Packet Tracer 5 使用手册

CCNA 配置手册

Packet Tracer 5.0 在 CCNA 中的使用

Cisco 网络技术学院专用

目录

Packet Tracer 5.0 建构 CCNA 实验攻略(1)——配置 Cisco 交换机

Packet Tracer 5.0 是一款非常不错的 Cisco(思科)网络设备模拟器,对于想考思科初级认证 如 CCNA) 的朋友们来说, Packet Tracer 5.0 是非常不错的选择。利用 Packet Tracer 5.0 练习思科 IOS 操作命令很不错的。

要配置好 Cisco 交换必需要熟悉 IOS 命令及相关的知识。

一、几种配置命令模式

switch>

这种提示符表示是在用户命令模式，只能使用一些查看命令。

switch#

这种提示符表示是在特权命令模式。

switch(config)# 这种提示符表示是全局配置模式

switch(config-if)# 端口配置命令模式

```
1>
1>enable
1#
1#disable
1>enable
1#conf t
Enter configuration commands, one per line.  End with CNTL/Z
1(config)#hostname CoreSW
CoreSW(config)#interface f0/1
CoreSW(config-if)#
```

图一 几种命令模式

二、检查、查看命令

这些命令是查看当前配置状况，通常是以 show(sh)为开始的命令。show version 查看 IOS 的版本、show flash 查看 flash 内存使用状况、show mac-address-table 查看 MAC 地址列表

```
CoreSW#show version
Cisco IOS Software, C2960 Software (C2960-LANBASE-M), Version 12.2(25)FX, RELEAS
E SOFTWARE (fc1)
Copyright (c) 1986-2005 by Cisco Systems, Inc.
Compiled Wed 12-Oct-05 22:05 by pt_team

ROM: C2960 Boot Loader (C2960-HBOOT-M) Version 12.2(25r)FX, RELEASE SOFTWARE (fc
4)

System returned to ROM by power-on

Cisco WS-C2960-24TT (RC32300) processor (revision C0) with 21039K bytes of memor
y.


24 FastEthernet/IEEE 802.3 interface(s)
2 Gigabit Ethernet/IEEE 802.3 interface(s)

64K bytes of flash-simulated non-volatile configurat
Base ethernet MAC Address       : 0001.4397.DD14
Motherboard assembly number     : 73-9832-06
Power supply part number        : 341-0097-02
```

图二

```
CoreSW#sh flash
Directory of flash:/

    1  -rw-     4414921          <no date>  c2960-lanbase-mz.122-25.FX.bin

64016384 bytes total (59601463 bytes free)
CoreSW#
```

图三

```
CoreSW#sh mac-address-table
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----

   1    000d.bd8c.6cdd    DYNAMIC     Fa0/2
   1    00d0.baa9.975c    DYNAMIC     Fa0/1
CoreSW#
```

图四

```
CoreSW#show ?
  arp                 Arp table
  boot                show boot attributes
  cdp                 CDP information
  clock               Display the system clock
  dtp                 DTP information
  flash:              display information about flash: file system
  history             Display the session command history
  hosts               IP domain-name, lookup style, nameservers, and host table
  interfaces          Interface status and configuration
  ip                  IP information
  mac-address-table   MAC forwarding table
  port-security       Show secure port information
  processes           Active process statistics
  running-config      Current operating configuration
  sessions            Information about Telnet connections
  spanning-tree       Spanning tree topology
  startup-config      Contents of startup configuration
  tcp                 Status of TCP connections
  terminal            Display terminal configuration
  users               Display information about term:
  version             System hardware and software status
  vlan                VTP VLAN status
  vtp                 VTP information
CoreSW#show
```

