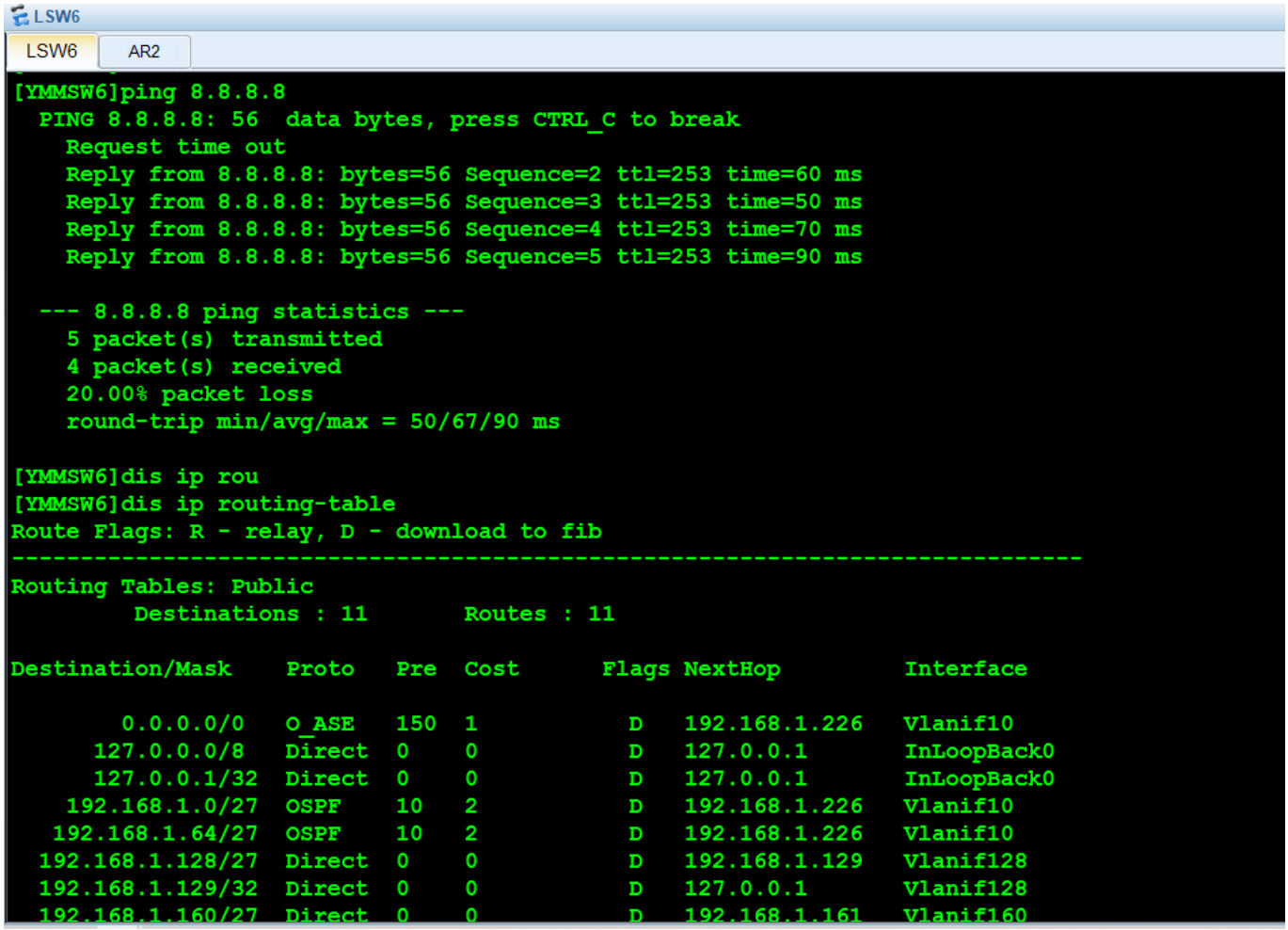


4.2、企业边界 AR2 申请千兆专线，同时增加 PPPOE 拨号千兆线路；节约成本提高广域网带宽；dialer 1 接口获得到地址；用 dialer 接口地址和 202.106.0.1 ping 8.8.8.8。





