

廈門大學



信息学院软件工程系

《计算机网络》实验报告

题 目 实验4 CISCO IOS 路由器基本配置

班 级 软件工程 2019 级 4 班

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实验时间 2021 年 5 月 1 日

2021 年 6 月 1 日

填写说明

- 1、本文件为 Word 模板文件，建议使用 Microsoft Word 2019 打开，在可填写的区域中如实填写；
- 2、填表时，勿破坏排版，勿修改字体字号，打印成 PDF 文件提交；
- 3、文件总大小尽量控制在 1MB 以下，勿超过 5MB；
- 4、应将材料清单上传在代码托管平台上；
- 5、在学期最后一节课前按要求打包发送至 cni21@qq.com。

1 实验目的

理解网络层和路由的基本原理

掌握路由器配置和组网络的方法

掌握 IP 协议、IP 地址配置和路由的概念

掌握 IP 协议和路由的基本原理

了解在模拟器下根据教程配置网络的方法

2 实验环境

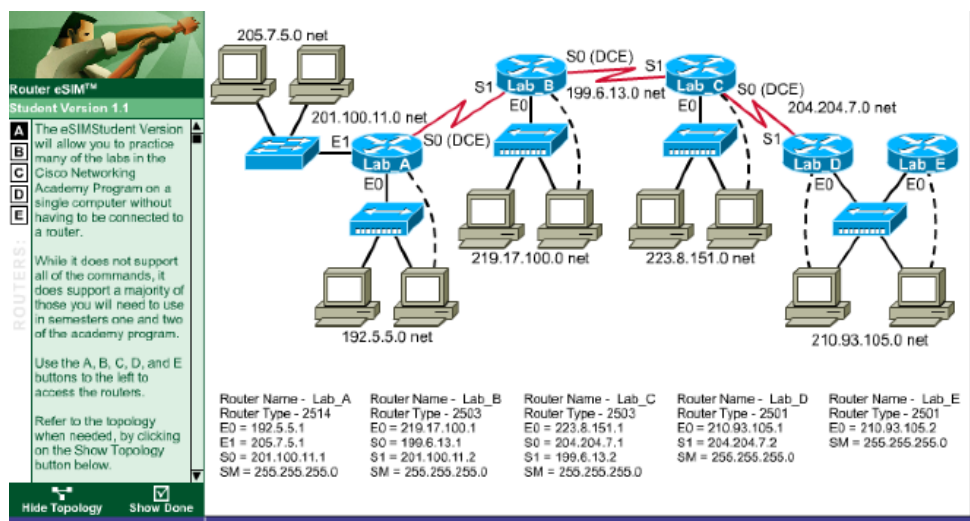
操作系统：Windows 10

操作软件：Router_eSIM v1.1 模拟器、CCNA Network Visualizer 6.0

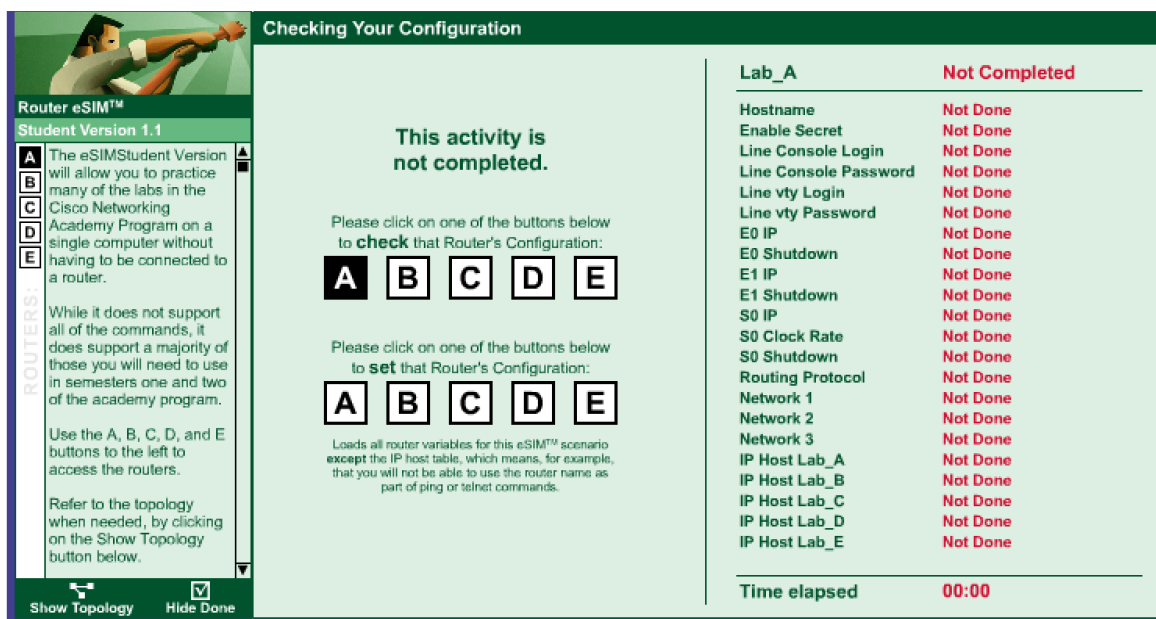
3 实验结果

一、Cisco IOS 的基本操作和路由器的常规配置

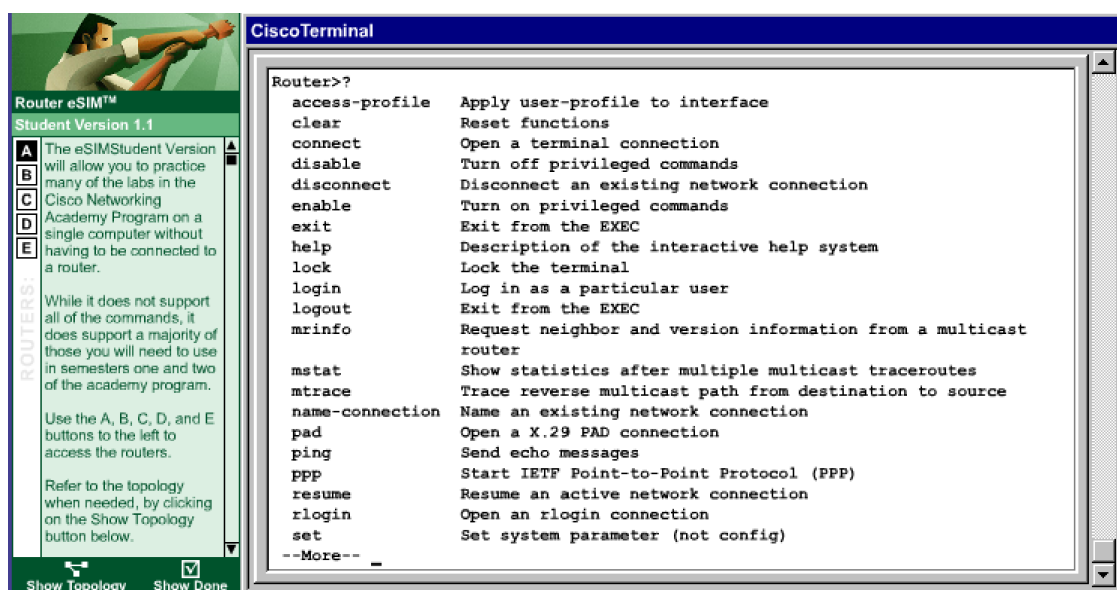
1.1 软件界面：网络拓扑图，通过点击左窗格最左侧的"A""B""C""D""E"分别对应需要配置的 A、B、C、D、E5 台路由器。单击相应的字母可以在这 5 台路由器间进行切换，右窗格就是对路由器的配置界面，在该窗格中输入命令行可以对相应路由器进行配置。单击左下的"ShowTopology"按钮可以显示 RouteresIM 模拟的网络拓扑图，



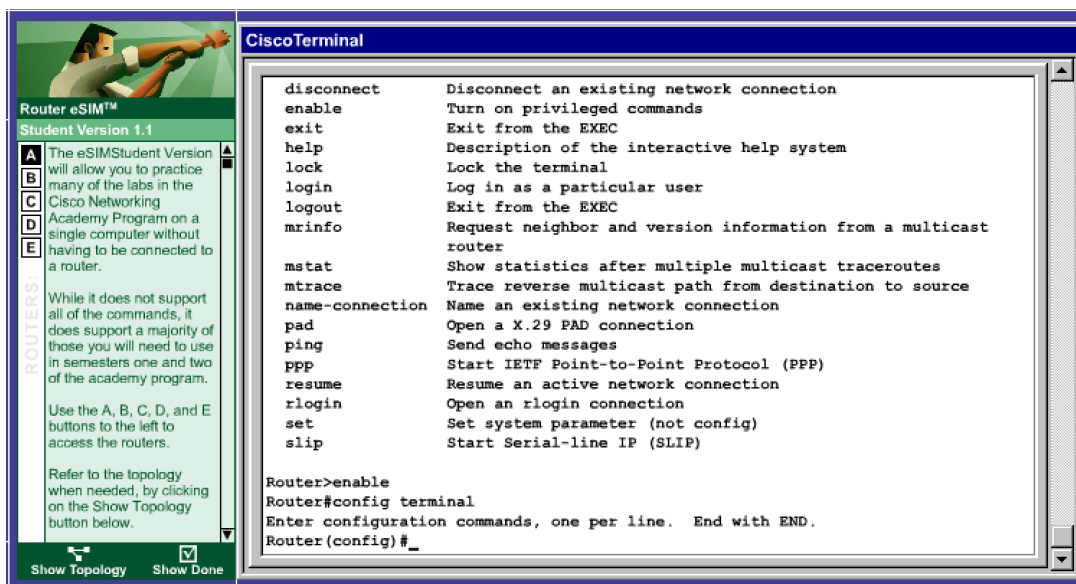
通过单击"ShowDone"可以显示出各个路由器都完成了哪些操作以及哪些操作还没有完成，操作完成会显示"Done"，否则显示"Not Done"



1.2 在普通用户模式下,提示符为">", 不能对路由器的配置做任何改动, 只能对路由器的一些状态做有限的检查。在普通用户模式下可以使用的命令可以输入"??"了解。