图五　Show ？　帮助命令显示当前所有的查看命令

```
CoreSW#show interface fa0/1
FastEthernet0/1 is up, line protocol is up (connected)
  Hardware is Lance, address is 00e0.8f7c.4b01 (bia 00e0.8f7c.4b01)
  MTU 1500 bytes, BW 100000 Kbit, DLY 1000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 100Mb/s
  input flow-control is off, output flow-control is off
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:08, output 00:00:05, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue :0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     956 packets input, 193351 bytes, 0 no buffer
     Received 956 broadcasts, 0 runts, 0 giants,
     0 input errors, 0 CRC, 0 frame, 0 overrun,
     0 watchdog, 0 multicast, 0 pause input
     0 input packets with dribble condition detected
     2357 packets output, 263570 bytes, 0 underruns
     0 output errors, 0 collisions, 10 interface resets
CoreSW#show
```

图六　查看端口状态信息

三、密码设置命令

Cisco 交换机、路由器中有很多密码，设置好这些密码可以有效地提高设备的安全性。

switch(config)#enable password　设置进入特权模式进的密码

switch(config-line)　可以设置通过 console 端口连接设备及 telnet 远程登录时所需要的密码

```
CoreSW#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
CoreSW(config)#enable password able
CoreSW(config)#line console 0
CoreSW(config-line)#password line
CoreSW(config-line)#login
CoreSW(config-line)#line vty 0 4
CoreSW(config-line)#password vty
CoreSW(config-line)#login
CoreSW(config-line)#exit
CoreSW(config)#
```

图七　设置交换机的各种密码

默认情况下，这些密码都是以明文的形式存储，所以很容易查看到。为了避免这种情况，我们可以以密文的形式存储各种密码:service password-encryption

```
CoreSW#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
CoreSW(config)#service password-encryption
CoreSW(config)#
```

图九

```
line con 0
 password 7 082D45400C
 login
!
line vty 0 4
 password 7 08375857
 login
line vty 5 15
 login
!
!
end
```

图十　密码以密文的形式存储

四、配置 IP 地址及默认网关

```
CoreSW# conf t
Enter configuration commands, one per line.  End with CNTL/Z.
CoreSW(config)#interface vlan1
CoreSW(config-if)#ip address 192.168.0.253 255.255.255.0
CoreSW(config-if)#
CoreSW(config)# ip default-gateway 192.168.0.254
```

图十一

五、管理 MAC 地址表

switch#show mac-address-table　显示 MAC 地址列表

switch#clear mac-address-table dynamic　清除动态 MAC 地址列表

```
CoreSW#show mac-address-table
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----

   1    0005.5ed3.c4b1    DYNAMIC     Fa0/4
   1    000d.bd8c.6cdd    DYNAMIC     Fa0/2
   1    00d0.baa9.975c    DYNAMIC     Fa0/1
CoreSW#clear mac-address-table dynamic
CoreSW#
```

图十二

```
CoreSW(config)#mac-address-table static 00d0.baa9.975c vlan 1 interface fa0/1
CoreSW(config)#exit
%SYS-5-CONFIG_I: Configured from console by console
CoreSW#sh mac-address-table
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----

   1    0005.5ed3.c4b1    DYNAMIC     Fa0/4
   1    000d.bd8c.6cdd    DYNAMIC     Fa0/2
   1    00d0.baa9.975c    STATIC      Fa0/1
CoreSW#
```

