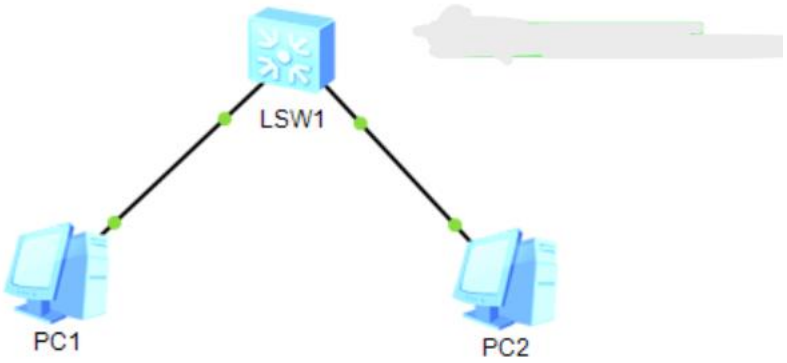
交换机端口　实验报告

学院：　　专业：　　班级：
学号：　　姓名：　　实验时间：
一、　实验名称 交换机端口绑定实验。
二、　实验目的 本实验旨在通过配置和管理交换机端口，深入理解交换机在网络中的功能与数据转发机制，掌握端口基本设置，从而提升对二层网络设备管理能力的实践认知。
三、　实验环境 交换机 1 台、计算机 2 台、网线若干。
四、　实验内容及步骤 1.按照网络拓扑图连接设备    2.配置主机 ip 地址

3.添加静态 mac 地址表项

```
LSW1

[SwitchA]undo mac-address dynamic vlan 1
[SwitchA]
Jun 17 2026 21:05:28-08:00 SwitchA DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.201
5.25.191.3.1 configurations have been changed. The current change number is 6,
he change loop count is 0, and the maximum number of records is 4095.uduudispl
 mac-address
[SwitchA]mac-a
[SwitchA]mac-address sta
[SwitchA]mac-address static 5489-98f4-80e3 GE
[SwitchA]mac-address static 5489-98f4-80e3 GE0/0/1 vlan 1
                                           ^
Error: Wrong parameter found at '^' position.
[SwitchA]mac-address static 5489-98f4-80e3 ?
  GigabitEthernet  GigabitEthernet interface

[SwitchA]mac-address static 5489-98f4-80e3 G
[SwitchA]mac-address static 5489-98f4-80e3 GigabitEthernet 0/0/1 vlan 1
[SwitchA]mac-address static 5489-98f4-80e3 GigabitEthernet 0/0/1 vlan 1
Jun 17 2026 21:07:18-08:00 SwitchA DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.201
5.25.191.3.1 configurations have been changed. The current change number is 7,
he chan
[SwitchA]mac-address static 5489-9843-6437 GigabitEthernet 0/0/2 vlan 1
[SwitchA]
Jun 17 2026 21:07:48-08:00 SwitchA DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.201

[SwitchA]display mac-address
MAC address table of slot 0:
-------------------------------------------------------------------------------
MAC Address    VLAN/       PEVLAN CEVLAN Port            Type      LSP/LSR-ID
               VSI/SI                                              MAC-Tunnel
-------------------------------------------------------------------------------
5489-98f4-80e3 1           -      -      GE0/0/1         static    -
5489-9843-6437 1           -      -      GE0/0/2         static    -
-------------------------------------------------------------------------------
```

4.禁用端口的学习功能

```
[SwitchA-GigabitEthernet0/0/1]mac-address lea
[SwitchA-GigabitEthernet0/0/1]mac-address learning dis
[SwitchA-GigabitEthernet0/0/1]mac-address learning disable
```

5.设置 vlan1 的虚接口

```
[SwitchA-GigabitEthernet0/0/1]interface GigabitEthernet 0/0/2
[SwitchA-GigabitEthernet0/0/2]mac-address learning disable
[SwitchA-GigabitEthernet0/0/2]interface GigabitEthernet 0/0/2
Jun 17 2026 21:17:18-08:00 SwitchA DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.201
5.25.191.3.1 configurations have been changed. The current change number is 10,
the change loop count is 0, and the max
[SwitchA-GigabitEthernet0/0/2]interface GigabitEthernet 0/0/3
[SwitchA-GigabitEthernet0/0/3]mac-address learning disable
[SwitchA-GigabitEthernet0/0/3]
Jun 17 2026 21:17:38-08:00 SwitchA DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.201
5.25.191.3.1 configurations have been changed. The current change number is 11,
the change loop count is 0, and the maximum number of records is 4095.
[SwitchA-GigabitEthernet0/0/3]quit
[SwitchA]vlan 1
[SwitchA-vlan1]int vlan 1
[SwitchA-Vlanif1]ip add
[SwitchA-Vlanif1]ip address 192.168.0.1 255.255.255.0
[SwitchA-Vlanif1]
Jun 17 2026 21:18:17-08:00 SwitchA %%01IFNET/4/LINK_STATE(l)[0]:The line protoc
l IP on the interface Vlanif1 has entered the UP state.
Jun 17 2026 21:18:18-08:00 SwitchA DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.201
5.25.191.3.1 configurations have been changed. The current change number is 12,
the change loop count is 0, and the maximum number of records is 4095.
```

五、 实验结果及分析

1.保持 PC1 连接 ethemet1/0/1 端口，PC2 连接 ethemet1/0/2 端口，使用 PC1 测试 PC2 是否连通，结果显示可以连通

```
PC>ping 192.168.0.151

Ping 192.168.0.151: 32 data bytes, Press Ctrl_C to break
From 192.168.0.151: bytes=32 seq=1 ttl=128 time=47 ms
From 192.168.0.151: bytes=32 seq=2 ttl=128 time=46 ms
From 192.168.0.151: bytes=32 seq=3 ttl=128 time=47 ms
From 192.168.0.151: bytes=32 seq=4 ttl=128 time=47 ms
From 192.168.0.151: bytes=32 seq=5 ttl=128 time=47 ms

--- 192.168.0.151 ping statistics ---
  5 packet(s) transmitted
  5 packet(s) received
  0.00% packet loss
  round-trip min/avg/max = 46/46/47 ms
```

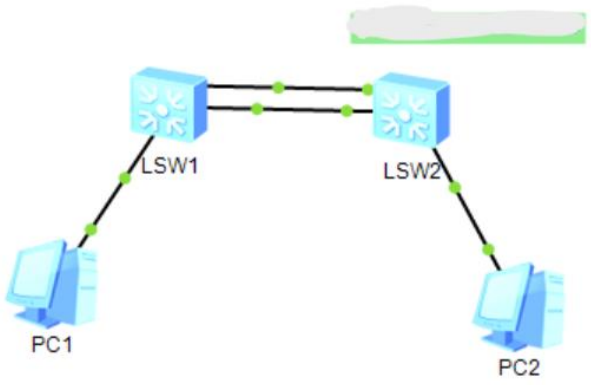
2.调整 PC1 连接 ethemet1/0/3 端口，PC2 连接 ethemet1/0/2 端口，使用 PC1 测试 PC2 是否连通，结果显示无法连通。

```
PC>ping 192.168.0.151

Ping 192.168.0.151: 32 data bytes, Press Ctrl_C to break
Request timeout!
Request timeout!
Request timeout!
Request timeout!
Request timeout!

--- 192.168.0.151 ping statistics ---
  5 packet(s) transmitted
  0 packet(s) received
  100.00% packet loss
```

六、 实验总结

通过本次交换机实验，我掌握了端口管理的基本配置方法，包括端口状态控制、交换机与计算机的连接。此次实验加深了我对交换机工作原理的理解，并提升了网络设备配置的实践能力。

交换机端口　　实验报告

学院：　　专业：　　班级：
学号：　　姓名：　　实验时间：
一、　实验名称 交换机端口汇聚实验。
二、　实验目的 本实验旨在通过配置和管理交换机端口，深入理解交换机在网络中的功能与数据转发机制，掌握端口基本设置，从而提升对二层网络设备管理能力的实践认知。
三、　实验环境 交换机 2 台、计算机 2 台、网线若干。
四、　实验内容及步骤 1.按照拓扑图连接设备    2.设置计算机 ip 地址 

3.交换机 A 创建 eth-trunk 聚合端口，并将端口添加进聚合端口

```
[SwitchA]int
[SwitchA]interface E
[SwitchA]interface Eth-Trunk 1
[SwitchA-Eth-Trunk1]mode lac
[SwitchA-Eth-Trunk1]mode lacp-static
[SwitchA-Eth-Trunk1]max band
[SwitchA-Eth-Trunk1]max bandwidth-affected-linknumber 2
[SwitchA-Eth-Trunk1]max active-linknumber 2
[SwitchA-Eth-Trunk1]
Jun 18 2026 17:57:11-08:00 SwitchA DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.201
5.25.191.3.1 configurations have been changed. The current change number is 7,
he change loop count is 0, and the maximum number of records is 4095.
[SwitchA-Eth-Trunk1]q
[SwitchA]int
[SwitchA]interface G
[SwitchA]interface GigabitEthernet 0/0/1
[SwitchA-GigabitEthernet0/0/1]et
[SwitchA-GigabitEthernet0/0/1]eth-trunk 1
Info: This operation may take a few seconds. Please wait for a moment...done.
[SwitchA]interface GigabitEthernet 0/0/2
[SwitchA-GigabitEthernet0/0/2]eth
[SwitchA-GigabitEthernet0/0/2]eth-trunk 1
```

4.交换机 B 创建 eth-trunk 聚合端口，并将端口添加进聚合端口

```
[SwitchB]interface Eth-Trunk 1
[SwitchB-Eth-Trunk1]mdoe
[SwitchB-Eth-Trunk1]mo
[SwitchB-Eth-Trunk1]mode lac
[SwitchB-Eth-Trunk1]mode lacp-static
[SwitchB-Eth-Trunk1]max
[SwitchB-Eth-Trunk1]max ac
[SwitchB-Eth-Trunk1]max active-linknumber 2
[SwitchB-Eth-Trunk1]
Jun 18 2026 17:59:19-08:00 SwitchB DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.201
5.25.191.3.1 configurations have been changed. The current change number is 6,
he change loop count is 0, and the maximum number of records is 4095.
[SwitchB-Eth-Trunk1]max ba
[SwitchB-Eth-Trunk1]max bandwidth-affected-linknumber 2
[SwitchB]interface GigabitEthernet 0/0/1
[SwitchB-GigabitEthernet0/0/1]et
[SwitchB-GigabitEthernet0/0/1]eth-trunk 1
Info: This operation may take a few seconds. Please wait for a moment...done.
[SwitchB-GigabitEthernet0/0/1]
Jun 18 2026 18:02:44-08:00 SwitchB %%01IFNET/4/IF_STATE(1)[0]:Interface Eth-Tru
k1 has turned into UP state.q
[SwitchB]
Jun 18 2026 18:02:49-08:00 SwitchB DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.201
5.25.191.3.1 configurations have been changed. The current change number is 8,
he change loop count is 0, and the maximum number of records is 4095.int
[SwitchB]interface G
[SwitchB]interface GigabitEthernet 0/0/2
[SwitchB-GigabitEthernet0/0/2]et
[SwitchB-GigabitEthernet0/0/2]eth-trunk 1
```