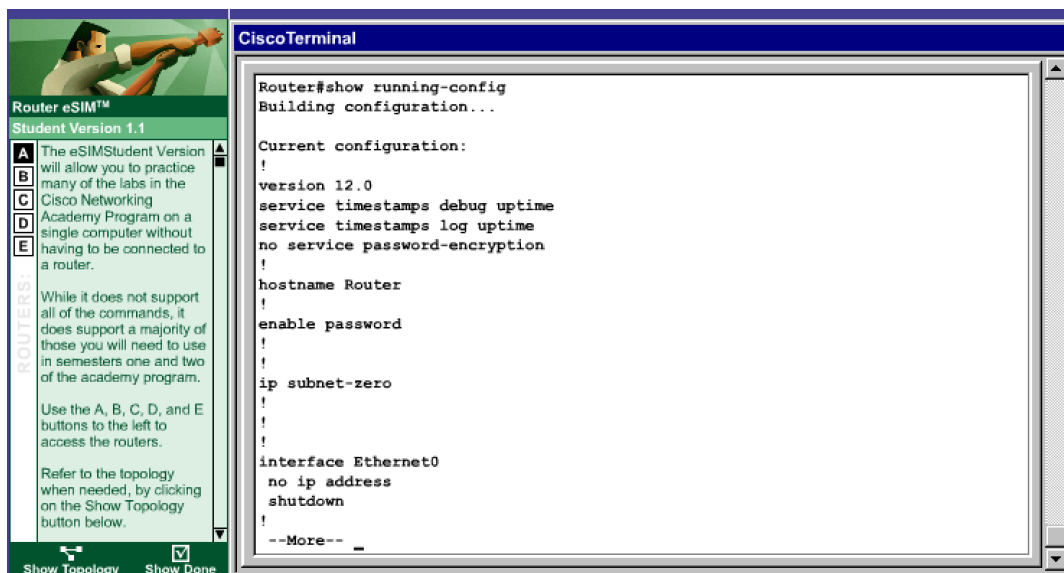


1.3 通过输入“enable”，然后输入级用户口令, 就可以进入超级用户模式, 在超级用户模式 Router# 下, 可以对路由器所有状态进行全面检查。然后在超级用户模式下输入 “config t”，就可以进入全局配置模式 Router (config)#, 对路由器进行事关全局的配置。

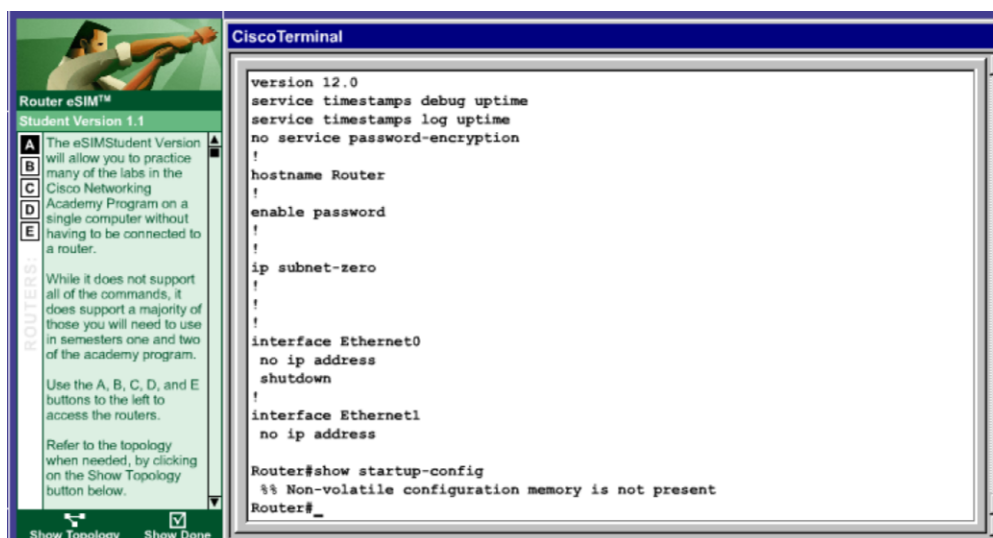


1.4 查看路由器的运行状态

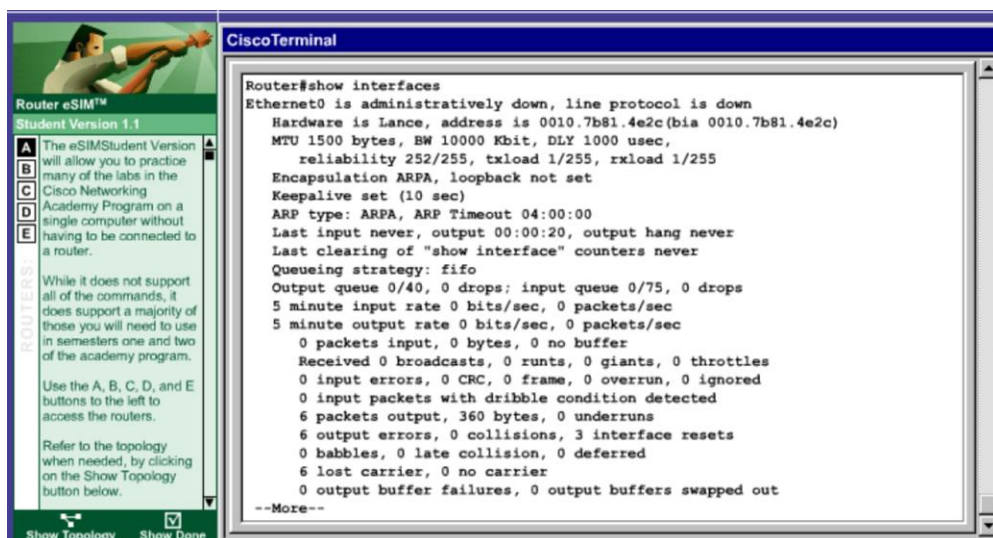
show running-config 显示当前运行状态的配置,



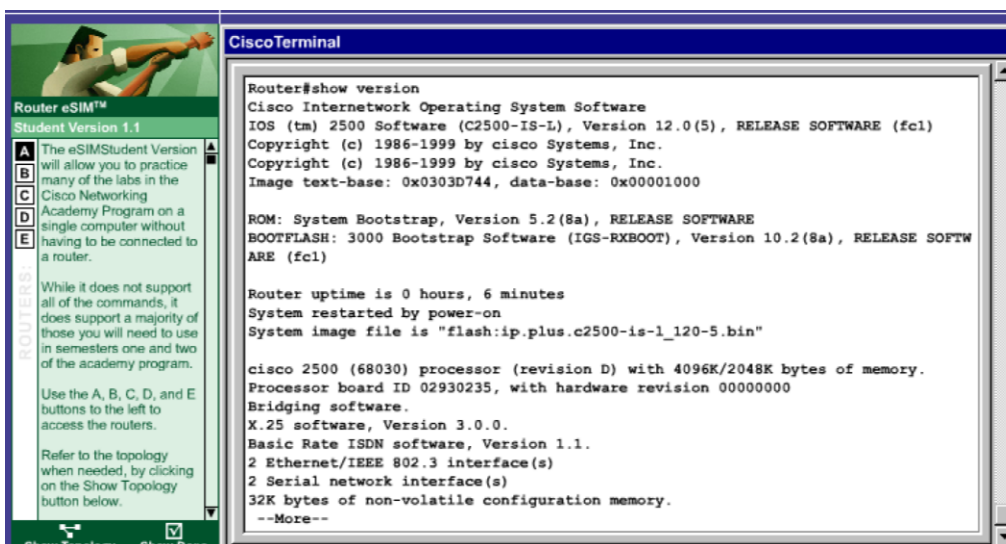
Show startup-config 显示保存在路由器 NVRAM 里的配置，图中表示当前没有进行配置