4.3、企业内部路由：IGP 网络配置 OSPF 路由保障通讯，LSW6 和 AR2 配置 OSPF 进程 1 和英特网路由设置；LSW6 ping 8.8.8.8。



5、开启服务和包过滤：

5.1、企业内部向英特网开放服务：LSW6 能远程登陆 用 AAA 增加安全性，并使用伪端口 7788；AR3 成功登陆 LSW6。

```
<YMMISP>telnet 202.106.0.3 7788
  Press CTRL_] to quit telnet mode
  Trying 202.106.0.3 ...
  Connected to 202.106.0.3 ...


Login authentication


Username:zl
Password:
Info: The max number of VTY users is 5, and the number
      of current VTY users on line is 1.
      The current login time is 2023-04-11 03:44:23.
<YMMSW6>
```

5.2、安全设置：

5.2.1、PC5 不能访问英特网；Client4 不能访问 www.zledu1314.com；

LSW6

LSW6

```
[YMMSW6]interface Eth-Trunk1
[YMMSW6-Eth-Trunk1]dis th
#
interface Eth-Trunk1
 port link-type trunk
 port trunk allow-pass vlan 128 160
 traffic-filter inbound acl 2000
 mode lacp-static
 max active-linknumber 2
#
return
[YMMSW6-Eth-Trunk1]dis acl all
 Total nonempty ACL number is 1

Basic ACL 2000, 1 rule
Acl's step is 5
 rule 5 deny source 192.168.1.190 0

[YMMSW6-Eth-Trunk1]
```

AR2

AR2

```
[YMMAR2]dis acl all
 Total quantity of nonempty ACL number is 2

Basic ACL 2000, 1 rule
Acl's step is 5
 rule 5 permit source 192.168.1.0 0.0.0.255

Advanced ACL 3001, 1 rule
Acl's step is 5
 rule 5 deny tcp source 192.168.1.2 0 destination-port eq www (5 matches)
```

PC5 vlan 160

基础配置 | 命令行 | 组播 | UDP发包工具 | 串口

```
PC>ping 8.8.8.8

Ping 8.8.8.8: 32 data bytes, Press Ctrl_C to
break
Request timeout!
Request timeout!
Request timeout!
Request timeout!
Request timeout!

--- 8.8.8.8 ping statistics ---
  5 packet(s) transmitted
  0 packet(s) received
```