五、 实验结果及分析

1.端口汇聚结果

```
[SwitchA]display eth-trunk
Eth-Trunkl's state information is:
Local:
LAG ID: 1                   WorkingMode: STATIC
Preempt Delay: Disabled     Hash arithmetic: According to SIP-XOR-DIP
System Priority: 32768      System ID: 4clf-ccfl-6c0e
Least Active-linknumber: 1  Max Active-linknumber: 2
Operate status: up          Number Of Up Port In Trunk: 2
--------------------------------------------------------------------------------
ActorPortName          Status   PortType PortPri PortNo PortKey PortState Weigh
GigabitEthernet0/0/1   Selected 1GE      32768   2      305     10111100  1
GigabitEthernet0/0/2   Selected 1GE      32768   3      305     10111100  1

Partner:
--------------------------------------------------------------------------------
ActorPortName          SysPri   SystemID        PortPri PortNo PortKey PortSta
GigabitEthernet0/0/1   32768    4clf-cc48-0f72  32768   2      305     1011110
GigabitEthernet0/0/2   32768    4clf-cc48-0f72  32768   3      305     1011110
```

```
[SwitchB]display eth-trunk 1
Eth-Trunkl's state information is:
Local:
LAG ID: 1                   WorkingMode: STATIC
Preempt Delay: Disabled     Hash arithmetic: According to SIP-XOR-DIP
System Priority: 32768      System ID: 4clf-cc48-0f72
Least Active-linknumber: 1  Max Active-linknumber: 2
Operate status: up          Number Of Up Port In Trunk: 2
--------------------------------------------------------------------------------
ActorPortName          Status   PortType PortPri PortNo PortKey PortState Weigh
GigabitEthernet0/0/1   Selected 1GE      32768   2      305     10111100  1
GigabitEthernet0/0/2   Selected 1GE      32768   3      305     10111100  1

Partner:
--------------------------------------------------------------------------------
ActorPortName          SysPri   SystemID        PortPri PortNo PortKey PortSta
GigabitEthernet0/0/1   32768    4clf-ccfl-6c0e  32768   2      305     1011110
GigabitEthernet0/0/2   32768    4clf-ccfl-6c0e  32768   3      305     1011110
```

2.PC1 和 PC2 可以互相 ping 通

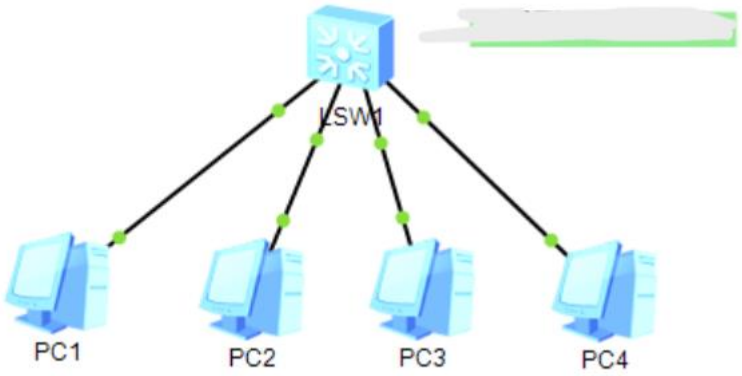
```
PC>ping 192.168.0.152

Ping 192.168.0.152: 32 data bytes, Press Ctrl_C to break
From 192.168.0.152: bytes=32 seq=1 ttl=128 time=62 ms
From 192.168.0.152: bytes=32 seq=2 ttl=128 time=78 ms
From 192.168.0.152: bytes=32 seq=3 ttl=128 time=78 ms
From 192.168.0.152: bytes=32 seq=4 ttl=128 time=62 ms
From 192.168.0.152: bytes=32 seq=5 ttl=128 time=78 ms

--- 192.168.0.152 ping statistics ---
  5 packet(s) transmitted
  5 packet(s) received
  0.00% packet loss
  round-trip min/avg/max = 62/71/78 ms
```

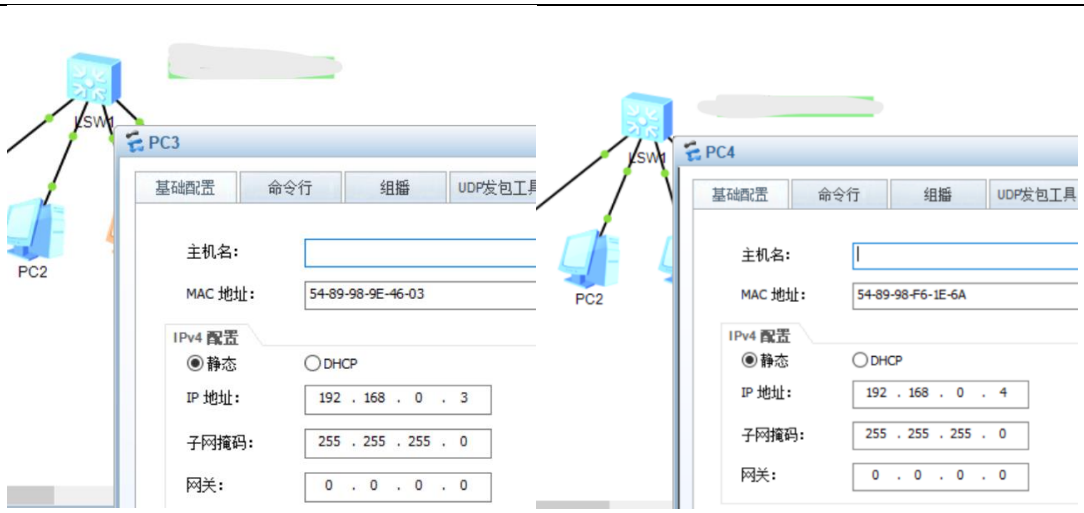
```
PC>ping 192.168.0.151

Ping 192.168.0.151: 32 data bytes, Press Ctrl_C to break
From 192.168.0.151: bytes=32 seq=1 ttl=128 time=78 ms
From 192.168.0.151: bytes=32 seq=2 ttl=128 time=63 ms
From 192.168.0.151: bytes=32 seq=3 ttl=128 time=78 ms
From 192.168.0.151: bytes=32 seq=4 ttl=128 time=94 ms
From 192.168.0.151: bytes=32 seq=5 ttl=128 time=78 ms

--- 192.168.0.151 ping statistics ---
  5 packet(s) transmitted
  5 packet(s) received
  0.00% packet loss
  round-trip min/avg/max = 63/78/94 ms
```

六、 实验总结

通过本次交换机实验，我掌握了端口管理的基本配置方法，包括端口状态控制、交换机与计算机的连接，并成功完成了端口聚合（LACP）的配置与验证。实验过程中，我观察到端口聚合能有效提升带宽利用率并实现链路冗余。此次实验加深了我对交换机工作原理的理解，并提升了网络设备配置的实践能力。

VLAN 实验报告

学院：　　专业：　　班级：
学号：　　姓名：　　实验时间：
一、　实验名称 单交换机 VLAN 配置
二、　实验目的 本次 VLAN 虚拟局域网实验旨在通过配置交换机间的 VLAN 互通（Trunk 链路）和 VLAN 间路由（三层交换或路由器），深入理解 VLAN 技术在网络分段和广播域隔离中的作用。有助于理解逻辑网络划分与实际物理拓扑的关系，提升相关能力。
三、　实验环境 交换机 1 台，计算机 4 台，网线若干
四、　实验内容及步骤 1. 按照网络拓扑图连接设备    2. 设置计算机 IP 地址 



3. 为连接到交换机上的 PC 分配 VLAN

```
[SwitchA]vlan 2
[SwitchA-vlan2]port
[SwitchA-vlan2]port G
[SwitchA-vlan2]port GigabitEthernet 0/0/1 to 0/0/2
```

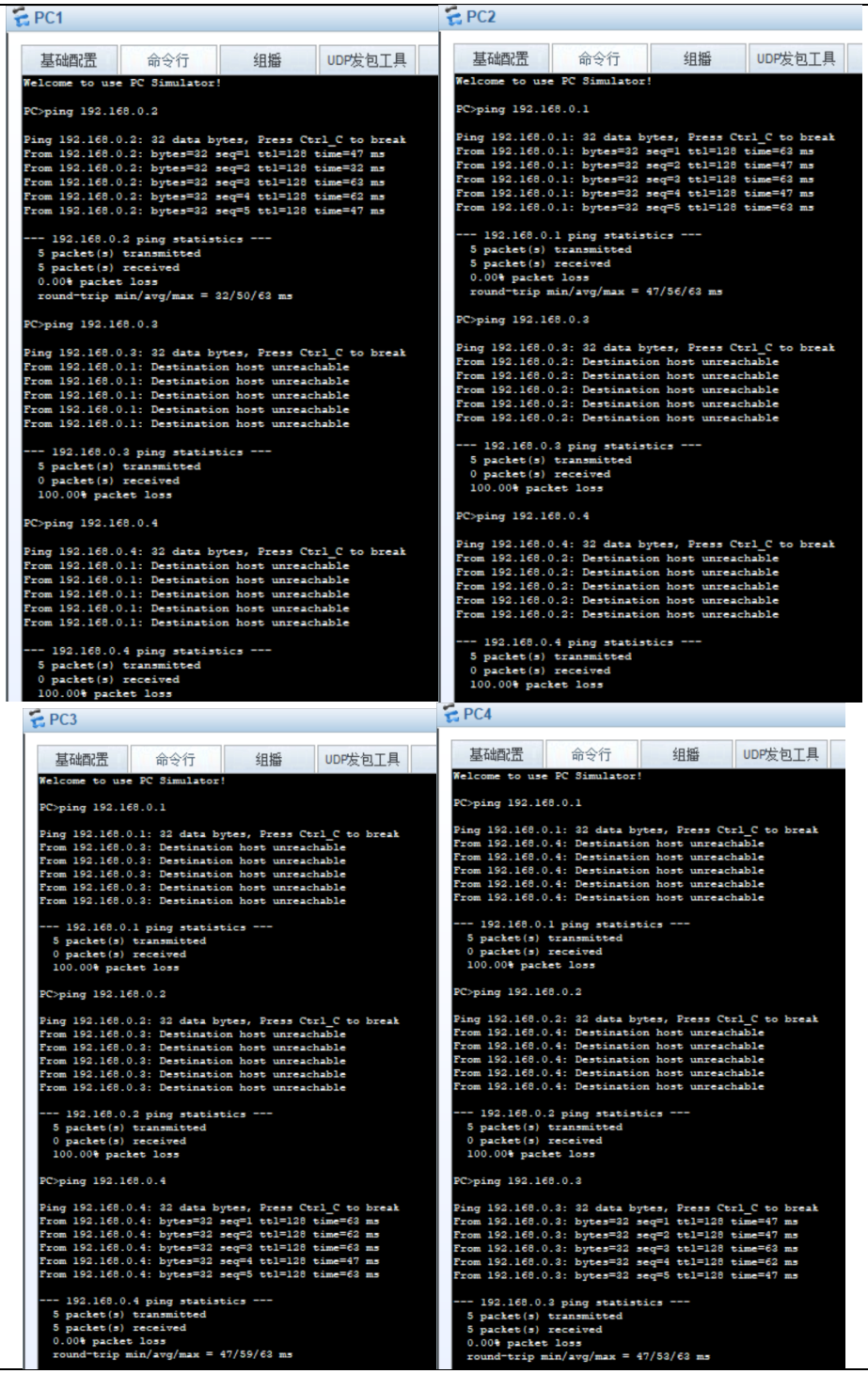
```
[SwitchA]vlan 3
[SwitchA-vlan3]port GigabitEthernet 0/0/3
```

五、 实验结果及分析

1. 查看各端口属于的 vlan

```
interface Vlanif1
#
interface MEth0/0/1
#
interface GigabitEthernet0/0/1
 port link-type access
 port default vlan 2
#
interface GigabitEthernet0/0/2
 port link-type access
 port default vlan 2
#
interface GigabitEthernet0/0/3
 port link-type access
 port default vlan 3
#
interface GigabitEthernet0/0/4
 port link-type access
 port default vlan 3
#
```