图十三　设置静态 MAC 地址

六、配置端口安全

switch(config-if)switchport port-security

switch(config-if)switchport port-security maximum 4

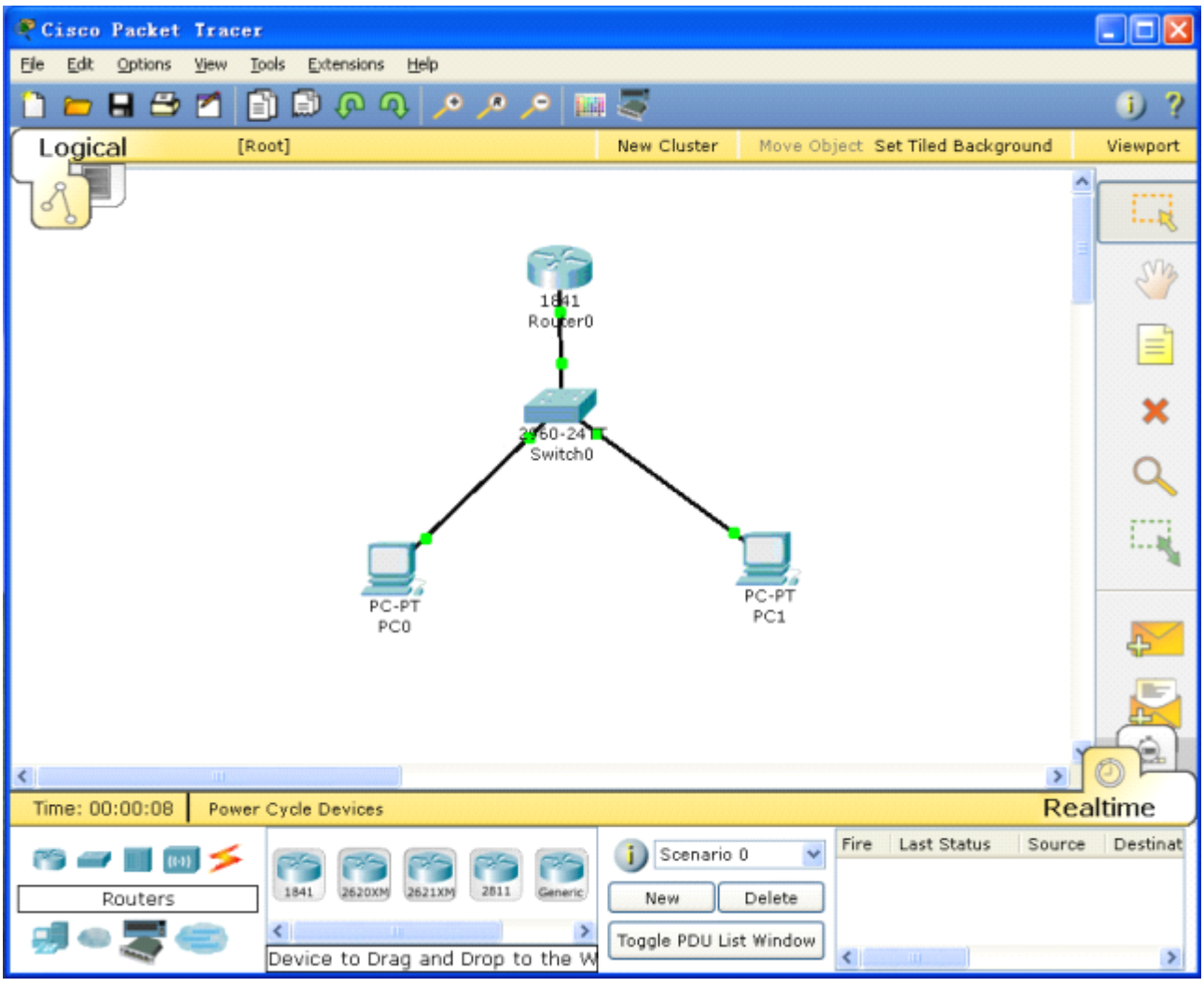
```
CoreSW(config-if)#interface fa0/2
CoreSW(config-if)#switchport mode access
CoreSW(config-if)#switchport port-security
CoreSW(config-if)#switchport port-security maximum 4
CoreSW(config-if)#
```

图十四

```
CoreSW(config)#interface fa0/2
CoreSW(config-if)#switchport port-security mac-address 000d.bd8c.6ccd
CoreSW(config-if)#switchport port-security violation shutdown
```

图十五

七、一个配置实例



图十六　实例拓扑图

```
Switch>
Switch>en
Switch#config
Configuring from terminal, memory, or network [terminal]? t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#interface fa0/1
Switch(config-if)#description link RouterA
Switch(config-if)#interface vlan1
Switch(config-if)#ip address 192.168.1.2 255.255.255.0
Switch(config-if)#exit
Switch(config)#hostname 2960
2960(config)#ip default-gateway 192.168.1.1
```