show interfaces 命令显示了各接口的配置参数和工作数据。该指令对于差错检测和确定故障所在都有很大的帮助

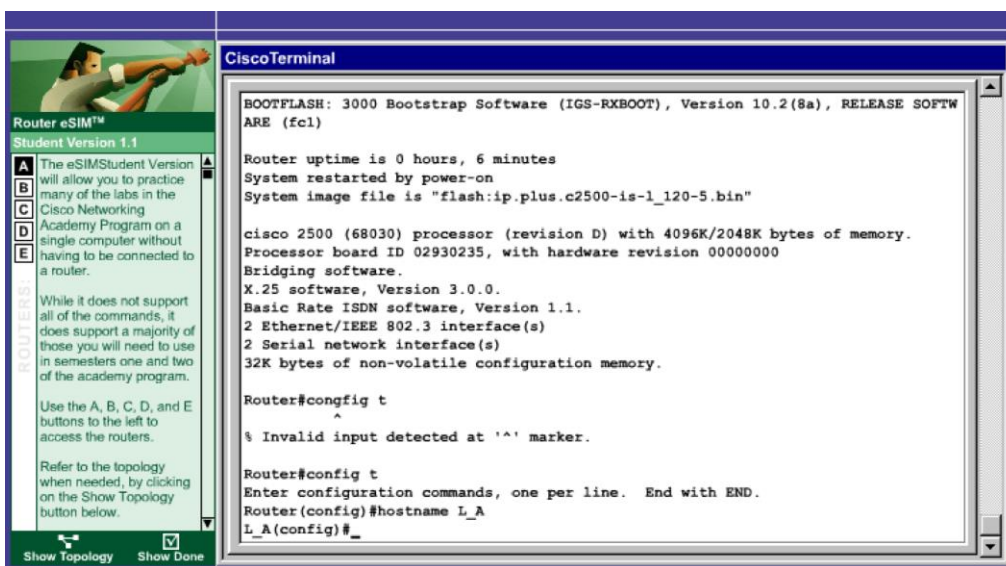


show version 显示当前运行在路由器上的 CiscoIOS 的版本号、路由器的型号。

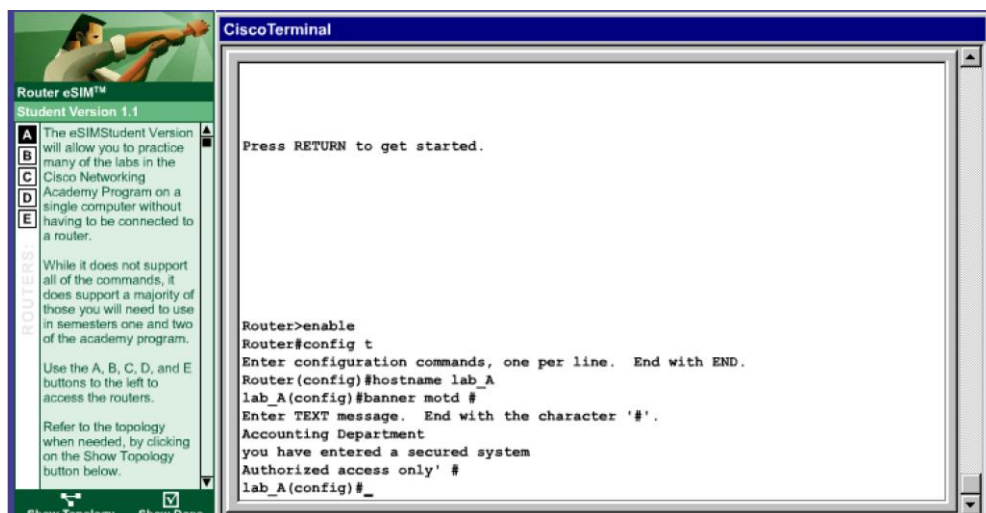


1.5 路由器一些常规的配置

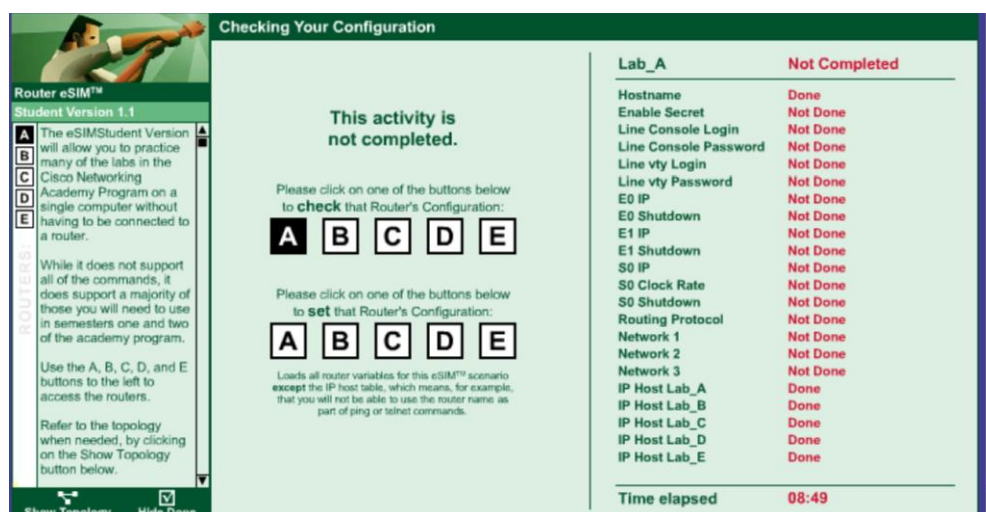
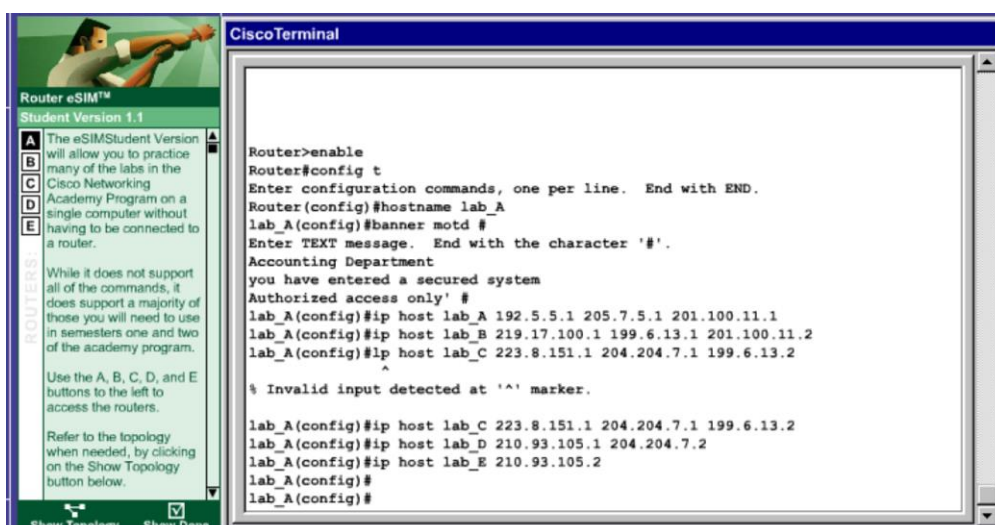
路由器出厂的名字都默认为 Router 为了区分网络中的各个路由器，要给路由器取名字，通常会将路由器的摆放地点表现到名字中。在全局配置模式下用 `hostname` 改变路由器的名字



用于设置当日消息标题的命令 `banner motd`，是将#.....#之间的文本在各终端试图访问路由器时，在登录口令提示之前显示出来。可以用它来通知系统关闭等信息

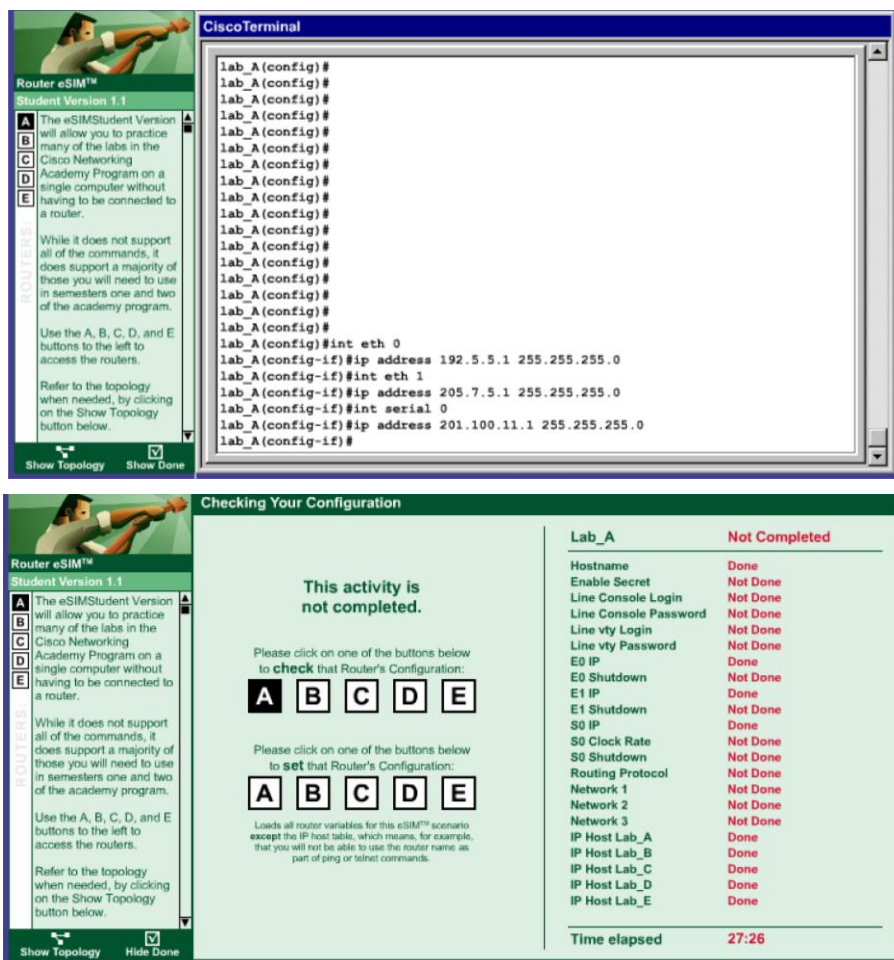


可以在路由器内建立一个 IP 地址的映射表，静态指定机器名与 IP 地址的映射关系,这样可以通过机器名和 IP 地址两种方式指定计算机、交换机和路由器的接口。

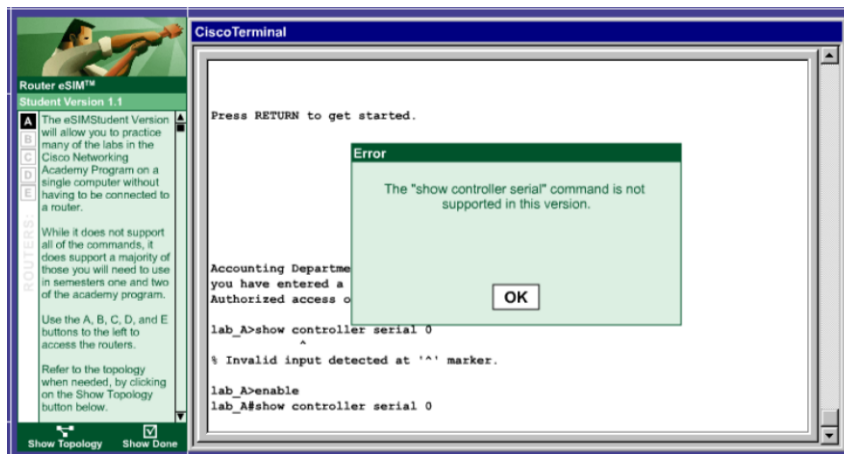


对路由器的各个接口进行配置，必须首先进入路由器的接口配置模式。

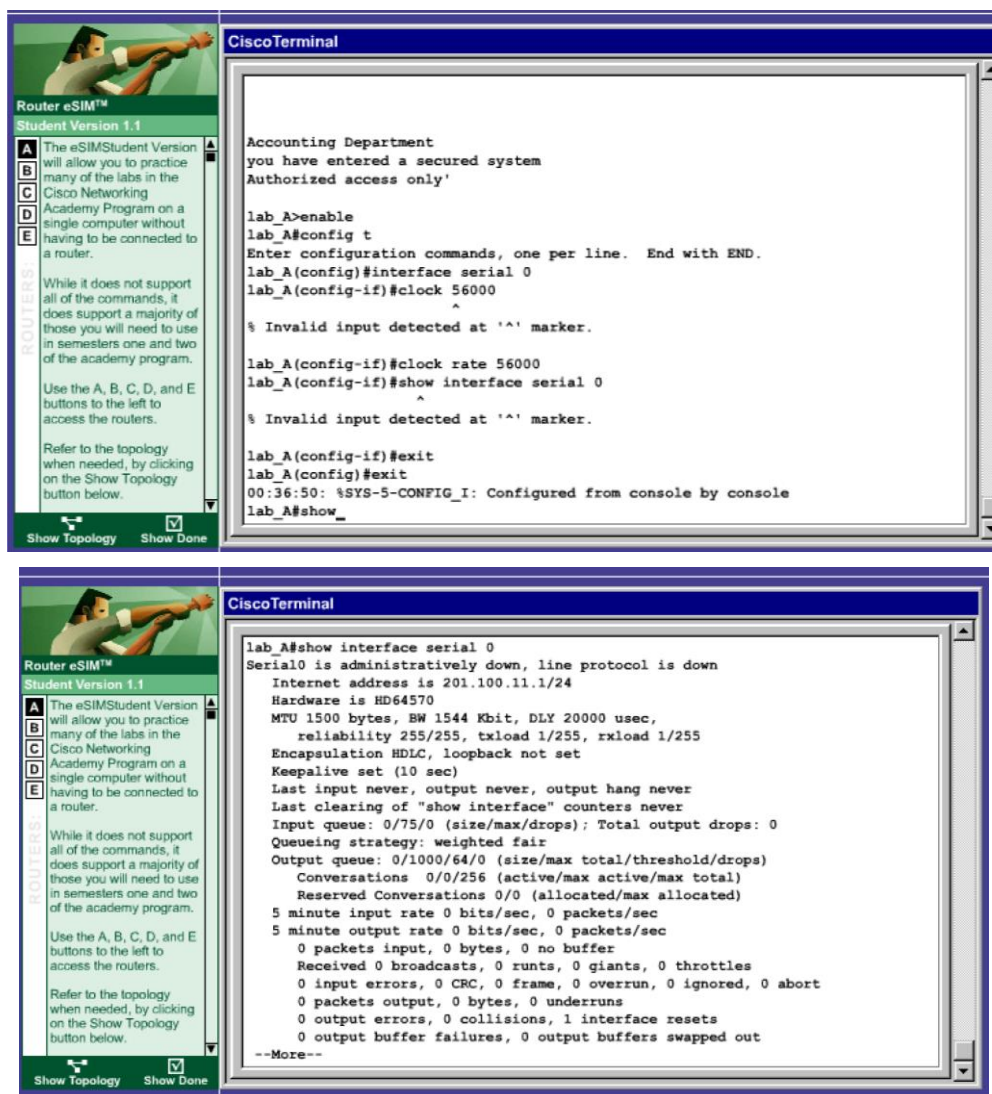
为路由器的一个接口配置 IP 地址，在该接口上启动中进程的方法，这个 ip 地址也是该接口所连接的子网的网关