2. 属于同一网段的 PC 可以 ping 通，不属于同一网段的 PC 不能 ping 通



六、 实验总结

通过本次 VLAN 虚拟局域网实验，我成功完成了交换机间的 VLAN 互通配置（Trunk 链路）以及 VLAN 间的三层路由实验。实验过程中，我掌握了基于端口的 VLAN 划分方法，并通过三层交换机实现了不同 VLAN 间的路由互通。该实验不仅加深了我对广播域隔离和逻辑网络分段的理解，更让我熟悉了企业级网络环境中 VLAN 的实际部署流程，有效提升了我的网络规划与配置实践能力。

VLAN 实验报告

学院：　　专业：　　班级：
学号：　　姓名：　　实验时间：
一、　实验名称 交换机之间的 VLAN 内互通
二、　实验目的 本次 VLAN 虚拟局域网实验旨在通过配置交换机间的 VLAN 互通（Trunk 链路）和 VLAN 间路由（三层交换或路由器），深入理解 VLAN 技术在网络分段和广播域隔离中的作用。有助于理解逻辑网络划分与实际物理拓扑的关系，提升相关能力。
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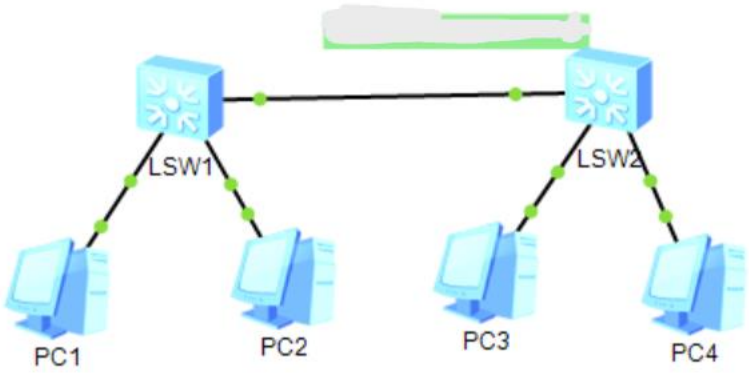
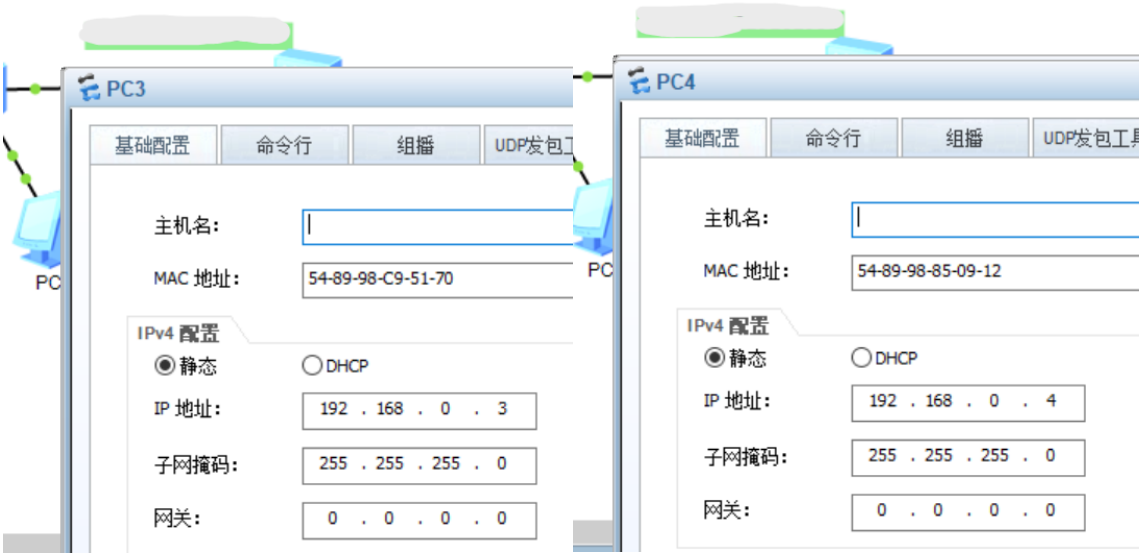
四、　实验内容及步骤 1. 按照网络拓扑图连接设备    2. 设置计算机 IP 地址 



3. 在交换机 A 上分配 VLAN

```
[SwitchA]
Jun 18 2026 19:59:58-08:00 SwitchA DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.201
5.25.191.3.1 configurations have been changed. The current change number is 8,
he change loop count is 0, and the maximum number of records is 4095.vlan 10
[SwitchA-vlan10]port G
[SwitchA-vlan10]port GigabitEthernet 0/0/1
```

```
[SwitchA]vlan 20
[SwitchA-vlan20]por
[SwitchA-vlan20]port
Jun 18 2026 20:00:28-08:00 SwitchA DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.201
5.25.191.3.1 configurations have been changed. The current change number is 10,
the change loop count is 0, and the maximum number of records is 4095.G
[SwitchA-vlan20]port GigabitEthernet 0/0/2
```

```
[SwitchA-GigabitEthernet0/0/3]port trunk all
[SwitchA-GigabitEthernet0/0/3]port trunk allow-pass vl
[SwitchA-GigabitEthernet0/0/3]port trunk allow-pass vlan all
```

4. 在交换机 B 上分配 VLAN

```
[SwitchB]vlan 10
[SwitchB-vlan10]po
Jun 18 2026 20:04:29-08:00 SwitchB DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.201
5.25.191.3.1 configurations have been changed. The current change number is 7,
he change loop count is 0, and the maximum number of records is 4095.r
[SwitchB-vlan10]port G
[SwitchB-vlan10]port GigabitEthernet 0/0/1
```

```
[SwitchB-vlan10]vlan 20
[SwitchB-vlan20]po
Jun 18 2026 20:04:49-08:00 SwitchB DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.201
5.25.191.3.1 configurations have been changed. The current change number is 9,
he change loop count is 0, and the maximum number of records is 4095.r
[SwitchB-vlan20]port G
[SwitchB-vlan20]port GigabitEthernet 0/0/2
```

```
[SwitchB]interface G
[SwitchB]interface GigabitEthernet 0/0/3
[SwitchB-GigabitEthernet0/0/3]por
[SwitchB-GigabitEthernet0/0/3]port lin
[SwitchB-GigabitEthernet0/0/3]port link-ty
[SwitchB-GigabitEthernet0/0/3]port link-type tr
[SwitchB-GigabitEthernet0/0/3]port link-type trunk
[SwitchB-GigabitEthernet0/0/3]
Jun 18 2026 20:05:19-08:00 SwitchB DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.201
5.25.191.3.1 configurations have been changed. The current change number is 11,
the change loop count is 0, and the maximum number of records is 4095.por
[SwitchB-GigabitEthernet0/0/3]port tr
[SwitchB-GigabitEthernet0/0/3]port trunk al
[SwitchB-GigabitEthernet0/0/3]port trunk allow-pass vla
[SwitchB-GigabitEthernet0/0/3]port trunk allow-pass vlan all
```

五、　实验结果及分析

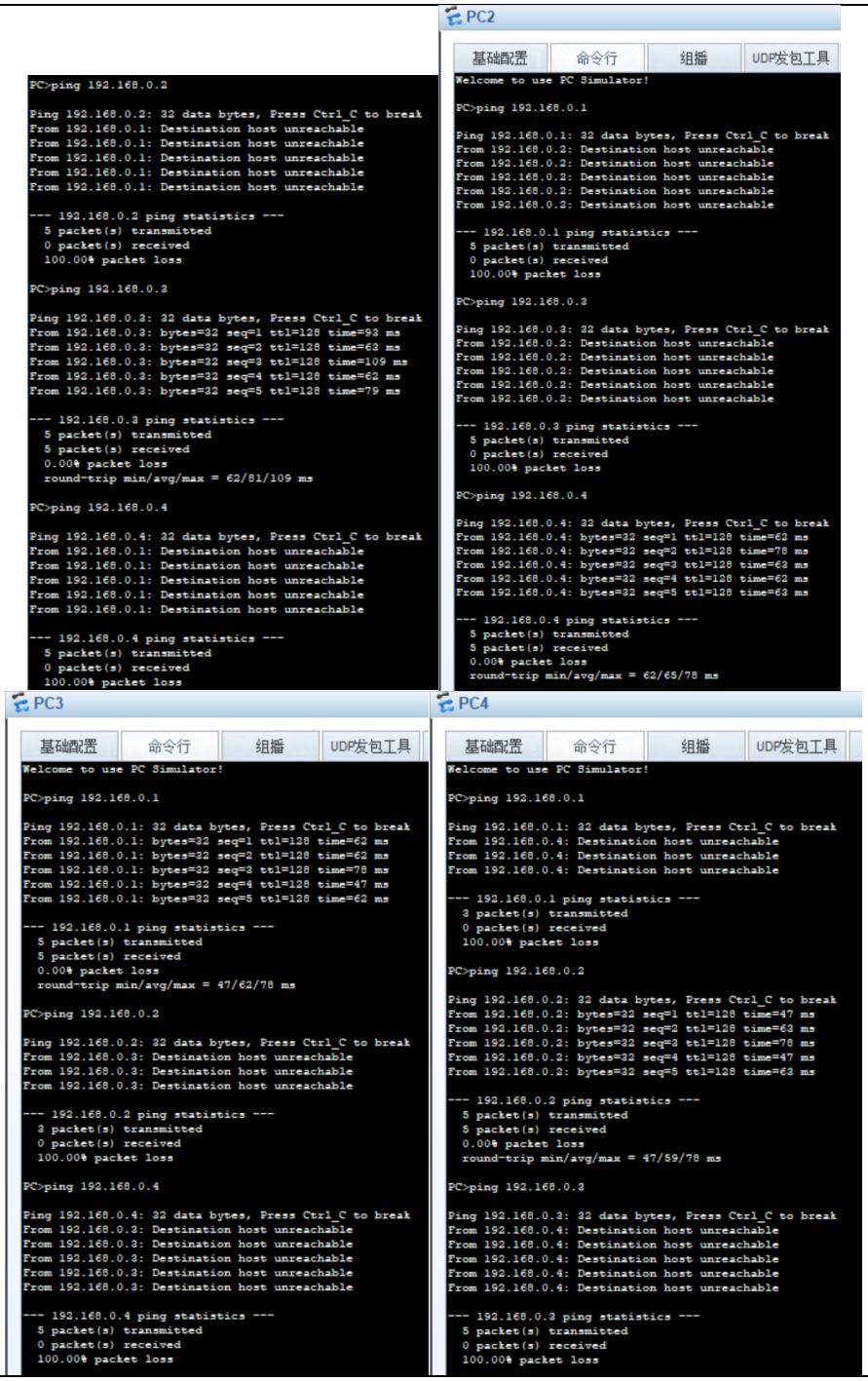
1. 查看交换机 A 各端口属于的 vlan

```
interface Vlanif1
#
interface MEth0/0/1
#
interface GigabitEthernet0/0/1
 port link-type access
 port default vlan 10
#
interface GigabitEthernet0/0/2
 port link-type access
 port default vlan 20
#
interface GigabitEthernet0/0/3
 port link-type trunk
 port trunk allow-pass vlan 2 to 4094
#
interface GigabitEthernet0/0/4
```

2. 查看交换机 B 各端口属于的 vlan

```
interface Vlanif1
#
interface MEth0/0/1
#
interface GigabitEthernet0/0/1
 port link-type access
 port default vlan 10
#
interface GigabitEthernet0/0/2
 port link-type access
 port default vlan 20
#
interface GigabitEthernet0/0/3
 port link-type trunk
 port trunk allow-pass vlan 2 to 4094
#
```