图十七

```
2960(config)#interface fa0/2
2960(config-if)#description link pc0
2960(config-if)#interface fa0/3
2960(config-if)#description link pc1
2960(config-if)#switchport mode access
2960(config-if)#switchport port-security
2960(config-if)#switchport port-security maximum 1
2960(config-if)#switchport port-security violation shutdown
2960(config-if)#
```

图十八

```
2960(config)#service password-encryption
2960(config)#enable password able
2960(config)#line console 0
2960(config-line)#password line
2960(config-line)#login
2960(config-line)#line vty 0 4
2960(config-line)#password vty
2960(config-line)#login
2960(config-line)#exit
2960(config)#
```

图十九

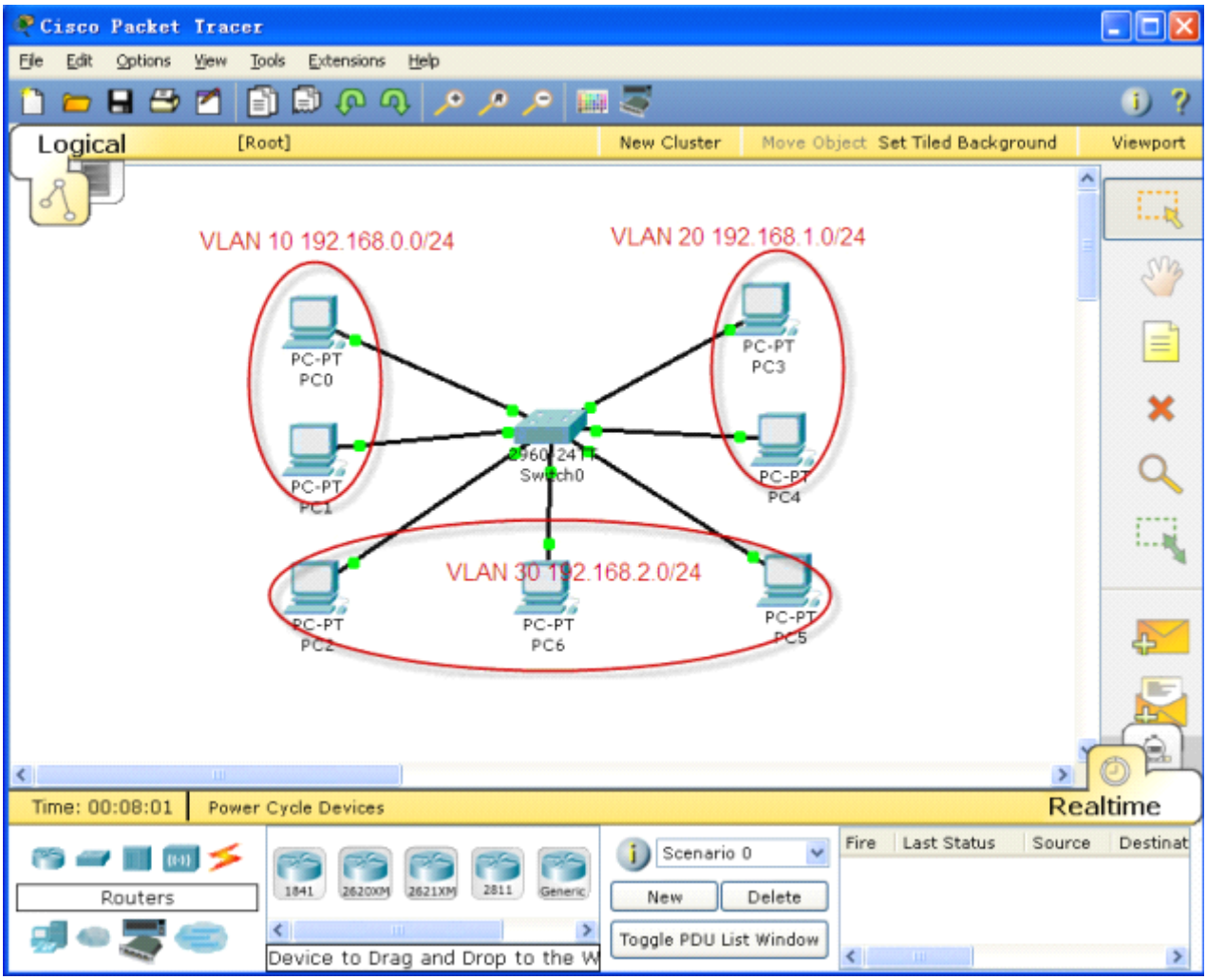
```
2960#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
2960#
```