在串行在串行端口连接中，作为 DCE 的一端必须为连接的另一端 DTE 提供时钟信号。默认情况下，Cisco 的路由器串行端口充当 DTE 设备，如果要配置成 DCE 端，必须用 clock rate 指定时钟频率，也只有 DCE 端口，才需要配置 clock rate



在配置接口前是不支持这条指令，在对接口配置后，可以查看串口配置情况



二、静态路由配置

2.1 使用软件 RouterSim CCNA Network Visualizer 的简介

2.2 静态路由配置之前的工作

在配置静态路由之前，要配置路由器各个端口的 IP 地址，还要使用 `no shutdown` 激活端口。端口如果充当 DCE 端，还需要配置时钟频率，在准备工作做完之后，如果查看路由表(`show ip route`)，会看到路由器直连网络的情况。

```

A Con0 is now available

Press RETURN to get started!

A>enable
A#conf t
Enter configuration commands, one per line. End with CNTL/Z
A(config)#int f0/0
A(config-if)#ip addr 192.5.5.1 255.255.255.0
A(config-if)#no shutdown
08:03:35 %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
08:03:35 %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

A(config-if)#int f0/1
A(config-if)#ip addr 205.7.5.1 255.255.255.0
A(config-if)#no shutdown
08:04:05 %LINK-3-UPDOWN: Interface FastEthernet0/1, changed state to up
08:04:05 %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

A(config-if)#int s0/0
A(config-if)#ip addr 201.100.11.1 255.255.255.0
A(config-if)#clock rate 56000
A(config-if)#clock rate 56000
^
% Invalid input detected at '^' marker.
A(config-if)#clock rate 56000
A(config-if)#no shutdown
08:05:02 %LINK-3-UPDOWN: Interface Serial0/0, changed state to up
08:05:02 %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0, changed state to up

A(config-if)#exit
A(config)#exit
A#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
        i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, * - candidate default
        U - per-user static route, o - ODR, P - periodic downloaded static route
        T - traffic engineered route

Gateway of last resort is not set
C    201.100.11.0/24 is directly connected, Serial0/0
C    205.7.5.0/24 is directly connected, FastEthernet0/1
C    192.5.5.0/24 is directly connected, FastEthernet0/0
A#

```

对路由器 A 进行配置，并且查看 A 路由器的直连网络情况

Console for B

File Edit View Tools Help



B Con0 is now available

Press RETURN to get started!

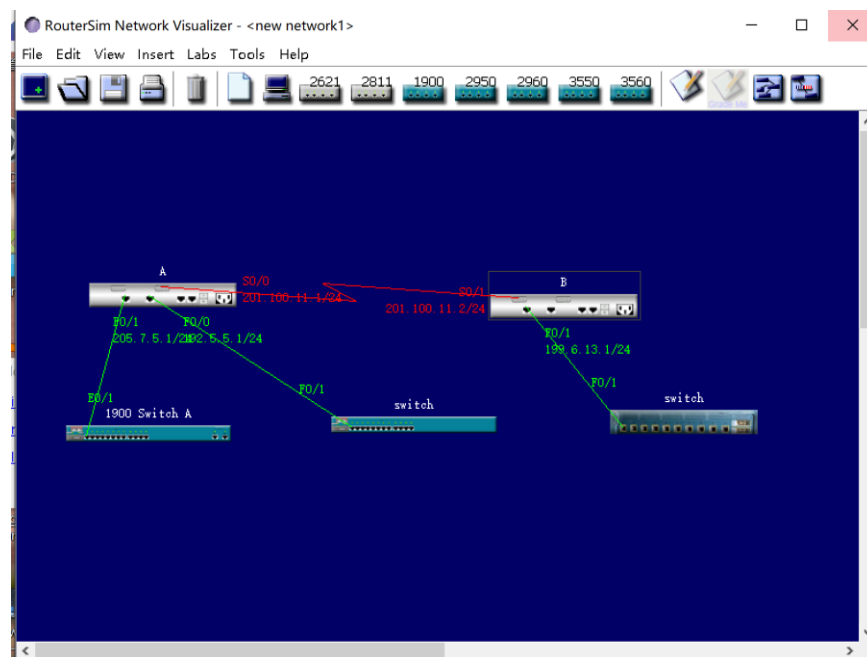
```
B>enable
B#conf t
Enter configuration commands, one per line. End with CNTL/Z
B(config)#int s0/1
B(config-if)#ip addr 201.100.11.1 255.255.255.0
B(config-if)#clock rate 56000
%Error: This command applies only to DCE interfaces
B(config-if)#no shut down
      ^
% Invalid input detected at '^' marker.
B(config-if)#no shutdown
08:08:32 %LINK-3-UPDOWN: Interface Serial0/1, changed state to up
08:08:32 %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1, changed state to up

B(config-if)#int f0/1
B(config-if)#ip addr 199.6.13.1 255.255.255.0
B(config-if)#no shutdown
08:09:20 %LINK-3-UPDOWN: Interface FastEthernet0/1, changed state to up
08:09:20 %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

B(config-if)#exit
B(config)#exit
B#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, * - candidate default
       U - per-user static route, o - ODR, P - periodic downloaded static route
       T - traffic engineered route

Gateway of last resort is not set
C    201.100.11.0/24 is directly connected, Serial0/1
C    199.6.13.0/24 is directly connected, FastEthernet0/1
B#_
```

对路由器 B 进行配置，并查看 B 的网络直连情况



端口配置情况

在 RouterA 上,通过 ping 命令测试到路由器 RouterB 的直连网络地址 199.6.13.1 是否连通。

```

RouterSim Network Visualizer - <new network1>
File Edit View Insert Labs Tools Help

Router A Console for 2621 Router A
File Edit View Tools Help

Router Con0 is now available

Press RETURN to get started!

Router>enable
Router#ping 199.6.13.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 199.6.13.1, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5), round-trip min/avg/max = 0/0/0 ms
Router#
  
```

Success rate id 0 percent 表示 ping 不通，需要配置静态路由或动态路由协议

2.3 配置静态路由

```

Console for A
File Edit View Tools Help

A Con0 is now available

Press RETURN to get started!

A>enable
A#conf t
Enter configuration commands, one per line. End with CNTL/Z
A(config)#ip route 199.6.13.0 255.255.255.0 201.100.11.2
A(config)#exit
A#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
        i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, * - candidate default
        U - per-user static route, o - ODR, P - periodic downloaded static route
        T - traffic engineered route

Gateway of last resort is not set
S    199.6.13.0 [1/0] via 201.100.11.2
C    201.100.11.0/24 is directly connected, Serial0/0
C    205.7.5.0/24 is directly connected, FastEthernet0/1
C    192.5.5.0/24 is directly connected, FastEthernet0/0
A#

```

2.4 配置默认路由，并且查看路由表

```

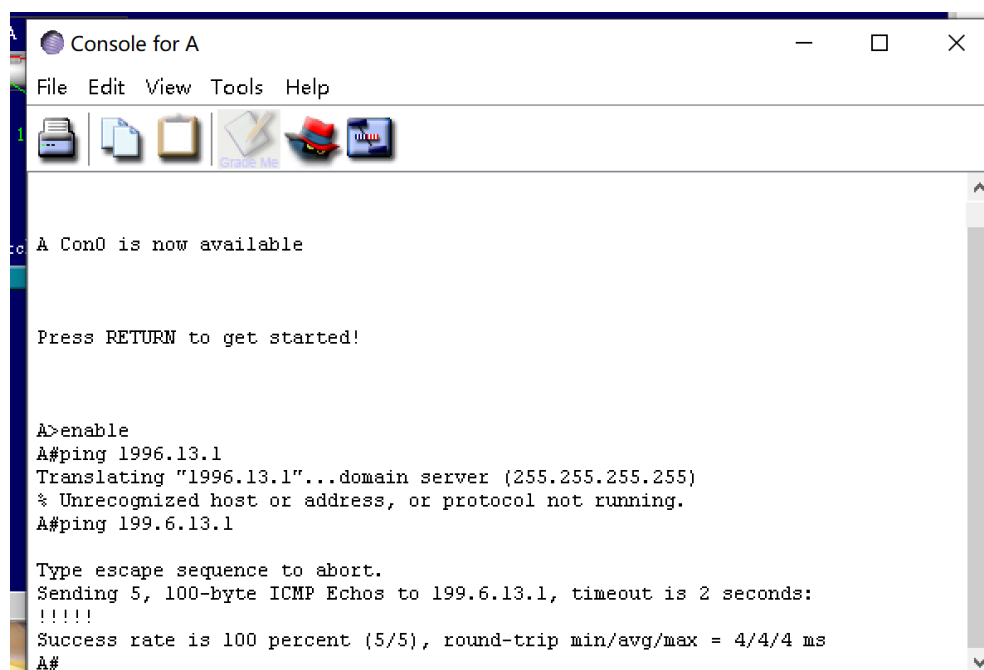
Console for A
File Edit View Tools Help

A(config)#
A(config)#ip route 0.0.0.0 0.0.0.0 201.100.11.2
A(config)#enxit
A
% Invalid input detected at '^' marker.
A(config)#exit
A#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
        i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, * - candidate default
        U - per-user static route, o - ODR, P - periodic downloaded static route
        T - traffic engineered route

Gateway of last resort is 201.100.11.2 to network 0.0.0.0
S    199.6.13.0 [1/0] via 201.100.11.2
C    201.100.11.0/24 is directly connected, Serial0/0
S*   0.0.0.0 [1/0] via 201.100.11.2
C    205.7.5.0/24 is directly connected, FastEthernet0/1
C    192.5.5.0/24 is directly connected, FastEthernet0/0
A#

```

2.5 检测连通性



```
Console for A
File Edit View Tools Help

A Con0 is now available

Press RETURN to get started!

A>enable
A#ping 1996.13.1
Translating "1996.13.1"...domain server (255.255.255.255)
% Unrecognized host or address, or protocol not running.
A#ping 199.6.13.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 199.6.13.1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 4/4/4 ms
A#
```

三、动态路由协议 RIP 的配置

3.1 RIP 配置

配置 Rip 的两条命令是：

Router(config)#router rip: 用于启动 Rip 协议

Router(config-router)#network network-number: 选择 Rip 协议起作用的网络，必须是路由器直连的可分类网络。

File Edit View Tools Help



A Con0 is now available

Press RETURN to get started!

```
A>enable
A#conf t
Enter configuration commands, one per line. End with CNTL/Z
A(config)#router rip
A(config-router)#network 172.16.0.0
      ^
% Invalid input detected at '^' marker.
A(config-router)#network 172.16.0.0
      ^
% Invalid input detected at '^' marker.
A(config-router)#network 172.16.0.0
A(config-router)#network 10.0.0.0
A(config-router)#exit
A(config)#exit
A#sh ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 4 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Redistributing: rip
  Default version control: send version 1, receive any version
    Interface          Send Recv Triggered RIP Key-chain
  Automatic network summarization is in effect
  Maximum path: 4
  Routing for networks:
    10.0.0.0
    172.16.0.0
  Routing information sources:
    Gateway      Distance      Last Update
  Distance: <default is 120>

A#
```