Client4

基础配置 | 客户端信息 | 日志信息

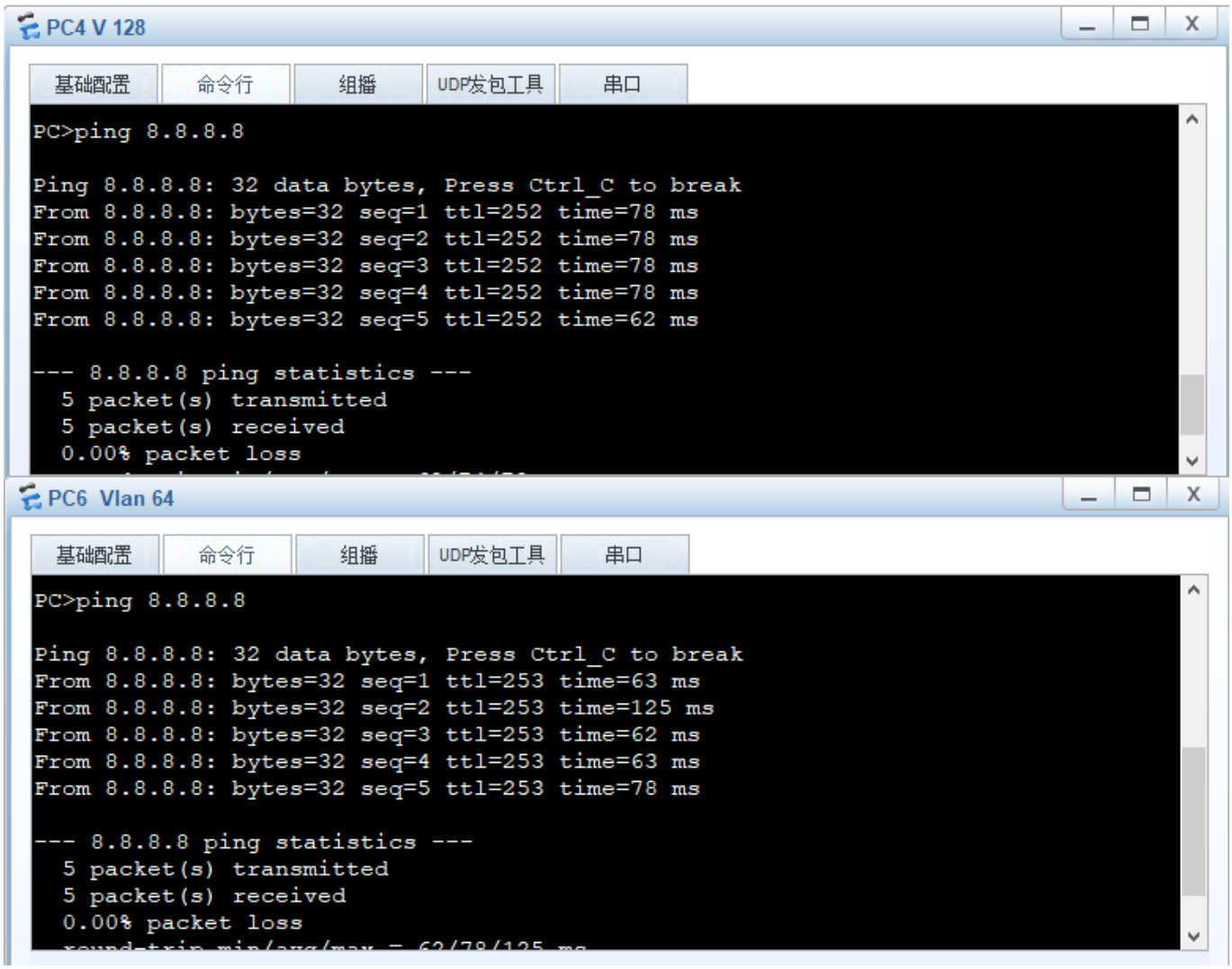
FtpClient

HttpClient

地址: http://www.zledu1314.com 获取

Parse URL failure.