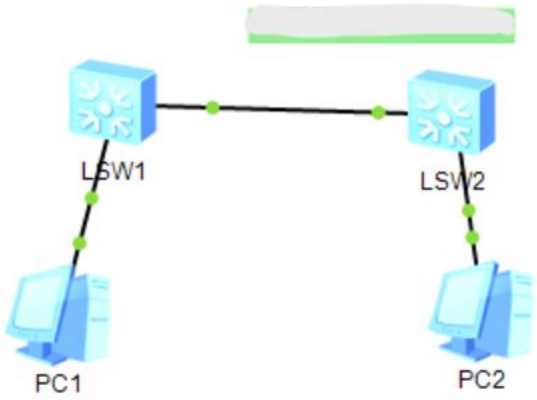
3. 属于同一网段的 PC 可以 ping 通，不属于同一网段的 PC 不能 ping 通



六、 实验总结

通过本次 VLAN 虚拟局域网实验，我成功完成了交换机间的 VLAN 互通配置（Trunk 链路）以及 VLAN 间的三层路由实验。实验过程中，我掌握了基于端口的 VLAN 划分方法，并通过三层交换机实现了不同 VLAN 间的路由互通。该实验不仅加深了我对广播域隔离和逻辑网络分段的理解，更让我熟悉了企业级网络环境中 VLAN 的实际部署流程，有效提升了我的网络规划与配置实践能力。

VLAN 实验报告

学院：　　专业：　　班级：
学号：　　姓名：　　实验时间：
一、　实验名称 VLAN 间的互通
二、　实验目的 本次 VLAN 虚拟局域网实验旨在通过配置交换机间的 VLAN 互通（Trunk 链路）和 VLAN 间路由（三层交换或路由器），深入理解 VLAN 技术在网络分段和广播域隔离中的作用。有助于理解逻辑网络划分与实际物理拓扑的关系，提升相关能力。
三、　实验环境 交换机 2 台，计算机 2 台，网线若干
四、　实验内容及步骤 1. 按照网络拓扑图连接设备    2. 设置计算机 IP 地址    3. 交换机 A 配置

```
[SwitchA]vlan 10
[SwitchA-vlan10]
Jun 18 2026 20:46:17-08:00 SwitchA DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.201
5.25.191.3.1 configurations have been changed. The current change number is 7,
he change loop count is 0, and the maximum number of records is 4095.
[SwitchA-vlan10]por
[SwitchA-vlan10]port G
[SwitchA-vlan10]port GigabitEthernet 0/0/1
[SwitchA-vlan10]
Jun 18 2026 20:46:37-08:00 SwitchA DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.201
5.25.191.3.1 configurations have been changed. The current change number is 8,
he change loop count is 0, and the maximum number of records is 4095.int
[SwitchA-vlan10]int vlan 10
[SwitchA-Vlanif10]
Jun 18 2026 20:46:45-08:00 SwitchA %%01IFNET/4/IF_STATE(l)[0]:Interface Vlanif
 has turned into UP state.
[SwitchA-Vlanif10]ip add
[SwitchA-Vlanif10]ip address 10.1.1.1 255.0.0.0
```

```
[SwitchA-vlan20]
Jun 18 2026 20:47:07-08:00 SwitchA DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.201
5.25.191.3.1 configurations have been changed. The current change number is 10,
the change loop count is 0, and the maximum number of records is 4095.por
[SwitchA-vlan20]port G
[SwitchA-vlan20]port GigabitEthernet 0/0/2
[SwitchA-vlan20]
Jun 18 2026 20:47:13-08:00 SwitchA %%01IFNET/4/IF_STATE(l)[2]:Interface Vlanif
has turned into DOWN state.
[SwitchA-vlan20]
Jun 18 2026 20:47:17-08:00 SwitchA DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.201
5.25.191.3.1 configurations have been changed. The current change number is 11,
the change loop count is 0, and the maximum number of records is 4095.
[SwitchA-vlan20]int V
[SwitchA-vlan20]int Vlan 20
[SwitchA-Vlanif20]
Jun 18 2026 20:47:25-08:00 SwitchA %%01IFNET/4/IF_STATE(l)[3]:Interface Vlanif
 has turned into UP state.
[SwitchA-Vlanif20]ip add
[SwitchA-Vlanif20]ip address 20.1.1.1 255.0.0.0
```

```
[SwitchA-rip-1]network 10.0.0.0
[SwitchA-rip-1]network 1
Jun 18 2026 20:48:17-08:00 SwitchA DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.201
5.25.191.3.1 configurations have been changed. The current change number is 14
the change loop count is 0, and the maximum number of records
[SwitchA-rip-1]network 20.0.0.0
[SwitchA-rip-1]
```

4. 交换机 B 配置

```
[SwitchB]vlan 30
Jun 18 2026 20:49:18-08:00 SwitchB DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.201
5.25.191.3.1 configurations have been changed. The current change number is 6,
he change loop count is 0, and the maximum number of records is 4095.
[SwitchB-vlan30]por
[SwitchB-vlan30]port G
[SwitchB-vlan30]port GigabitEthernet 0/0/1
[SwitchB-vlan30]int
Jun 18 2026 20:49:28-08:00 SwitchB DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.201
5.25.191.3.1 configurations have been changed. The current change number is 8,
he change loop count is 0, and the maximum number of records is 4095.vlan 30
[SwitchB-Vlanif30]
Jun 18 2026 20:49:34-08:00 SwitchB %%01IFNET/4/IF_STATE(l)[0]:Interface Vlanif
 has turned into UP state.
[SwitchB-Vlanif30]ip add
[SwitchB-Vlanif30]ip address 30.1.1.1 255.0.0.0
```

```
[SwitchB-Vlanif30]vlan 20
[SwitchB-vlan20]
Jun 18 2026 20:50:08-08:00 SwitchB DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.201
5.25.191.3.1 configurations have been changed. The current change number is 10
the change loop count is 0, and the maximum number of records is 4095.port
[SwitchB-vlan20]port G
[SwitchB-vlan20]port GigabitEthernet 0/0/2
[SwitchB-vlan20]
Jun 18 2026 20:50:17-08:00 SwitchB %%01IFNET/4/IF_STATE(l)[2]:Interface Vlanif
has turned into DOWN state.
Jun 18 2026 20:50:18-08:00 SwitchB DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.201
5.25.191.3.1 configurations have been changed. The current change number is 11
the change loop count is 0, and the maximum number of records is 4095.
[SwitchB-vlan20]int vlan
[SwitchB-vlan20]int vlan 20
[SwitchB-Vlanif20]
Jun 18 2026 20:50:35-08:00 SwitchB %%01IFNET/4/IF_STATE(l)[3]:Interface Vlanif
 has turned into UP state.
[SwitchB-Vlanif20]ip add
[SwitchB-Vlanif20]ip address 20.1.1.2 255.0.0.0
```

五、 实验结果及分析

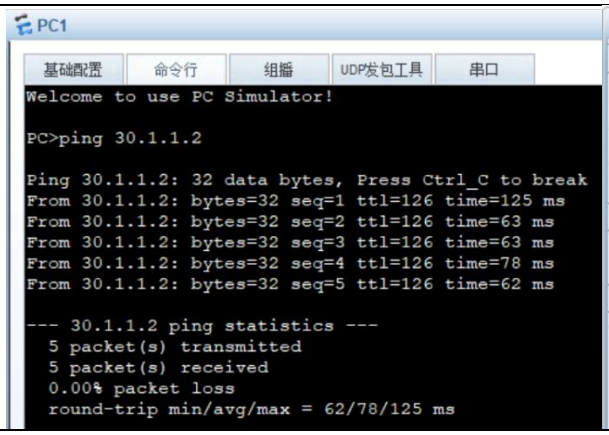
1. 查看交换机 A 路由信息

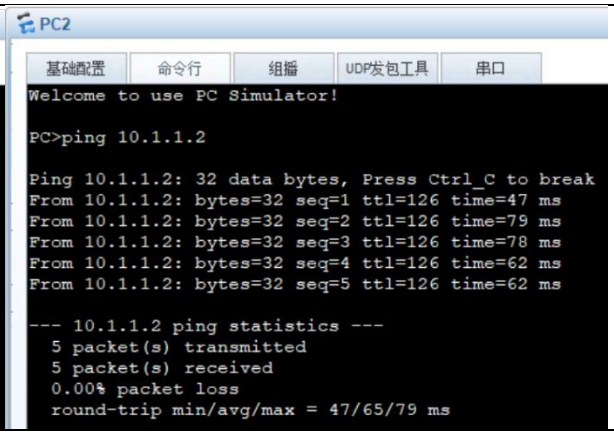
```
[SwitchA-rip-1]display ip routing-table
Route Flags: R - relay, D - download to fib
------------------------------------------------------------------------------
Routing Tables: Public
         Destinations : 7        Routes : 7

Destination/Mask    Proto   Pre  Cost      Flags NextHop         Interface

        10.0.0.0/8  Direct  0    0           D   10.1.1.1        Vlanif10
        10.1.1.1/32 Direct  0    0           D   127.0.0.1       Vlanif10
        20.0.0.0/8  Direct  0    0           D   20.1.1.1        Vlanif20
        20.1.1.1/32 Direct  0    0           D   127.0.0.1       Vlanif20
        30.0.0.0/8  RIP     100  1           D   20.1.1.2        Vlanif20
      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
```

2. 查看交换机 B 路由信息

```
[SwitchB]display ip routing-table
Route Flags: R - relay, D - download to fib
------------------------------------------------------------------------------
Routing Tables: Public
         Destinations : 7        Routes : 7

Destination/Mask    Proto   Pre  Cost      Flags NextHop         Interface

        10.0.0.0/8  RIP     100  1           D   20.1.1.1        Vlanif20
        20.0.0.0/8  Direct  0    0           D   20.1.1.2        Vlanif20
        20.1.1.2/32 Direct  0    0           D   127.0.0.1       Vlanif20
        30.0.0.0/8  Direct  0    0           D   30.1.1.1        Vlanif30
        30.1.1.1/32 Direct  0    0           D   127.0.0.1       Vlanif30
      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
```

3. 两台 PC 可以互相 ping 通

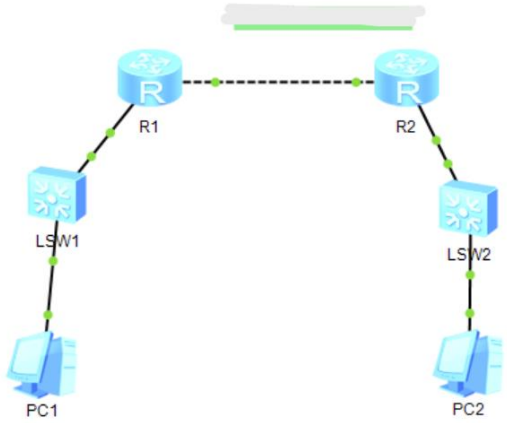




六、 实验总结

通过本次 VLAN 虚拟局域网实验，我成功完成了交换机间的 VLAN 互通配置（Trunk 链路）以及 VLAN 间的三层路由实验。实验过程中，我掌握了基于端口的 VLAN 划分方法，并通过三层交换机实现了不同 VLAN 间的路由互通。该实验不仅加深了我对广播域隔离和逻辑网络分段的理解，更让我熟悉了企业级网络环境中 VLAN 的实际部署流程，有效提升了我的网络规划与配置实践能力。

路由协议　　实验报告

学院：　　专业：　　班级：
学号：　　姓名：　　实验时间：
一、　实验名称 OSPF 路由协议配置实验
二、　实验目的 本次单区域 OSPF 路由协议实验旨在通过基础配置掌握动态路由协议的核心原理与实现方法。重点包括：1）学习单区域 OSPF 网络的基本配置流程；2）观察邻居关系建立与路由表更新的动态过程。
三、　实验环境 交换机 2 台，路由器 2 台，计算机 2 台，网线若干
四、　实验内容及步骤 1. 按照网络拓扑连接设备    2. 设置连接的 PC 的 IP 地址、网关掩码和网关地址 