配置路由器 A 并且查看 A 的路由协议 RIP 的工作状态

```
File Edit View Tools Help


Router Con0 is now available

Press RETURN to get started!

Router>enable
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z
Router(config)#hostname b
b(config)#hostname B
B(config)#
B(config)#router rip
B(config-router)#network 10.0.0.0
B(config-router)#exit
B(config)#exit
B#sh ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 30 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Redistributing: rip
  Default version control: send version 1, receive any version
    Interface          Send Recv Triggered RIP Key-chain
  Automatic network summarization is in effect
  Maximum path: 4
  Routing for networks:
    10.0.0.0
  Routing information sources:
    Gateway            Distance      Last Update
  Distance: <default is 120>

B#
```

配置路由器 B 并且查看其的路由协议 RIP 的工作状态

Console for Router

File Edit View Tools Help



Router Con0 is now available

Press RETURN to get started!

```
Router>enable
Translating "enable"...domain server (255.255.255.255)
% Unknown command or computer name, or unable to find computer address
Router>enable
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z
Router(config)#router rip
      ^
% Invalid input detected at '^' marker.
Router(config)#router rip
Router(config-router)#network 192.168.1.0
Router(config-router)#net work 10.0.0.0
      ^
% Invalid input detected at '^' marker.
Router(config-router)#network 10.0.0.0
Router(config-router)#exit
Router(config)#exit
Router#sh ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 7 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Redistributing: rip
  Default version control: send version 1, receive any version
    Interface          Send Recv Triggered RIP  Key-chain
  Automatic network summarization is in effect
  Maximum path: 4
  Routing for networks:
    10.0.0.0
    192.168.1.0
  Routing information sources:
    Gateway      Distance      Last Update
  Distance: <default is 120>

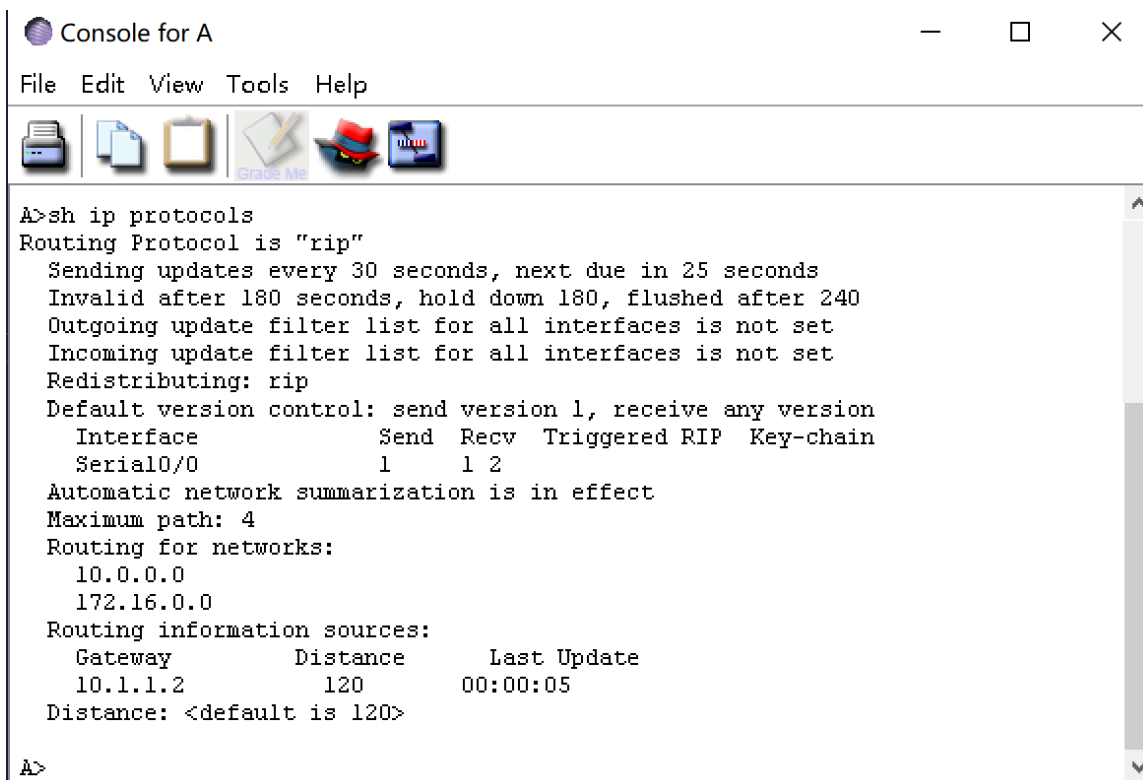
Router#
```

配置路由器 C 并且查看其的路由协议 RIP 的工作状态

```
B>enable
B#conf t
Enter configuration commands, one per line. End with CNTL/Z
B(config)#int s0/1
B(config-if)#ip addr 10.1.1.2 255.255.255.0
B(config-if)#no shutdown
08:50:56 %LINK-3-UPDOWN: Interface Serial0/1, changed state to up
08:50:56 %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1, changed state to up

B(config-if)#int s0/0
B(config-if)#ip addr 10.2.2.2 255.255.255.0
B(config-if)#clock rate 56000
B(config-if)#no shutdown
08:51:39 %LINK-3-UPDOWN: Interface Serial0/0, changed state to up
08:51:39 %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0, changed state to up
```

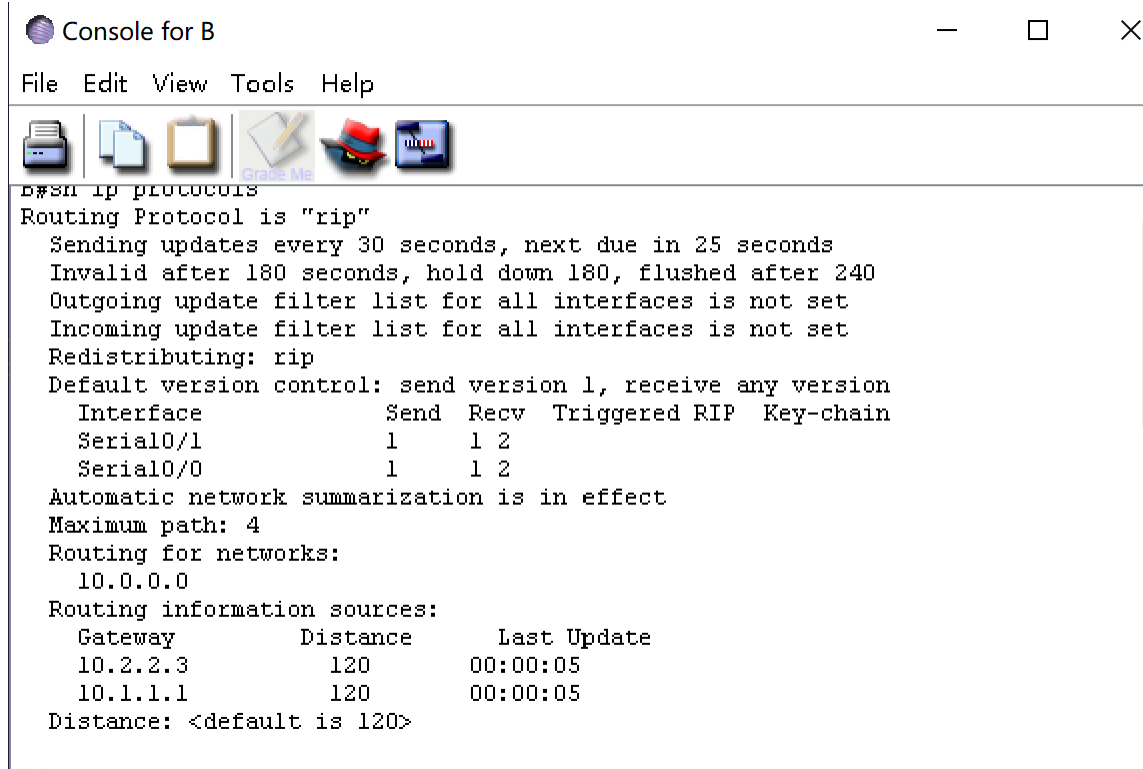
对 A、B、C 路由器进行端口设置（只截取了 B 路由器的配置过程）



```

A>sh ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 25 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Redistributing: rip
  Default version control: send version 1, receive any version
    Interface          Send  Recv  Triggered RIP  Key-chain
  Serial0/0            1     1 2
  Automatic network summarization is in effect
  Maximum path: 4
  Routing for networks:
    10.0.0.0
    172.16.0.0
  Routing information sources:
    Gateway      Distance    Last Update
    10.1.1.2      120        00:00:05
  Distance: <default is 120>

A>
  
```



```

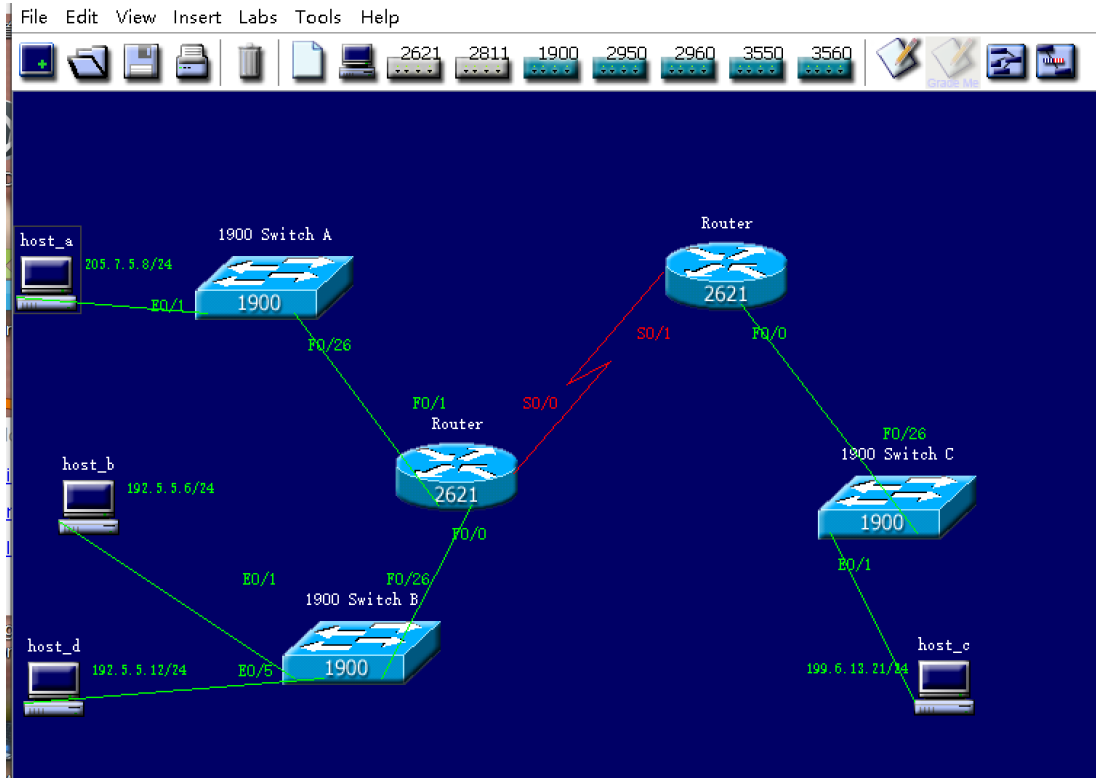
B#sh ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 25 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Redistributing: rip
  Default version control: send version 1, receive any version
    Interface          Send  Recv  Triggered RIP  Key-chain
  Serial0/1            1     1 2
  Serial0/0            1     1 2
  Automatic network summarization is in effect
  Maximum path: 4
  Routing for networks:
    10.0.0.0
  Routing information sources:
    Gateway      Distance    Last Update
    10.2.2.3      120        00:00:05
    10.1.1.1      120        00:00:05
  Distance: <default is 120>

B#
  