图二十　保存对交换机的配置

Packet Tracer 5.0 建构 CCNA 实验攻略(2)——配置 VLAN

Vlan(Virtual Local Area Network)即虚拟局域网。VLAN 可以把同一个物理网络划分为多个逻辑网段，因此，Vlan 可以抑制网络风暴，增强网络的安全性。

一、实例拓扑图



图一　交换机 Cisco 2960

二、创建 VLAN

在 Cisco IOS 中有两种方式创建 vlan,在全局配置模式下使用 vlan vlanid 命令，如 switch(config)#vlan 10；在 vlan database 下创建 vlan,如 switch(vlan)vlan 20

```
Switch>en
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname CoreSW
CoreSW(config)#vlan 10
CoreSW(config-vlan)#name Math
CoreSW(config-vlan)#exit
CoreSW(config)#exit
%SYS-5-CONFIG_I: Configured from console by console
CoreSW#vlan database
% Warning: It is recommended to configure VLAN from config mode,
  as VLAN database mode is being deprecated. Please consult user
  documentation for configuring VTP/VLAN in config mode.

CoreSW(vlan)#vlan 20 name Chinese
VLAN 20 added:
    Name: Chinese
CoreSW(vlan)#vlan 30 name Other
VLAN 30 added:
    Name: Other
```

图二　创建 vlan

三、把端口划分给 vlan(基于端口的 vlan)

switch(config)#interface fastethernet0/1　进入端口配置模式
switch(config-if)#switchport mode access　配置端口为 access 模式
switch(config-if)#switchport access vlan 10　把端口划分到 vlan 10

```
CoreSW>en
CoreSW#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
CoreSW(config)#interface fa0/1
CoreSW(config-if)#switchport mode access
CoreSW(config-if)#switchport access vlan 10
CoreSW(config-if)#interface fa0/7
CoreSW(config-if)#switchport mode access
CoreSW(config-if)#switchport access vlan 10
CoreSW(config-if)#
```

图三

如果一次把多个端口划分给某个 vlan 可以使用 interface range 命令。

```
CoreSW(config-if)#interface range fa0/2 - 4
CoreSW(config-if-range)#switchport mode access
CoreSW(config-if-range)#switchport access vlan 20
CoreSW(config-if-range)#interface range fa0/5 - 6
CoreSW(config-if-range)#switchport mode access
CoreSW(config-if-range)#switchport access vlan 30
CoreSW(config-if-range)#
```

图四

四、查看 vlan 信息

switch#show vlan

```
CoreSW#sh vlan

VLAN Name                                Status    Ports
---- ----------------------------------- --------- -------------------------------
1    default                             active    Fa0/8, Fa0/9, Fa0/10, Fa0/11
                                                   Fa0/12, Fa0/13, Fa0/14, Fa0/15
                                                   Fa0/16, Fa0/17, Fa0/18, Fa0/19
                                                   Fa0/20, Fa0/21, Fa0/22, Fa0/23
                                                   Fa0/24, Gig1/1, Gig1/2
10   Math                                active    Fa0/1, Fa0/7
20   Chinese                             active    Fa0/2, Fa0/3, Fa0/4
30   Other                               active    Fa0/5, Fa0/6
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  -      -      -        -
10   enet  100010     1500  -      -      -        -
20   enet  100020     1500  -      -      -        -
30   enet  100030     1500  -      -      -        -
1002 enet  101002     1500  -      -      -        -
1003 enet  101003     1500  -      -      -        -
1004 enet  101004     1500  -      -      -        -
1005 enet  101005     1500  -      -      -        -
```