3. 在路由器 A 上进行配置

R1

```
[RTA]router id 1.1.1.1
[RTA]int
[RTA]interface Lo
[RTA]interface Logic-Chann
Jun 18 2026 23:09:01-08:00 RTA DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 2, the
hange loop count is 0, and the maximum number of records is
[RTA]interface Loo
[RTA]interface LoopBack 0
[RTA-LoopBack0]
Jun 18 2026 23:09:11-08:00 RTA DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 3, the
hange loop count is 0, and the maximum number of records is 4095.
[RTA-LoopBack0]ip add
[RTA-LoopBack0]ip address 1.1.1.1 32
[RTA-LoopBack0]q
[RTA]in
Jun 18 2026 23:09:51-08:00 RTA DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 4, the
hange loop count is 0, and the maximum number of records is 4095.t
[RTA]interface E
[RTA]interface Ethe
[RTA]interface Ethernet 0/0/0
[RTA-Ethernet0/0/0]ip add
[RTA-Ethernet0/0/0]ip address 10.1.1.1 255.255.255.0
```

R1

```
[RTA]interface Serial 0/0/0
[RTA-Serial0/0/0]lin
[RTA-Serial0/0/0]link-protocol ppp
[RTA-Serial0/0/0]ip add
[RTA-Serial0/0/0]ip address 20.1.1.1 255.255.255.252
[RTA-Serial0/0/0]q
[RTA]ospf
Jun 18 2026 23:11:21-08:00 RTA DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 6, the
hange loop count is 0, and the maximum number of records is 4095.
[RTA-ospf-1]area 0
[RTA-ospf-1-area-0.0.0.0]net
[RTA-ospf-1-area-0.0.0.0]network 1.1.1
Jun 18 2026 23:11:31-08:00 RTA DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 8, the
hange loop count is 0, and the maximum number of records is 4095..1
[RTA-ospf-1-area-0.0.0.0]network 1.1.1.1 0.0.0.0
[RTA-ospf-1-area-0.0.0.0]
Jun 18 2026 23:11:41-08:00 RTA DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 9, the
hange loop count is 0, and the maximum number of records is 4095.
[RTA-ospf-1-area-0.0.0.0]net
[RTA-ospf-1-area-0.0.0.0]network 20.1.1.0 0.0.0.3
[RTA-ospf-1-area-0.0.0.0]network 20.1.1.0 0.0.0.255
Jun 18 2026 23:12:01-08:00 RTA DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 10, the
change loop count is 0, and the maximum number of records is 4095.
[RTA-ospf-1-area-0.0.0.0]network 10.1.1.0 0.0.0.255
```

4. 在路由器 B 上进行配置

```
[RTB]router id 1.1.1.2
[RTB]int
[RTB]interface Loo
[RTB]interface LoopBack 0
[RTB-LoopBack0]
Jun 18 2026 23:12:54-08:00 RTB DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 3, the
hange loop count is 0, and the maximum number of records is 4095.
[RTB-LoopBack0]ip ad
[RTB-LoopBack0]ip address 1.1.1.2 32
[RTB-LoopBack0]q
[RTB]int
[RTB]interface
Jun 18 2026 23:13:14-08:00 RTB DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 4, the
hange loop count is 0, and the maximum number of records is 4095.E
[RTB]interface Ethe
[RTB]interface Ethernet 0/0/0
[RTB-Ethernet0/0/0]ip add
[RTB-Ethernet0/0/0]ip address 30.1.1.1 255.255.255.0
```

R2

```
[RTB]interface Serial 0/0/0
[RTB-Serial0/0/0]lin
[RTB-Serial0/0/0]link-protocol ppp
[RTB-Serial0/0/0]ip add
[RTB-Serial0/0/0]ip address 20.1.1.2 255.255.255.252
[RTB-Serial0/0/0]
Jun 18 2026 23:14:15-08:00 RTB %%01IFNET/4/LINK_STATE(l)[1]:The line protocol
P IPCP on the interface Serial0/0/0 has entered the UP state.q
[RTB]ospf
Jun 18 2026 23:14:24-08:00 RTB DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 6, the
hange loop count is 0, and the maximum number of records is 4095.
[RTB]ospf
[RTB-ospf-1]area
[RTB-ospf-1]area 0
[RTB-ospf-1-area-0.0.0.0]net
[RTB-ospf-1-area-0.0.0.0]network
Jun 18 2026 23:14:34-08:00 RTB DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 8, the
hange loop count is 0, and the maximum number of records is 4095.
[RTB-ospf-1-area-0.0.0.0]network 1.1.1.2 0.0.0.0
[RTB-ospf-1-area-0.0.0.0]net
[RTB-ospf-1-area-0.0.0.0]network 20.1.1.0 0
Jun 18 2026 23:14:54-08:00 RTB DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 9, the
hange loop count is 0, and the maximum number of records is 4095..
[RTB-ospf-1-area-0.0.0.0]network 20.1.1.0 0.0.0.3
```

五、 实验结果及分析

1. 查看路由器 A 的路由表

```
[RTA-ospf-1-area-0.0.0.0]display ip routing-table
Route Flags: R - relay, D - download to fib
------------------------------------------------------------------------------
Routing Tables: Public
         Destinations : 10        Routes : 10

Destination/Mask    Proto   Pre  Cost      Flags NextHop         Interface

        1.1.1.1/32  Direct  0    0           D   127.0.0.1       LoopBack0
        1.1.1.2/32  OSPF    10   1562        D   20.1.1.2        Serial0/0/0
       10.1.1.0/24  Direct  0    0           D   10.1.1.1        Ethernet0/0/0
       10.1.1.1/32  Direct  0    0           D   127.0.0.1       Ethernet0/0/0
       20.1.1.0/30  Direct  0    0           D   20.1.1.1        Serial0/0/0
       20.1.1.1/32  Direct  0    0           D   127.0.0.1       Serial0/0/0
       20.1.1.2/32  Direct  0    0           D   20.1.1.2        Serial0/0/0
       30.1.1.0/24  OSPF    10   1563        D   20.1.1.2        Serial0/0/0
      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
```

2. 查看路由器 B 的路由表

```
[RTB-ospf-1-area-0.0.0.0]display ip routing-table
Route Flags: R - relay, D - download to fib
------------------------------------------------------------------------------
Routing Tables: Public
         Destinations : 10        Routes : 10

Destination/Mask    Proto   Pre  Cost      Flags NextHop         Interface

        1.1.1.1/32  OSPF    10   1562        D   20.1.1.1        Serial0/0/0
        1.1.1.2/32  Direct  0    0           D   127.0.0.1       LoopBack0
       10.1.1.0/24  OSPF    10   1563        D   20.1.1.1        Serial0/0/0
       20.1.1.0/30  Direct  0    0           D   20.1.1.2        Serial0/0/0
       20.1.1.1/32  Direct  0    0           D   20.1.1.1        Serial0/0/0
       20.1.1.2/32  Direct  0    0           D   127.0.0.1       Serial0/0/0
       30.1.1.0/24  Direct  0    0           D   30.1.1.1        Ethernet0/0/0
       30.1.1.1/32  Direct  0    0           D   127.0.0.1       Ethernet0/0/0
      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
```

3. 两台 PC 可以互相 ping 通

PC1

基础配置 | 命令行 | 组播 | UDP发包工具 | 串口

```
Welcome to use PC Simulator!

PC>ping 30.1.1.2

Ping 30.1.1.2: 32 data bytes, Press Ctrl_C to break
From 30.1.1.2: bytes=32 seq=1 ttl=126 time=171 ms
From 30.1.1.2: bytes=32 seq=2 ttl=126 time=125 ms
From 30.1.1.2: bytes=32 seq=3 ttl=126 time=125 ms
From 30.1.1.2: bytes=32 seq=4 ttl=126 time=110 ms
From 30.1.1.2: bytes=32 seq=5 ttl=126 time=109 ms

--- 30.1.1.2 ping statistics ---
  5 packet(s) transmitted
  5 packet(s) received
  0.00% packet loss
  round-trip min/avg/max = 109/128/171 ms
```

PC2

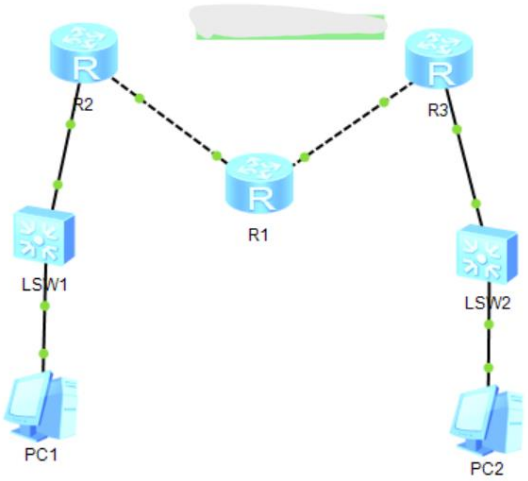
基础配置 | 命令行 | 组播 | UDP发包工具 | 串口

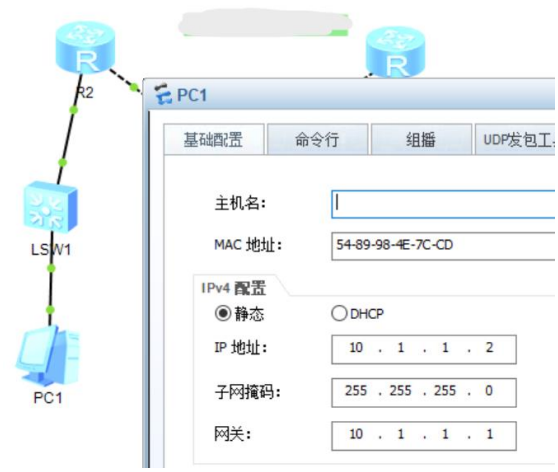
```
Welcome to use PC Simulator!

PC>ping 10.1.1.2

Ping 10.1.1.2: 32 data bytes, Press Ctrl_C to break
From 10.1.1.2: bytes=32 seq=1 ttl=126 time=125 ms
From 10.1.1.2: bytes=32 seq=2 ttl=126 time=94 ms
From 10.1.1.2: bytes=32 seq=3 ttl=126 time=109 ms
From 10.1.1.2: bytes=32 seq=4 ttl=126 time=94 ms
From 10.1.1.2: bytes=32 seq=5 ttl=126 time=109 ms

--- 10.1.1.2 ping statistics ---
  5 packet(s) transmitted
  5 packet(s) received
  0.00% packet loss
  round-trip min/avg/max = 94/106/125 ms
```

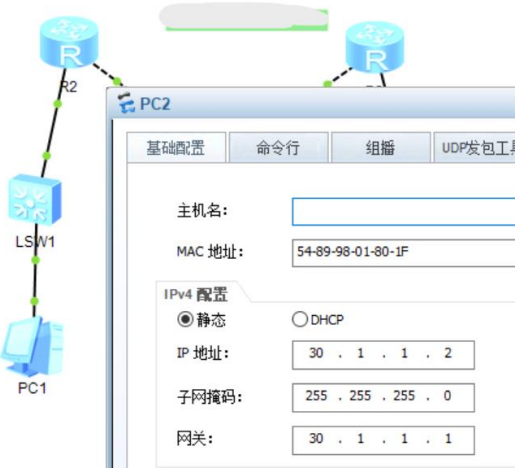
六、 实验总结

通过本次单区域 OSPF 实验，我完成了多台路由器的 OSPF 基础配置，成功实现了路由表的动态更新与互通。实验过程中，通过查看邻居状态表和路由表，直观理解了 OSPF 的 Hello 协议工作机制。该实验帮助我掌握了小型网络中动态路由协议的基本部署方法，为后续复杂网络环境下的协议配置打下了坚实基础。