```

查看路由器 ABC 配置状态

四、Cisco 路由器访问列表配置

4.1 配置访问列表之前对实验环境的配置



实验拓扑图

Configure Host B

Host Name:

☐ Obtain an IP address automatically

☒ Use the following IP address:

IP Address

Subnet

Default Gateway

模拟器上计算机 IP 地址的配置


```
Console for routerB
File Edit View Tools Help

Router Con0 is now available

Press RETURN to get started!

Router>en
Router#conf t
Enter configuration commands, one per line. End with CMTL/Z
Router(config)#hostname routerB
routerB(config)#line console
% Incomplete command.
routerB(config)#line console0
^
% Invalid input detected at '^' marker.
routerB(config)#line console 0
routerB(config-line)#password kb
routerB(config-line)#login
routerB(config-line)#exit
routerB(config)#line vty 0 4
routerB(config-line)#password tb
routerB(config-line)#exit
routerB(config)#enable secret cb
routerB(config)#int f0/0
routerB(config-if)#ip addr 192.5.5.1 255.255.255.0
routerB(config-if)#no shutdown
09:31:07 %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
09:31:07 %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

routerB(config-if)#int f0/1
routerB(config-if)#ip addr 205.7.5.1
% Incomplete command.
routerB(config-if)#ip addr 205.7.5.1 255.255.255.0
routerB(config-if)#no shutdown
09:31:34 %LINK-3-UPDOWN: Interface FastEthernet0/1, changed state to up
09:31:34 %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

routerB(config-if)#int s0/0
routerB(config-if)#ip addr 201.100.11.1 255.255.255.0
routerB(config-if)#clock rate 56000
routerB(config-if)#no shutdown
09:32:10 %LINK-3-UPDOWN: Interface Serial0/0, changed state to up
09:32:10 %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0, changed state to up

routerB(config-if)#router rip
routerB(config-router)#network 192.5.5.0
routerB(config-router)#network 205.7.5.0
routerB(config-router)#network 201.100.11.0
routerB(config-router)#exit
routerB(config)#_
```

对路由器 B 的基本配置和路由协议 RIP 的配置

Console for routerA

File Edit View Tools Help



Router Con0 is now available

Press RETURN to get started!

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z
Router(config)#hostname routerA
routerA(config)#line console 0
routerA(config-line)#password ka
routerA(config-line)#login
routerA(config-line)#exit
routerA(config)#line vty 0 4
routerA(config-line)#password ta
routerA(config-line)#exit
routerA(config)#enable secret ca
^
% Invalid input detected at '^' marker.
routerA(config)#enable secret ca
routerA(config)#int f0/0
routerA(config-if)#ip addr 199.6.13.1 255.255.255.0
routerA(config-if)#no shutdown
09:35:38 %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
09:35:38 %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

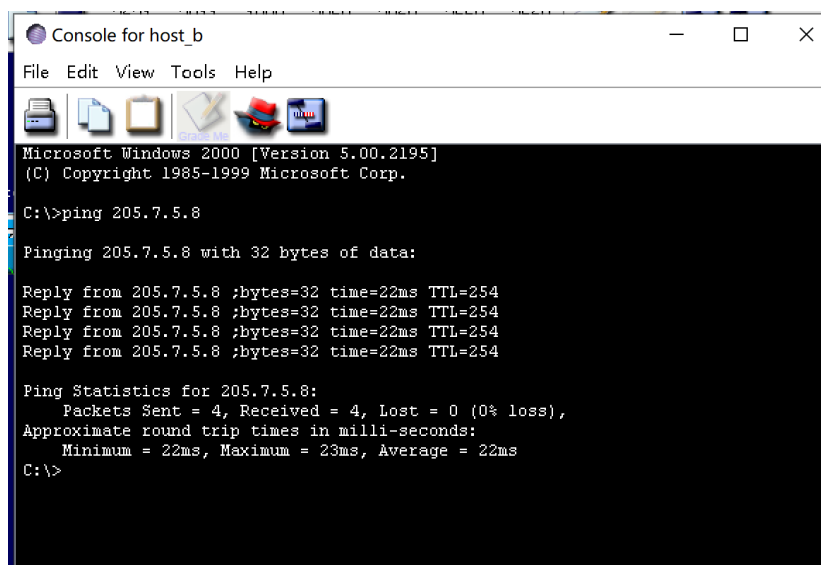
routerA(config-if)#int s0/1
routerA(config-if)#ip addr 201.100.11.2 255.255.255.0
routerA(config-if)#no shutdown
09:36:26 %LINK-3-UPDOWN: Interface Serial0/1, changed state to up
09:36:26 %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1, changed state to up

routerA(config-if)#router rip
routerA(config-router)#network 201.100.11.0
routerA(config-router)#network 199.6.13.0
routerA(config-router)#exit
routerA(config)#
```

对路由器 A 的基本配置和路由协议 RIP 的配置

4.2 配置标准访问列表

利用标准访问列表限制主机 host_B 对 205.7.5.0 网络的访问



```

Microsoft Windows 2000 [Version 5.00.2195]
(C) Copyright 1985-1999 Microsoft Corp.

C:\>ping 205.7.5.8

Pinging 205.7.5.8 with 32 bytes of data:

Reply from 205.7.5.8 :bytes=32 time=22ms TTL=254
Reply from 205.7.5.8 :bytes=32 time=22ms TTL=254
Reply from 205.7.5.8 :bytes=32 time=22ms TTL=254
Reply from 205.7.5.8 :bytes=32 time=22ms TTL=254

Ping Statistics for 205.7.5.8:
    Packets Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 22ms, Maximum = 23ms, Average = 22ms
C:\>

```

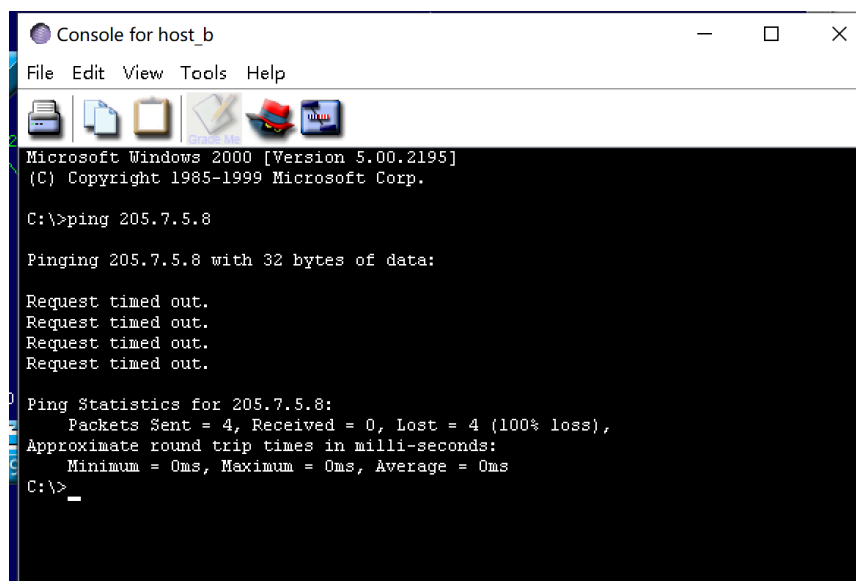
限制前主机 B 可以访问子网 205.7.5.0

```

routerB(config)#
routerB(config)#
routerB(config)#
routerB(config)#exit
routerB#conf t
Enter configuration commands, one per line. End with CNTL/Z
routerB(config)#access-list 50 deny host 192.5.5.6
routerB(config)#access-list 50 deny permit any
^
% Invalid input detected at '^' marker.
routerB(config)#access-list 50 permit any
routerB(config)#int f0/1
routerB(config-if)#ip access-group 50 out
routerB(config-if)#exit
routerB(config)#

```

对主机的访问列表控制



```

Microsoft Windows 2000 [Version 5.00.2195]
(C) Copyright 1985-1999 Microsoft Corp.

C:\>ping 205.7.5.8

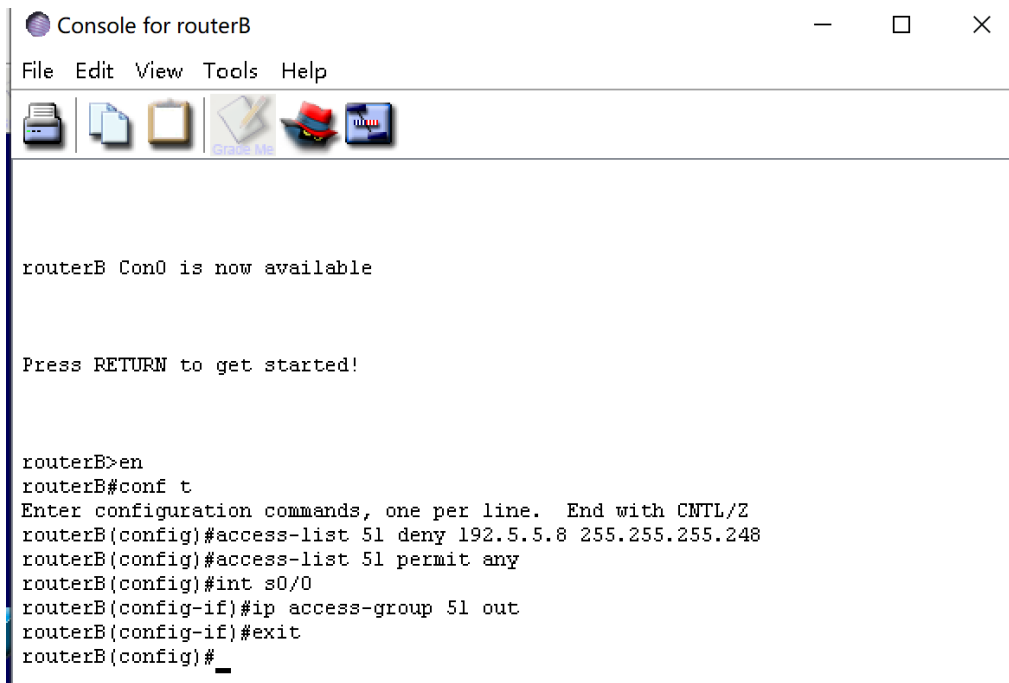
Pinging 205.7.5.8 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping Statistics for 205.7.5.8:
    Packets Sent = 4, Received = 0, Lost = 4 (100% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\>

```

限制后主机已不能访问子网 205.7.5.0