图五

```
CoreSW#show vlan brief

VLAN Name                                Status    Ports
---- ----------------------------------- --------- -------------------------------
1    default                             active    Fa0/8, Fa0/9, Fa0/10, Fa0/11
                                                   Fa0/12, Fa0/13, Fa0/14, Fa0/15
                                                   Fa0/16, Fa0/17, Fa0/18, Fa0/19
                                                   Fa0/20, Fa0/21, Fa0/22, Fa0/23
                                                   Fa0/24, Gig1/1, Gig1/2
10   Math                                active    Fa0/1, Fa0/7
20   Chinese                             active    Fa0/2, Fa0/3, Fa0/4
30   Other                               active    1
1002 fddi-default                        active
1003 token-ring-default                  active
1004 fddinet-default                     active
1005 trnet-default                       active
CoreSW#
```

图六　show vlan brief　查看 vlan 简明信息

```
CoreSW#show vlan id 10

VLAN Name                                Status    Ports
---- ----------------------------------- --------- -------------------------------
10   Math                                active    Fa0/1, Fa0/7

VLAN Type  SAID       MTU   Parent RingNo BridgeNo Stp  BrdgMode Trans1 Trans2
---- ----- ---------- ----- ------ ------ -------- ---- -------- ------ ------
10   enet  100010     1500  -      -      -        -    -        0      0

CoreSW#sh vlan id 30

VLAN Name                                Status    Ports
---- ----------------------------------- --------- -------------------------------
30   Other                               active

VLAN Type  SAID       MTU   Parent RingNo Bridge
---- ----- ---------- ----- ------ ------ -------- ---- -------- ------ ------
30   enet  100030     1500  -      -      -        -    -        0      0
```

图七　查看 id 为 10 的 vlan

```
CoreSW#show vlan name Math

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
10   Math                             active    Fa0/1, Fa0/7

VLAN Type  SAID       MTU   Parent RingNo BridgeNo Stp  BrdgMode Trans1 Trans2
---- ----- ---------- ----- ------ ------ -------- ---- -------- ------ ------
10   enet  100010     1500  -      -      -        -    -        0      0

CoreSW#show vlan name Other

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
30   Other                            active    Fa0/5, Fa0/6

VLAN Type  SAID       MTU   Parent RingNo BridgeNo Stp  BrdgMode Trans1 Trans2
---- ----- ---------- ----- ------ ------ -------- ---- -------- ------ ------
30   enet  100030     1500  -      -      -        -    -        0      0

CoreSW#show vlan name Chinese

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
20   Chinese                          active    Fa0/2, Fa0/3, Fa0/4

VLAN Type  SAID       MTU   Parent RingNo BridgeNo Stp  BrdgMode Trans1 Trans2
---- ----- ---------- ----- ------ ------ -------- ---- -------- ------ ------
```

图八　通过 vlan 的名字查看 vlan

五、删除配置

```
CoreSW(config)#interface fa0/8
CoreSW(config-if)#no switchport access vlan 40
CoreSW(config-if)#exit
CoreSW(config)#exit
```

图九　把第 0 个模块中的第 8 个端口从 vlan 40 中删除

```
CoreSW#vlan database
% Warning: It is recommended to configure VLAN from config mode,
  as VLAN database mode is being deprecated. Please consult user
  documentation for configuring VTP/VLAN in config mode.

CoreSW(vlan)#no vlan 40
Deleting VLAN 40...
CoreSW(vlan)#
```