路由协议　　实验报告

学院：　　专业：　　班级：
学号：　　姓名：　　实验时间：
一、　实验名称 多域 OSPF 邻居认证
二、　实验目的 本次多区域 OSPF 实验旨在掌握复杂网络中 OSPF 的分区域部署与路由优化策略，重点 包括：1）理解骨干区域（Area 0）与非骨干区域的设计原理；2）学习区域边界路由器（ABR）的配置方法与路由汇总技术；3）验证 LSA 类型在不同区域间的传播规则，从而掌握大规模 网络分层路由管理的实现方式。
三、　实验环境 3 台路由器，2 台交换机，2 台计算机，网线若干
四、　实验内容及步骤 1. 按照网络拓扑连接设备    2. 设置连接的 PC 的 IP 地址、网关掩码和网关地址





3. 在路由器 A 上进行配置

```
[RTA-ospf-1]area 1
Jun 18 2026 23:58:18-08:00 RTA DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 10, th
change loop count is 0, and the maximum number of records is 4095.
[RTA-ospf-1-area-0.0.0.1]
Jun 18 2026 23:58:28-08:00 RTA DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 11, th
change loop count is 0, and the maximum number of records is 4095.\
                    ^
Error: Unrecognized command found at '^' position.
[RTA-ospf-1-area-0.0.0.1]net
[RTA-ospf-1-area-0.0.0.1]network 21.1.1.0 0.0.0.255
[RTA-ospf-1-area-0.0.0.1]aut
[RTA-ospf-1-area-0.0.0.1]authentication-mode md
[RTA-ospf-1-area-0.0.0.1]authentication-mode md5
```

4. 在路由器 B 上进行配置

```
[RTB]interface Ethernet 0/0/0
[RTB-Ethernet0/0/0]
Jun 18 2026 23:59:53-08:00 RTB DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 1, the
hange loop count is 0, and the maximum number of records is 4095.
[RTB-Ethernet0/0/0]ip add
[RTB-Ethernet0/0/0]ip address 10.1.1.1 255.255.255.0
[RTB-Ethernet0/0/0]
Jun 19 2026 00:00:06-08:00 RTB %%01IFNET/4/LINK_STATE(l)[0]:The line protocol
 on the interface Ethernet0/0/0 has entered the UP state.
[RTB-Ethernet0/0/0]in
[RTB-Ethernet0/0/0]q
Jun 19 2026 00:00:13-08:00 RTB DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 2, the
hange loop count is 0, and the maximum number of records is 4095.
[RTB]int
[RTB]interface Se
[RTB]interface Serial 0/0/0
[RTB-Serial0/0/0]ip add
[RTB-Serial0/0/0]ip address 20.1.1.2 255.255.255.0
```

```
[RTB-Serial0/0/0]ospf authentication-mode simple password
[RTB-Serial0/0/0]rout
[RTB-Serial0/0/0]rout
Jun 19 2026 00:01:03-08:00 RTB DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 4, the
hange loop count is 0, and the maximum number of records is 4095.
[RTB-Serial0/0/0]r
[RTB-Serial0/0/0]q
[RTB]rou
[RTB]router id 2.2.2.2
[RTB]
Jun 19 2026 00:01:23-08:00 RTB DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 5, the
hange loop count is 0, and the maximum number of records is 4095.ospf
[RTB-ospf-1]a
Jun 19 2026 00:01:33-08:00 RTB DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 6, the
hange loop count is 0, and the maximum number of records is 4095.re
[RTB-ospf-1]area 0
[RTB-ospf-1-area-0.0.0.0]net
[RTB-ospf-1-area-0.0.0.0]network 20.1.1
Jun 19 2026 00:01:43-08:00 RTB DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 7, the
hange loop count is 0, and the maximum number of records is 4095.
[RTB-ospf-1-area-0.0.0.0]network 20.1.1.0 0.0.0.255
```

```
[RTB-ospf-1-area-0.0.0.0]network 10.1.1.0 0.0.0.255
[RTB-ospf-1-area-0.0.0.0]aut
[RTB-ospf-1-area-0.0.0.0]authentication-mode sim
Jun 19 2026 00:02:23-08:00 RTB DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 9, the
hange loop count is 0, and the maximum number of records is 4095.
[RTB-ospf-1-area-0.0.0.0]authentication-mode simple
```

5. 在路由器 C 上进行配置

```
[RTC]interface Ethernet 0/0/0
[RTC-Ethernet0/0/0]ip add
[RTC-Ethernet0/0/0]ip address 30.1.1.1 255.255.255.0
[RTC-Ethernet0/0/0]
Jun 19 2026 00:03:48-08:00 RTC %%01IFNET/4/LINK_STATE(l)[0]:The line protocol
 on the interface Ethernet0/0/0 has entered the UP state.
[RTC-Ethernet0/0/0]
Jun 19 2026 00:03:55-08:00 RTC DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 2, the
hange loop count is 0, and the maximum number of records is 4095.
[RTC-Ethernet0/0/0]q
[RTC]int
[RTC]interface S
[RTC]interface Serial 0/0/1
[RTC-Serial0/0/1]ip add
[RTC-Serial0/0/1]ip address 21.1.1.2 255.255.255.0
[RTC-Serial0/0/1]
Jun 19 2026 00:04:18-08:00 RTC %%01IFNET/4/LINK_STATE(l)[1]:The line protocol
P IPCP on the interface Serial0/0/1 has entered the UP state.
[RTC-Serial0/0/1]osp
[RTC-Serial0/0/1]ospf au
[RTC-Serial0/0/1]ospf authentication-mode
Jun 19 2026 00:04:25-08:00 RTC DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 3, the
hange loop count is 0, and the maximum number of records is 4095.
[RTC-Serial0/0/1]ospf authentication-mode md
[RTC-Serial0/0/1]ospf authentication-mode md5 1 password
```

```
[RTC]router id 3.3.3.3
[RTC]osp
Jun 19 2026 00:04:55-08:00 RTC DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 5, the
hange loop count is 0, and the maximum number of records is 4095.d
[RTC]ospf
[RTC-ospf-1]area
[RTC-ospf-1]area 1
[RTC-ospf-1-area-0.0.0.1]
Jun 19 2026 00:05:05-08:00 RTC DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 7, the
hange loop count is 0, and the maximum number of records is 4095.net
[RTC-ospf-1-area-0.0.0.1]network 21.1.1.0 0.0.0.255
[RTC-ospf-1-area-0.0.0.1]network 30.1.1.0 0.0.0.255
[RTC-ospf-1-area-0.0.0.1]aut
[RTC-ospf-1-area-0.0.0.1]authentication-mode md
[RTC-ospf-1-area-0.0.0.1]authentication-mode md5
```

五、 实验结果及分析

1. 查看路由器 A 的 OSPF 信息表

```
[RTA-ospf-1-area-0.0.0.1]display ospf routing

      OSPF Process 1 with Router ID 1.1.1.1
            Routing Tables

 Routing for Network
 Destination        Cost  Type       NextHop         AdvRouter       Area
 20.1.1.0/24        1562  Stub       20.1.1.1        1.1.1.1         0.0.0.0
 21.1.1.0/24        1562  Stub       21.1.1.1        1.1.1.1         0.0.0.1
 10.1.1.0/24        1563  Stub       20.1.1.2        2.2.2.2         0.0.0.0
 30.1.1.0/24        1563  Stub       21.1.1.2        3.3.3.3         0.0.0.1

 Total Nets: 4
 Intra Area: 4  Inter Area: 0  ASE: 0  NSSA: 0
```

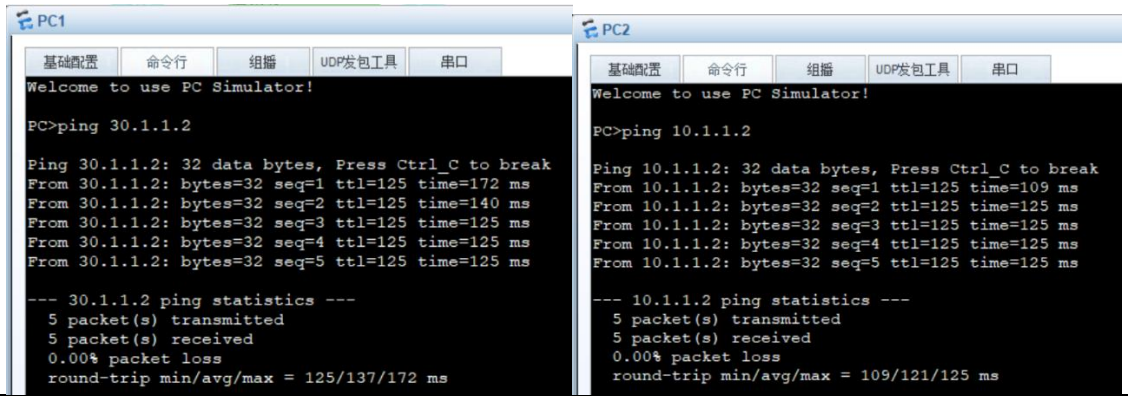
2. 查看路由器 B 的 OSPF 信息表

```
[RTB-ospf-1-area-0.0.0.0]display ospf routing

      OSPF Process 1 with Router ID 2.2.2.2
            Routing Tables

 Routing for Network
 Destination        Cost  Type       NextHop         AdvRouter       Area
 10.1.1.0/24        1     Stub       10.1.1.1        2.2.2.2         0.0.0.0
 20.1.1.0/24        1562  Stub       20.1.1.2        2.2.2.2         0.0.0.0
 21.1.1.0/24        3124  Inter-area 20.1.1.1        1.1.1.1         0.0.0.0
 30.1.1.0/24        3125  Inter-area 20.1.1.1        1.1.1.1         0.0.0.0

 Total Nets: 4
 Intra Area: 2  Inter Area: 2  ASE: 0  NSSA: 0
```

3. 查看路由器 C 的 OSPF 信息表

```
[RTC-ospf-1-area-0.0.0.1]display ospf routing

       OSPF Process 1 with Router ID 3.3.3.3
              Routing Tables

 Routing for Network
 Destination        Cost  Type       NextHop         AdvRouter       Area
 21.1.1.0/24        1562  Stub       21.1.1.2        3.3.3.3         0.0.0.1
 30.1.1.0/24        1     Stub       30.1.1.1        3.3.3.3         0.0.0.1
 10.1.1.0/24        3125  Inter-area 21.1.1.1        1.1.1.1         0.0.0.1
 20.1.1.0/24        3124  Inter-area 21.1.1.1        1.1.1.1         0.0.0.1

 Total Nets: 4
 Intra Area: 2  Inter Area: 2  ASE: 0  NSSA: 0
```

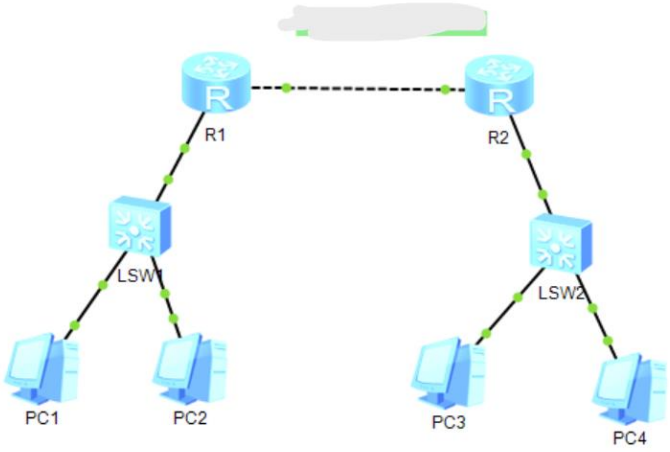
4. 两台 PC 可以互相 ping 通



六、 实验总结

通过配置多区域 OSPF 网络，我成功实现了跨区域路由通信，观察到 OSPF 协议完成区域间路由汇总的过程。实验验证了划分多区域的必要性，同时通过分析路由表加深了对 OSPF 层次化架构的理解。本次实验提升了我在复杂网络环境中规划与部署动态路由协议的能力。