```
routerB Con0 is now available

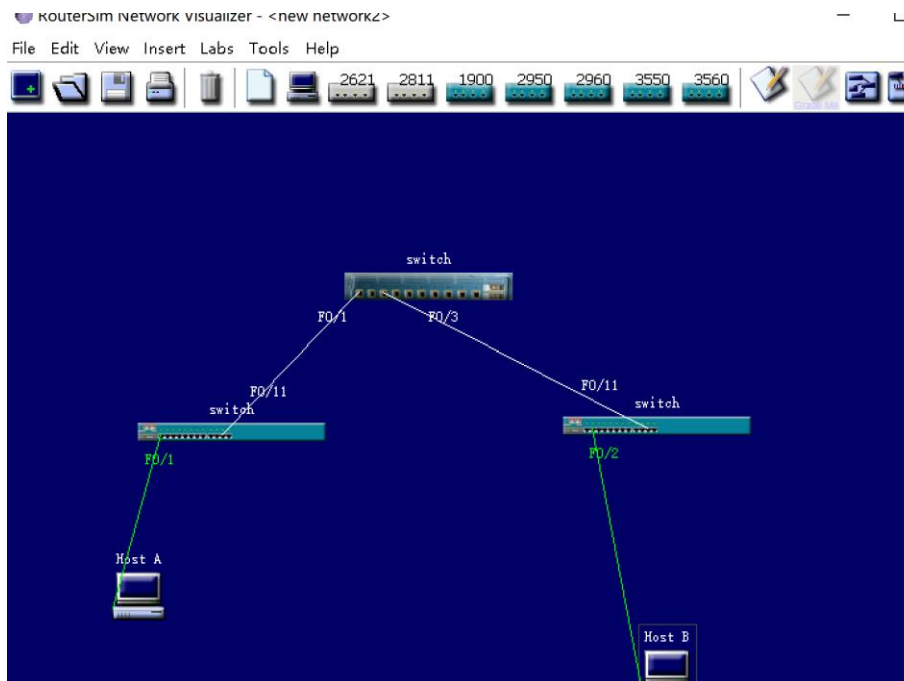
Press RETURN to get started!

routerB>en
routerB#conf t
Enter configuration commands, one per line.  End with CNTL/Z
routerB(config)#access-list 51 deny 192.5.5.8 255.255.255.248
routerB(config)#access-list 51 permit any
routerB(config)#int s0/0
routerB(config-if)#ip access-group 51 out
routerB(config-if)#exit
routerB(config)#
```

配置 RouterA 使 HostA 不能 telnet 到 routerA 上

五、基于交换机端口的 VLAN 配置

VLAN 配置



典型的快速以太网局域网

5.1 设置 VTP 域

在 Cisco3550 交换机上将 VTP 管理域名称设置为 “Cisco”，并使用 “show vtp status” 检查 VTP 配置

Console for switch

File Edit View Tools Help



switch Con0 is now available

Press RETURN to get started!

```
switch>en
switch#conf t
Enter configuration commands, one per line. End with CNTL/Z
switch(config)#host 3550A
3550A(config)#vtp domain Cisco
Changing VTP domain name from NULL to Cisco
3550A(config)#exit
3550A#sh vtp status
VTP Version                : 2
Configuration Revision      : 1
Maximum VLANs supported locally : 64
Number of existing VLANs    : 5
VTP Operating Mode          : Server
VTP Domain Name             : Cisco
VTP Pruning Mode            : Disabled
VTP V2 Mode                 : Disabled
VTP Traps Generation        : Disabled
MD5 digest                  : 0x70 0x01 0xF2 0x72 0x97 0xA1 0x35 0xEB
Configuration last modified by: 0.0.0.0 at 11-29-93 20:39:24
Local updater ID is 0.0.0.0 on interface V11 (lowest numbered VLAN interface found)
3550A#
```

配置的 3550A 的 VTP

在交换机 Cisco 2950 将 VTO 管理域设置为 “Cisco” 并设置为客户模式。

Console for switch

File Edit View Tools Help



switch Con0 is now available

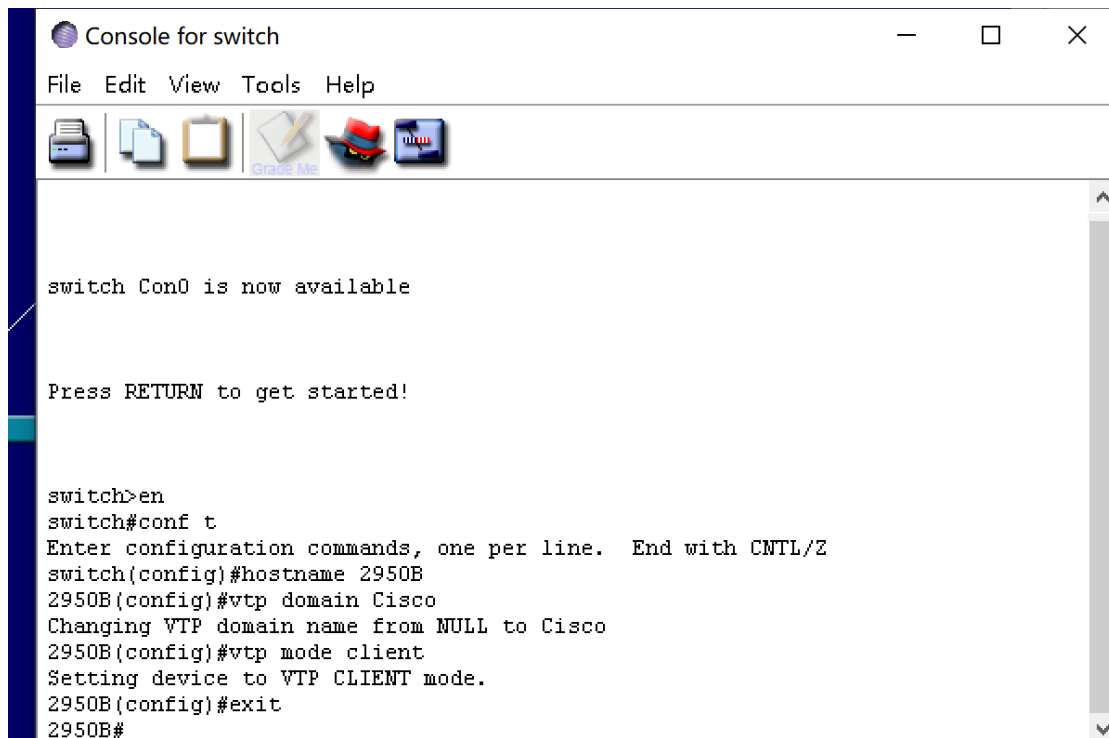
Press RETURN to get started!

```
switch>ne
Translating "ne"...domain server (255.255.255.255)
% Unknown command or computer name, or unable to find computer address
switch>en
switch#conf t
Enter configuration commands, one per line. End with CNTL/Z
switch(config)#hostname 2950A
2950A(config)#vtp domain Cisco
Changing VTP domain name from NULL to Cisco
2950A(config)#vtp mode ?
    client      Set the device to client mode.
    server      Set the device to server mode.
    transparent Set the device to transparent mode.

2950A(config)#vtp mode
% Incomplete command.
2950A(config)#vtp mode ?
    client      Set the device to client mode.
    server      Set the device to server mode.
    transparent Set the device to transparent mode.

2950A(config)#vtp mode client
Setting device to VTP CLIENT mode.
2950A(config)#exit
2950A#sh vtp status
VTP Version                : 2
Configuration Revision      : 1
Maximum VLANs supported locally : 64
Number of existing VLANs    : 5
VTP Operating Mode          : Client
VTP Domain Name             : Cisco
VTP Pruning Mode            : Disabled
VTP V2 Mode                 : Disabled
VTP Traps Generation        : Disabled
MD5 digest                  : 0x70 0x01 0xF2 0x72 0x97 0xA1 0x35 0xEB
Configuration last modified by: 2950 SwitchA at 11-29-93 20:39:24
Local updater ID is 2950 SwitchA on interface V11 (lowest numbered VLAN interface found)
2950A#
```

配置 2950A 的 VTP



```
switch Con0 is now available

Press RETURN to get started!

switch>en
switch#conf t
Enter configuration commands, one per line. End with CNTL/Z
switch(config)#hostname 2950B
2950B(config)#vtp domain Cisco
Changing VTP domain name from NULL to Cisco
2950B(config)#vtp mode client
Setting device to VTP CLIENT mode.
2950B(config)#exit
2950B#
```

配置 2950B 的 VTP

5.2 配置 trunk

将交换机 3550A 的端口 fa0/1 和端口 fa0/3 配置为 Trunk 端口并用 802.1q 封装

Console for 3550A

File Edit View Tools Help



3550A Con0 is now available

Press RETURN to get started!

```

3550A>en
3550A#conf t
Enter configuration commands, one per line. End with CNTL/Z
3550A(config)#interface fa0/1
3550A(config-if)#switchport trunk encapsulation ?
    dot1q      Interface uses only 802.1q trunking encapsulation when trunk
    isl        Interface uses only ISL trunking encapsulation when trunking
    negotiate   Device will negotiate trunking encapsulation with peer on
                interface
3550A(config-if)#switchport trunk encapsulation dot1q
                                     ^
% Invalid input detected at '^' marker.
3550A(config-if)#switchport trunk encapsulation dot1q
3550A(config-if)#switchport mode trunk
3550A(config-if)#interface fa0/3
3550A(config-if)#switchport trunk encapsulation dot1q
3550A(config-if)#switchport mode trunk

```

设置 3550A 的 trunk 端口

Console for 2950A

File Edit View Tools Help



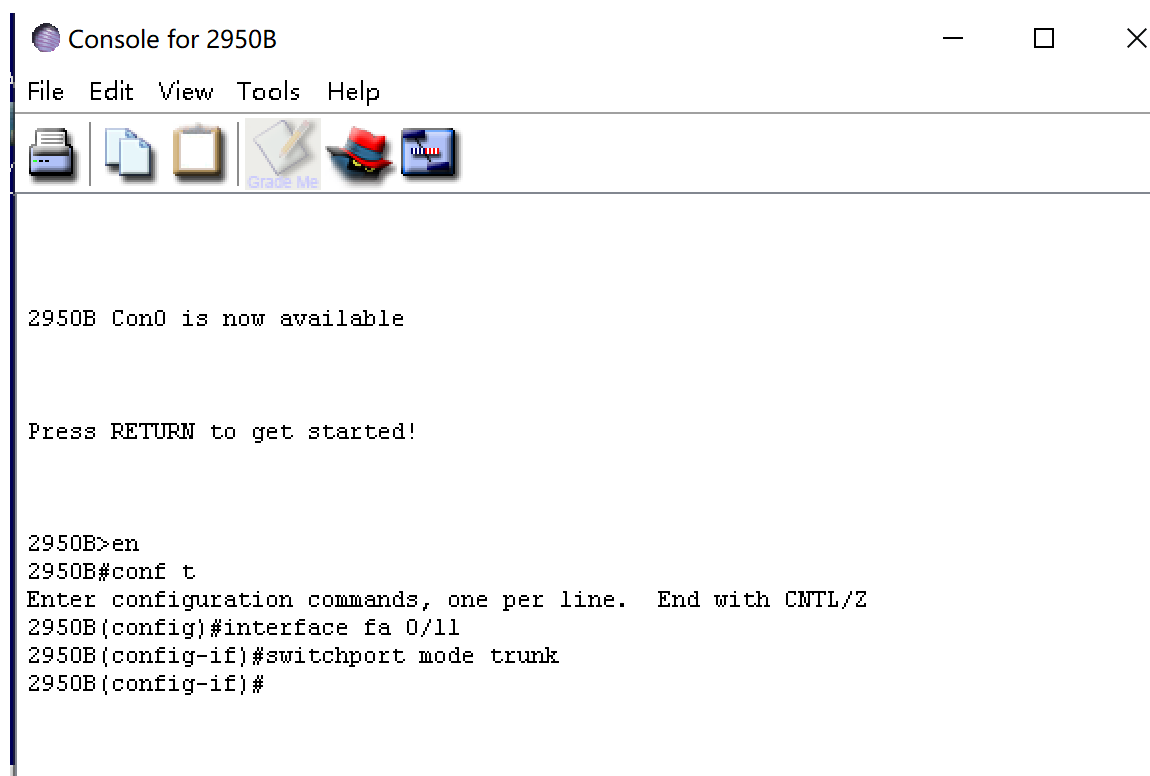
2950A Con0 is now available

Press RETURN to get started!