5.2.2、PC4 和 PC6 成功访问英特网；



三、相关配置：

```
AR2
sy
sysname AR2
int g0/0/0
ip address 192.168.1.226 27
int g0/0/1
ip address 202.106.0.1 27
int g0/0/2
ip address 192.168.1.1 27
ip route-s 0.0.0.0 0 202.106.0.2
dhcp enable
ip pool ymm
network 192.168.1.0 mask 27
gateway-list 192.168.1.1
excluded-ip-address 202.106.0.1 202.106.0.2
dns-list 8.8.8.8
int g0/0/2
dhcp select global
```

```
aaa
local-user ymm password cipher ymm123
local-user ymm privilege level 3
local-user ymm service-type telnet
q
user-interface vty 0 4
authentication-mode aaa
q
ospf router-id 2.2.2.2
area 0
network 192.168.1.226 0.0.0.0
default-route-advertise always
AR2创建子接口
int g0/0/2.11
dot1q termination vid 11
ip address 192.168.1.1 27
traffic-filter inbound acl 3001
arp broadcast enable
dhcp select global
int g0/0/2.64
dot1q termination vid 64
ip address 192.168.1.65 27
arp broadcast enable
ospf 1
area 1
network 192.168.1.65 0.0.0.0
AR2网络边界设备使用Easy NAT接入英特网;
acl number 2000
rule permit source 192.168.1.0 0.0.0.255
int g0/0/1
nat outbound 2000
nat server protocol tcp global 202.106.0.3 7788 inside 192.168.1.33 telnet
PC1>ping 8.8.8.1通
访问202.106.0.3的7788端口调转到192.168.1.33的23端口成功登录AR1设备
AR3telnet 202.106.0.3 7788成功登陆到AR1
PC1不能访问英特网络离目的近在AR2配置
acl n 2001
rule deny source 192.168.1.5 0
int g0/0/0
traffic-filter inbound acl 2001
PC1>ping 8.8.8.8不通PC3>ping 8.8.8.8通
AR1 离源近配置
acl number 3000
rule deny tcp source 192.168.1.4 0 destination any  destination-port eq 80
interface GigabitEthernet0/0/1
traffic-filter inbound acl 3000
rule deny udp source 192.168.1.4 0 destination any  destination-port eq 80
interface GigabitEthernet0/0/1
```

```
traffic-filter inbound acl 3000
```
Client3不能访问Client1可以访问
```
LSW6
sy
sysname LSW6
vlan batch 225 128 160
interface Vlanif225
ip address 192.168.1.98 27
interface Vlanif128
ip address 192.168.1.129 27
interface Vlanif160
ip address 192.168.1.161 27
int g0/0/1
port link-type access
port default vlan 225
int g0/0/4
port link-type access
port default vlan 128
int g0/0/5
port link-type access
port default vlan 160
ospf 1
area 2
network 0.0.0.0 0.0.0.0
q
```
链路聚合:
```
interface eth-trunk 1
mode lacp-static
max active-linknumber 2
trunkport gigabitethernet 0/0/6 to 0/0/8
port link-type trunk
port trunk allow-pass vlan 128 160
q
dis eth-trunk 1
LSW9
sy
sysname LSW9
vlan batch 128 160
int g0/0/4
p l a
p d v 128
int g0/0/5
p l a
p d v 160
interface eth-trunk 1
mode lacp-static
max active-linknumber 2
trunkport gigabitethernet 0/0/6 to 0/0/8
```

```
port link-type trunk
port trunk allow-pass vlan 128 160
q
LSW1-二层
sy
sysname LSW1-2
vlan batch 11 64
int g0/0/1
port link-type trunk
port trunk a vlan 11 64
int g0/0/15
port link-type trunk
port trunk allow-pass vlan 11 64
int g0/0/16
port link-type trunk
port trunk allow-pass vlan 11 64
q
stp mode stp
stp priority 4096
LSW7
vlan batch 11 64
int e0/0/15
port link-type trunk
port trunk allow-pass vlan 11 64
int e0/0/17
port link-type trunk
port trunk allow-pass vlan 11 64
vlan batch 11 64
int e0/0/1
port link-type access
port default vlan 11
int e0/0/2
port link-type access
port default vlan 11
q
stp mode stp
stp priority 8192
LSW8
sy
vlan batch 11 64
int e0/0/16
port link-type trunk
port trunk allow-pass vlan 11 64
int e0/0/17
port link-type trunk
port trunk allow-pass vlan 11 64
int e0/0/1
port link-type access
```

```
port default vlan 64
q
stp mode stp
AR2 拨号PPPOE
acl number 2000
rule permit
int dialer 1
ppp chap user zl
ppp chap password cipher ZL123
ip address ppp-negotiate
dialer user zl
dialer bundle 1
dialer-group 1
nat outbound 2000
int g4/0/0
pppoe-client dial-bundle-number 1
dialer-rule
dialer-rule 1 ip permit
ip route-static 0.0.0.0 0.0.0.0 dialer 1
ISP 配置测试
sy
sysn ISP
int g0/0/0
ip address 202.106.0.2 27
int g/0/1
ip address 8.8.8.1 27
ISP PPPOE服务配置
ip pool zl202
network 202.106.1.0 mask 24
dns-list 8.8.8.8 114.114.114.114
aaa
local-user zl password cipher ZL123
local-user zl service-type ppp
interface Virtual-Template1
ppp authentication-mode chap
remote address pool zl202
ip address 202.106.1.1 24
int g0/0/2
pppoe-server bind Virtual-Template 1
```