链路层协议　　实验报告

学院：　　专业：　　班级：
学号：　　姓名：　　实验时间：
一、　实验名称 帧中继实验
二、　实验目的 本实验旨在掌握帧中继协议的工作原理与基础配置方法，理解 DTE/DCE 的角色差异及 DLCI 数据链路连接标识的作用，学会在路由器串口封装帧中继协议、配置接口类型与 DLCI 参数，结合路由协议验证广域网连通性，提升广域网链路部署与基础排错能力。
三、　实验环境 2 台路由器、2 台交换机、4 台计算机、网线若干
四、　实验内容及步骤 1. 按照网络拓扑图连接设备    2. 设置计算机 ip 地址 

3. 在路由器 A 上进行设置

```
[RTA]interface Ethernet 0/0/0
[RTA-Ethernet0/0/0]ip add
[RTA-Ethernet0/0/0]ip address 192.168.0.1 255.255.255.0
[RTA-Ethernet0/0/0]
Jun 19 2026 00:52:17-08:00 RTA %%01IFNET/4/LINK_STATE(l)[0]:The line protocol
 on the interface Ethernet0/0/0 has entered the UP state.
Jun 19 2026 00:52:18-08:00 RTA DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 2, the
hange loop count is 0, and the maximum number of records is 4095.
[RTA-Ethernet0/0/0]q
[RTA]int
[RTA]interface se
[RTA]interface Serial 0/0/0
[RTA-Serial0/0/0]ip add
[RTA-Serial0/0/0]ip address 192.168.1.1 255.255.255.0
[RTA-Serial0/0/0]lin
[RTA-Serial0/0/0]link-protocol fr
Jun 19 2026 00:52:58-08:00 RTA DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 3, the
hange loop count is 0, and the maximum number of records is 4095.
Warning: The encapsulation protocol of the link will be changed.
Continue? [Y/N]:y
[RTA-Serial0/0/0]
[RTA-Serial0/0/0]fr int
[RTA-Serial0/0/0]fr interface-type dte
[RTA-Serial0/0/0]fr dl
[RTA-Serial0/0/0]fr dlci 100
[RTA-fr-dlci-Serial0/0/0-100]
Jun 19 2026 00:53:30-08:00 RTA FR/4/TRAP:OID 1.3.6.1.2.1.10.32.0.1 Interface 1
DLCI 100 turns into 3 state (invalid(1), active(2), inactive(3)).
[RTA-fr-dlci-Serial0/0/0-100]rip
[RTA-rip-1]net
Jun 19 2026 00:53:38-08:00 RTA DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 6, the
hange loop count is 0, and the maximum number of records is 4095.
[RTA-rip-1]network 192.168.0.0
[RTA-rip-1]network 192.168.0
Jun 19 2026 00:53:48-08:00 RTA DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 7, the
hange loop count is 0, and the maximum number of records is 40951
[RTA-rip-1]network 192.168.1.0
```

4. 在路由器 B 上进行设置

```
[RTB]interface Ethernet 0/0/0
[RTB-Ethernet0/0/0]
Jun 19 2026 00:54:40-08:00 RTB DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 1, the
hange loop count is 0, and the maximum number of records is 4095.
[RTB-Ethernet0/0/0]ip add
[RTB-Ethernet0/0/0]ip address 192.168.2.1 255.255.255.0
[RTB-Ethernet0/0/0]
Jun 19 2026 00:55:02-08:00 RTB %%01IFNET/4/LINK_STATE(l)[0]:The line protocol
 on the interface Ethernet0/0/0 has entered the UP state.int
[RTB-Ethernet0/0/0]q
Jun 19 2026 00:55:10-08:00 RTB DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 2, the
hange loop count is 0, and the maximum number of records is 4095.
[RTB]int
[RTB]interface se
[RTB]interface Serial 0/0/0
[RTB-Serial0/0/0]ip add
[RTB-Serial0/0/0]ip address 192.168.1.2 255.255.255.0
[RTB-Serial0/0/0]lin
[RTB-Serial0/0/0]link-protocol
Jun 19 2026 00:55:40-08:00 RTB DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 3, the
hange loop count is 0, and the maximum number of records is 4095.fr
[RTB-Serial0/0/0]link-protocol fr
Warning: The encapsulation protocol of the link will be changed.
Continue? [Y/N]:y
[RTB-Serial0/0/0]
[RTB-Serial0/0/0]fr interface-type dce
[RTB-Serial0/0/0]
Jun 19 2026 00:56:00-08:00 RTB DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 5, the
hange loop count is 0, and the maximum number of records is 4095.
Jun 19 2026 00:56:01-08:00 RTB %%01IFNET/4/LINK_STATE(l)[4]:The line protocol
 on the interface Serial0/0/0 has entered the UP state.
[RTB-Serial0/0/0]fr dl
[RTB-Serial0/0/0]fr dlci 200
[RTB-fr-dlci-Serial0/0/0-200]
Jun 19 2026 00:56:10-08:00 RTB DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 6, the
hange loop count is 0, and the maximum number of records is 4095.rip
[RTB-rip-1]net
[RTB-rip-1]network
Jun 19 2026 00:56:20-08:00 RTB DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.
.191.3.1 configurations have been changed. The current change number is 7, the
hange loop count is 0, and the maximum number of records is 4095.192.1
[RTB-rip-1]network 192.168.1.0
[RTB-rip-1]network 192.168.2.0
```

五、 实验结果及分析

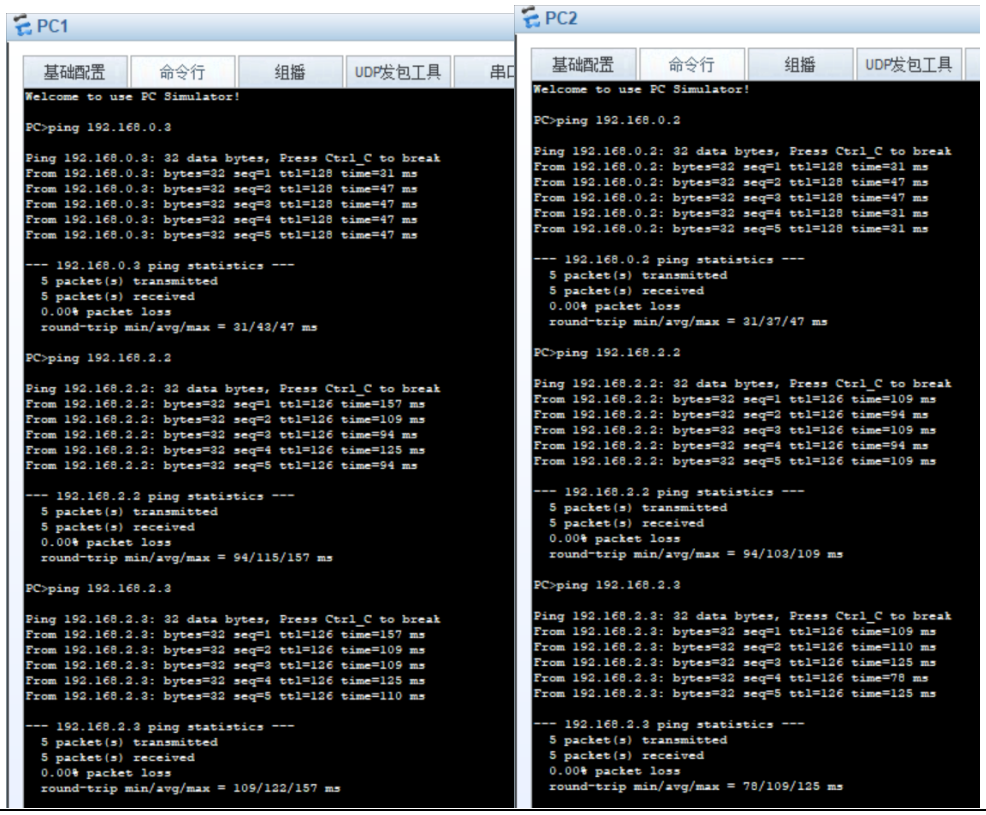
1. 在路由器 A 上查看接口状态

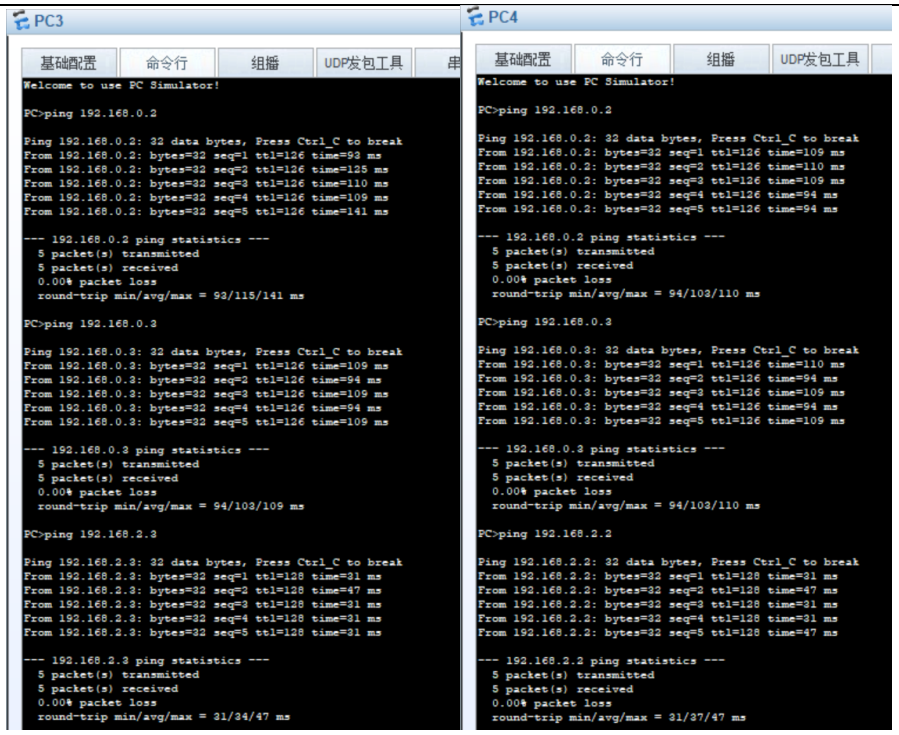
```
[RTA-rip-1]display interface Serial0/0/0
Serial0/0/0 current state : UP
Line protocol current state : UP
Last line protocol up time : 2026-06-19 00:56:01 UTC-08:00
Description:
Route Port,The Maximum Transmit Unit is 1500, Hold timer is 10(sec)
Internet Address is 192.168.1.1/24
Link layer protocol is FR IETF
  LMI DLCI is 0, LMI type is Q.933a, frame relay DTE
  LMI status enquiry sent 101, LMI status received 45
  LMI status timeout 18, LMI message discarded 6
Last physical up time   : 2026-06-19 00:53:01 UTC-08:00
Last physical down time : 2026-06-19 00:53:00 UTC-08:00
Current system time: 2026-06-19 01:03:21-08:00Interface is V35
    Last 300 seconds input rate 13 bytes/sec, 0 packets/sec
    Last 300 seconds output rate 13 bytes/sec, 0 packets/sec
    Input: 6273 bytes, 207 Packets
    Ouput: 6372 bytes, 222 Packets
    Input bandwidth utilization  : 0.16%
    Output bandwidth utilization : 0.16%
```