```

2950A>en
2950A#conf t
Enter configuration commands, one per line. End with CNTL/Z
2950A(config)#interface fa0/11
2950A(config-if)#switchport mode trunk
2950A(config-if)#interface fa0/11
2950A(config-if)#_

```



设置 2950A 和 2950B 的 trunk 端口

5.3 创建 VLAN

创建两个人 VLAN：VLAN10 和 VLAN20，并用 show vlan 命令验证

Console for 3550A

File Edit View Tools Help



3550A Con0 is now available

Press RETURN to get started!

```

3550A>en
3550A# conf t
Enter configuration commands, one per line. End with CNTL/Z
3550A(config)#vlan 10
3550A(config-vlan)#vlan20
^
% Invalid input detected at '^' marker.
3550A(config-vlan)#vlan 20
3550A(config-vlan)#exit
3550A(config)#sh vlan
^
% Invalid input detected at '^' marker.
3550A(config)#exit
3550A#sh vlan

```

VLAN Name	Status	Ports
1 default	active	Fa0/2, Fa0/4, Fa0/5, Fa0/6 Fa0/7, Fa0/8, Fa0/9, Fa0/10
10 VLAN0010	active	
20 VLAN0020	active	
1002 fddi-default	active	
1003 token-ring-default	active	
1004 fddinet-default	active	
1005 trnet-default	active	

VLAN Type	SAID	MTU	Parent	RingNo	BridgeNo	Stp	BrdgMode	Trans1	Trans2
1	enet 100001	1500	-	-	-	-	-	0	0
10	enet 100010	1500	-	-	-	-	-	0	0
20	enet 100020	1500	-	-	-	-	-	0	0
1002	fddi 101002	1500	-	-	-	-	-	0	0
1003	tr 101003	1500	-	-	-	-	-	0	0
1004	fdnet 101004	1500	-	-	-	ieee	-	0	0
1005	trnet 101005	1500	-	-	-	ibm	-	0	0

```

--More--
3550A#

```

创建 VLAN 并验证

5.4 分配交换机端口加入 VLAN

分别将交换机 2950A 和 2950B 的端口 fa0/2 加入 vlan 10 和 vlan 20



将交换机端口加入 VLAN

5.5 配置第三层交换机

在 3550 交换机上分别设置各 VLAN 的接口地址，2505 交换机将 VLAN 作为一种接口对待，就像路由器上的一样，提供 VLAN 10 和 VLAN20 之间的路由器

并启动路由器

```

Console for 3550A
File Edit View Tools Help

Press RETURN to get started!

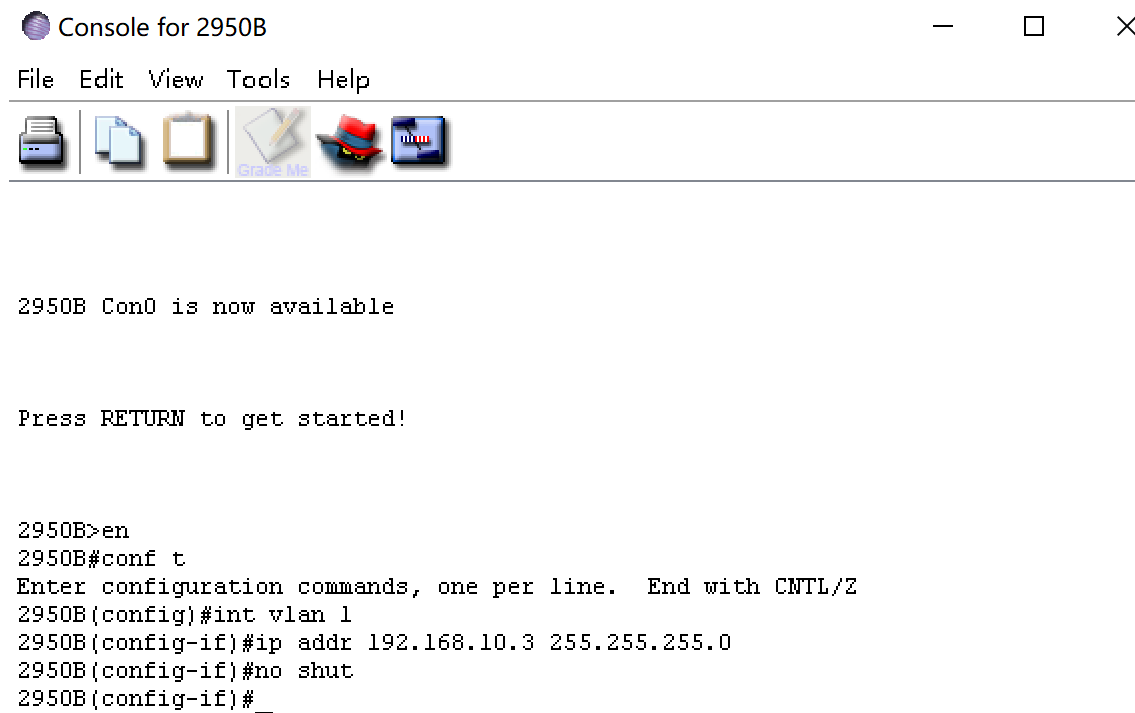
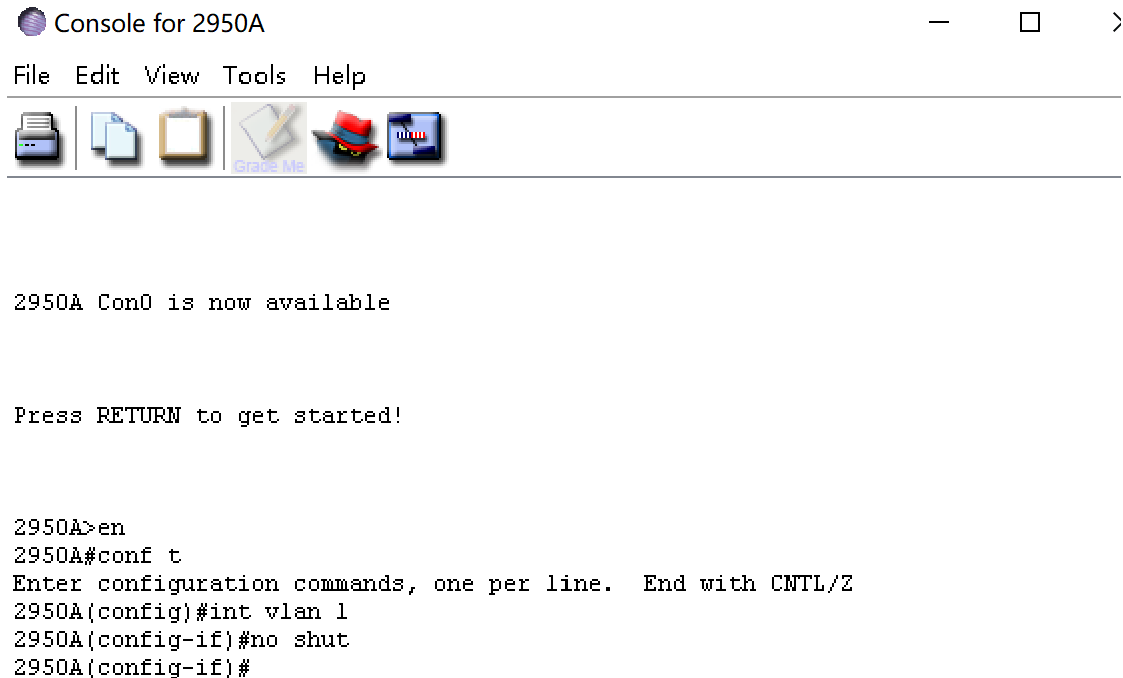
3550A>en
3550A#conf t
Enter configuration commands, one per line. End with CNTL/Z
3550A(config)#int vlan 10
3550A(config-if)#ip addr 10.10.10.1 255.255.255.0
3550A(config-if)#no shut
3550A(config-if)#ip addr 20.20.20.1 255.255.255.0
3550A(config-if)#no shut
3550A(config-if)#exit
3550A(config)#
3550A(config)#ip routing
3550A(config)#
3550A(config)#int vlan 1
3550A(config-if)#ip addr 192.168.10.1 255.255.255.0
3550A(config-if)#no shut
3550A(config-if)#
  
```

设置 IP 并启动路由

5.6 配置各交换机的管理地址

```

3550A(config)#
3550A(config)#int vlan 1
3550A(config-if)#ip addr 192.168.10.1 255.255.255.0
3550A(config-if)#no shut
3550A(config-if)#
  
```

设置管理地址

5.7 配置主机 hostA 和 hostB，并进行测试

Configure Host A

Host Name:

☐ Obtain an IP address automatically

☒ Use the following IP address:

IP Address:

Subnet:

Default Gateway:

Configure Host B

Host Name:

☐ Obtain an IP address automatically

☒ Use the following IP address:

IP Address:

Subnet:

Default Gateway:

Console for 3550A

File Edit View Tools Help

```

3550A CON0 IS NOW AVAILABLE

Press RETURN to get started!

3550A>en
3550A#ping 192.168.19.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.19.2, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5), round-trip min/avg/max = 0/0/0 ms
3550A#ping 192.168.10.3

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.10.3, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 4/4/4 ms
3550A#

```

基本实现相关连接操作

4 实验代码

本次实验的代码已上传于以下代码仓库：[cd888888/network: report \(github.com\)](https://github.com/cd888888/network-report)

5 实验总结

了解了在模拟器下根据教程配置网络的方法

了解了路由器配置的一些简单语句和方法。

理解了网络层和路由层的基本原理

网络层负责实现各种不一样的物理网络的互联

路由层简单来说就是为数据寻找传输路径。路径信息存储在路由表中

掌握了 IP 协议、IP 地址配置和路由的概念

IP 协议的分组转发：分为直接交付和简介交付，或者交给默认路由

IP 路由：路由器通过为 IP 信息选择传送路径，实现网络的互连，实现报文的传输。

掌握了 IP 协议和路由的基本原理