2. 在路由器 B 上查看接口状态

```
[RTB-rip-1]display interface Serial 0/0/0
Serial0/0/0 current state : UP
Line protocol current state : UP
Last line protocol up time : 2026-06-19 00:56:01 UTC-08:00
Description:
Route Port,The Maximum Transmit Unit is 1500, Hold timer is 10(sec)
Internet Address is 192.168.1.2/24
Link layer protocol is FR IETF
  LMI DLCI is 0, LMI type is Q.933a, frame relay DCE
  LMI status enquiry received 54, LMI status sent 54
  LMI status enquiry timeout 0, LMI message discarded 5
Last physical up time    : 2026-06-19 00:55:46 UTC-08:00
Last physical down time  : 2026-06-19 00:55:46 UTC-08:00
Current system time: 2026-06-19 01:04:57-08:00Interface is V35
    Last 300 seconds input rate 5 bytes/sec, 0 packets/sec
    Last 300 seconds output rate 5 bytes/sec, 0 packets/sec
    Input: 6819 bytes, 235 Packets
    Ouput: 6743 bytes, 221 Packets
    Input bandwidth utilization  : 0.06%
    Output bandwidth utilization : 0.06%
```

3. 各 PC 间可以 ping 通

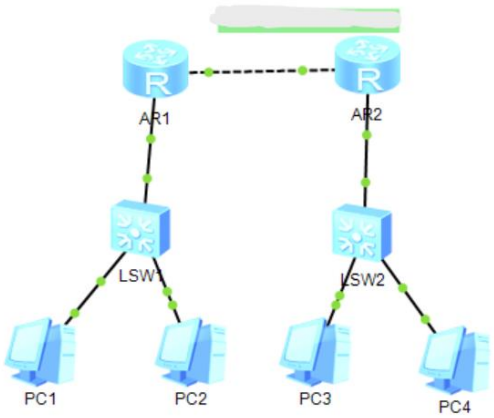
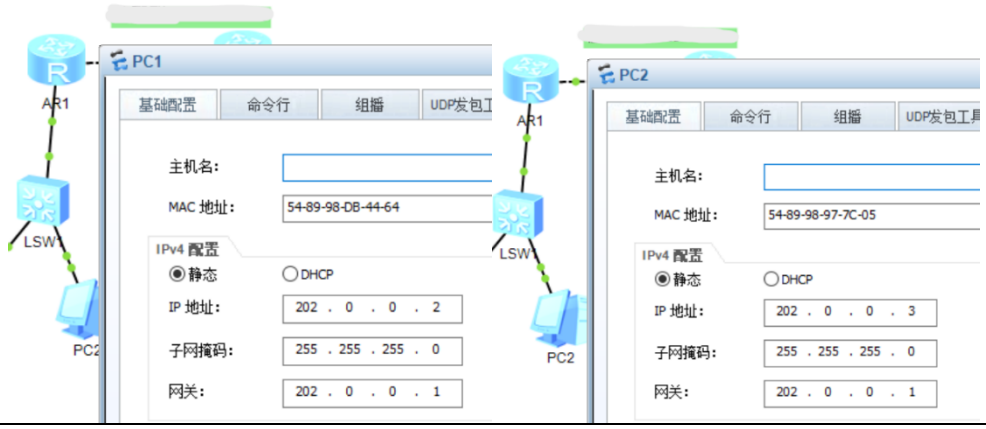




六、 实验总结

本次实验完成了帧中继广域网链路的搭建与配置，分别将两端路由器设置为 DTE 与 DCE 模式并配置对应 DLCI 标识，结合 RIP 路由协议实现了两端内网 PC 的跨网段互通。实验加深了对帧中继虚电路、统计复用特性的理解，掌握了帧中继配置流程与连通性验证方法。

访问控制列表　　实验报告

学院：　　专业：　　班级：
学号：　　姓名：　　实验时间：
一、　实验名称 ACL 实验二（按照自动排序匹配）
二、　实验目的 本实验旨在掌握标准 ACL 与扩展 ACL 的配置方法，理解 ACL 自动排序的“深度优先”匹配规则，对比配置顺序对不同匹配模式的影响。通过在路由器出接口部署 ACL，实现指定内网主机的外网访问权限控制，熟悉包过滤防火墙的工作逻辑，提升网络安全策略配置能力。
三、　实验环境 2 台路由器、2 台交换机、4 台计算机、网线若干
四、　实验内容及步骤 1. 按照网络拓扑图连接设备    2. 设置计算机 ip 地址 

3. 在路由器 A 上进行设置

```
[RTA]interface Serial 4/0/0
[RTA-Serial4/0/0]ip add
[RTA-Serial4/0/0]ip address 192.0.0.1 255.255.255.0
[RTA-Serial4/0/0]rip
[RTA-rip-1]net
[RTA-rip-1]network 202.0.0.0
[RTA-rip-1]network 192.0.0.0
[RTA]acl number 2008 match-order auto
[RTA-acl-basic-2008]rul
[RTA-acl-basic-2008]rule den
[RTA-acl-basic-2008]rule deny sour
[RTA-acl-basic-2008]rule deny source 202.0.0.0 0.0.0.255
[RTA-acl-basic-2008]rule
[RTA-acl-basic-2008]rule per
[RTA-acl-basic-2008]rule permit sou
[RTA-acl-basic-2008]rule permit source 202.0.0.2 0.0.0.0
[RTA-acl-basic-2008]q
[RTA]int
[RTA]interface s
[RTA]interface Serial 4/0/0
[RTA-Serial4/0/0]fire
[RTA-Serial4/0/0]pack
[RTA-Serial4/0/0]packet
[RTA-Serial4/0/0]tra
[RTA-Serial4/0/0]traff
[RTA-Serial4/0/0]traffic-fi
[RTA-Serial4/0/0]traffic-filter out
[RTA-Serial4/0/0]traffic-filter outbound acl 2008
```

```
[RTA]acl number 3008 match-order auto
[RTA-acl-adv-3008]rul
[RTA-acl-adv-3008]rule den
[RTA-acl-adv-3008]rule deny ip aou
[RTA-acl-adv-3008]rule deny ip sou
[RTA-acl-adv-3008]rule deny ip source 202.0.0.0 0.0.0.255 des
[RTA-acl-adv-3008]rule deny ip source 202.0.0.0 0.0.0.255 destination 202.0.1.
0.0.0.255
[RTA-acl-adv-3008]rul
[RTA-acl-adv-3008]rule per
[RTA-acl-adv-3008]rule permit ip sour
[RTA-acl-adv-3008]rule permit ip source 202.0.0.2 0.0.0.0 des
[RTA-acl-adv-3008]rule permit ip source 202.0.0.2 0.0.0.0 destination 202.0.1.
0.0.0.255
[RTA-acl-adv-3008]q
[RTA]int
[RTA]interface se
[RTA]interface Serial 4/0/0
[RTA-Serial4/0/0]traf
[RTA-Serial4/0/0]traffic-filter out
[RTA-Serial4/0/0]traffic-filter outbound acl 3008
```

4. 在路由器 B 上进行设置

```
[RTB]interface GigabitEthernet 0/0/0
[RTB-GigabitEthernet0/0/0]ip add
[RTB-GigabitEthernet0/0/0]ip address 202.0.1.1 24 255.255.255.0
                                                 ^
Error:Too many parameters found at '^' position.
[RTB-GigabitEthernet0/0/0]ip address 202.0.1.1 255.255.255.0
Jun 19 2026 14:18:39-08:00 RTB %%01IFNET/4/LINK_STATE(l)[0]:The line protocol
 on the interface GigabitEthernet0/0/0 has entered the UP state.
[RTB-GigabitEthernet0/0/0]q
[RTB]int
[RTB]interface se
[RTB]interface Serial 4/0/0
[RTB-Serial4/0/0]ip add
[RTB-Serial4/0/0]ip address 192.0.0.2 255.255.255.0
[RTB-Serial4/0/0]
Jun 19 2026 14:19:07-08:00 RTB %%01IFNET/4/LINK_STATE(l)[1]:The line protocol
P IPCP on the interface Serial4/0/0 has entered the UP state.
[RTB-Serial4/0/0]rip
[RTB-rip-1]netw
[RTB-rip-1]network 202.0.1.0
[RTB-rip-1]network 192.0.0.0
```

五、 实验结果及分析

1. 显示配置的访问列表规则

```
[RTA]display acl all
 Total quantity of nonempty ACL number is 2

Basic ACL 2008, 2 rules, match-order is auto
Acl's step is 5
 rule 5 permit source 202.0.0.2 0
 rule 10 deny source 202.0.0.0 0.0.0.255

Advanced ACL 3008, 2 rules, match-order is auto
Acl's step is 5
 rule 5 permit ip source 202.0.0.2 0 destination 202.0.1.0 0.0.0.255
 rule 10 deny ip source 202.0.0.0 0.0.0.255 destination 202.0.1.0 0.0.0.255
```

2. PC1 可以 ping 通 PC3、PC4

```
PC>ping 202.0.1.2

Ping 202.0.1.2: 32 data bytes, Press Ctrl_C to break
From 202.0.1.2: bytes=32 seq=1 ttl=126 time=78 ms
From 202.0.1.2: bytes=32 seq=2 ttl=126 time=63 ms
From 202.0.1.2: bytes=32 seq=3 ttl=126 time=62 ms
From 202.0.1.2: bytes=32 seq=4 ttl=126 time=79 ms
From 202.0.1.2: bytes=32 seq=5 ttl=126 time=62 ms

--- 202.0.1.2 ping statistics ---
  5 packet(s) transmitted
  5 packet(s) received
  0.00% packet loss
  round-trip min/avg/max = 62/68/79 ms

PC>ping 202.0.1.3

Ping 202.0.1.3: 32 data bytes, Press Ctrl_C to break
Request timeout!
From 202.0.1.3: bytes=32 seq=2 ttl=126 time=47 ms
From 202.0.1.3: bytes=32 seq=3 ttl=126 time=78 ms
From 202.0.1.3: bytes=32 seq=4 ttl=126 time=47 ms
From 202.0.1.3: bytes=32 seq=5 ttl=126 time=78 ms

--- 202.0.1.3 ping statistics ---
  5 packet(s) transmitted
  4 packet(s) received
  20.00% packet loss
  round-trip min/avg/max = 0/62/78 ms
```

3. PC2 不可以 ping 通 PC3、PC4

PC2

基础配置 | 命令行 | 组播 | UDP发包工具 | 串口

```
PC>ping 202.0.1.3

Ping 202.0.1.3: 32 data bytes, Press Ctrl_C to break
Request timeout!
Request timeout!
Request timeout!
Request timeout!
Request timeout!

--- 202.0.1.3 ping statistics ---
  5 packet(s) transmitted
  0 packet(s) received
  100.00% packet loss

PC>ping 202.0.1.2

Ping 202.0.1.2: 32 data bytes, Press Ctrl_C to break
Request timeout!
Request timeout!
Request timeout!
Request timeout!
Request timeout!

--- 202.0.1.2 ping statistics ---
  5 packet(s) transmitted
  0 packet(s) received
  100.00% packet loss
```

六、 实验总结

本次实验完成了自动排序模式下标准 ACL 与扩展 ACL 的配置部署，通过在广域网出接口应用访问控制规则，成功实现仅指定主机可访问外部网络、其余内网主机被拦截的控制效果。实验验证了深度优先原则下规则配置顺序不影响最终过滤结果，加深了对 ACL 包过滤机制的理解。