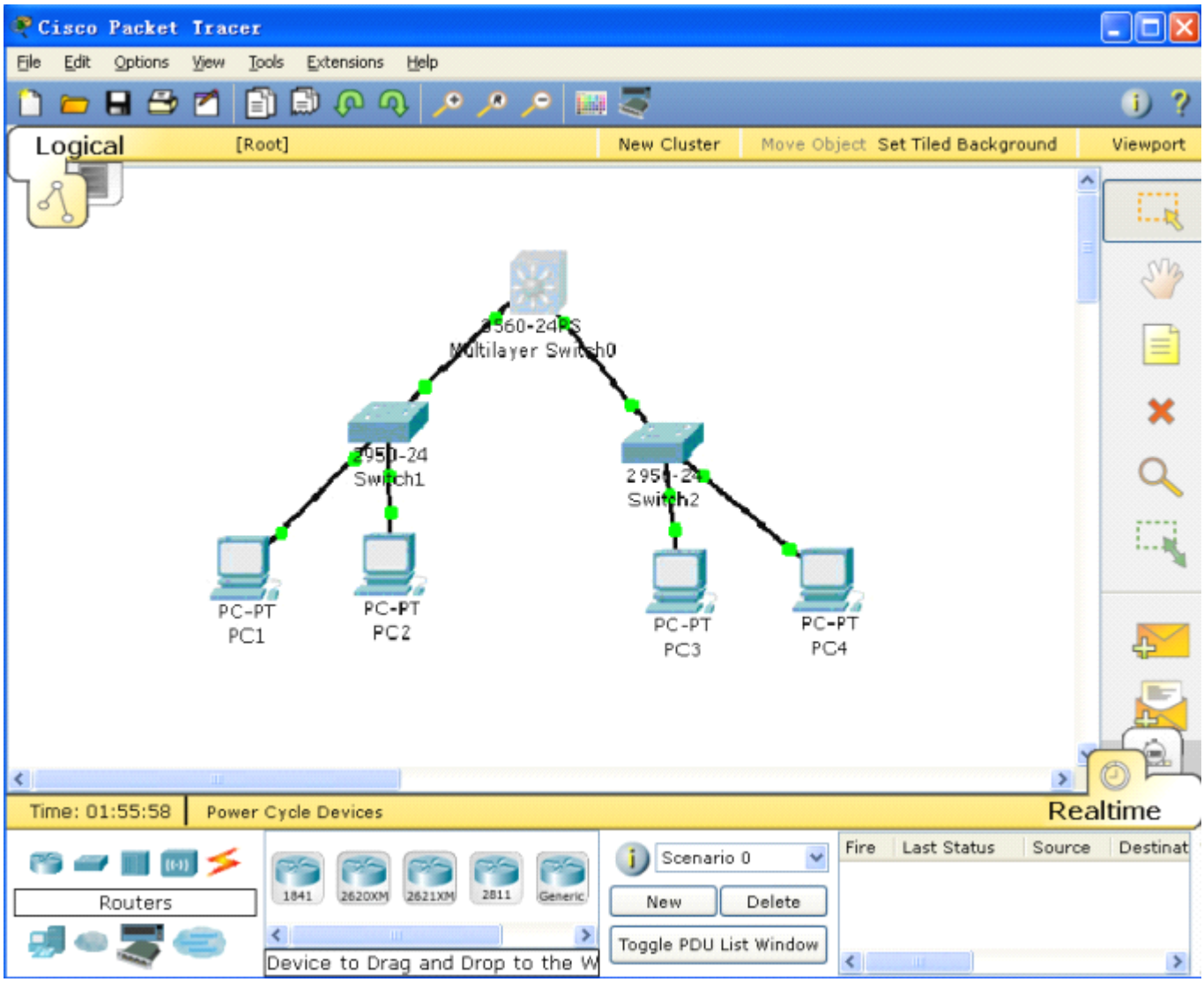
图十　删除 vlan 40

我们还可以为每个 vlan 配置 ip 地址。

Packet Tracer 5.0 建构 CCNA 实验攻略(3)——Cisco VTP

VTP(Vlan Trunk Protocol)即 VLAN 中继协议。VTP 通过网络(ISL 帧或 cisco 私有 DTP 帧)保持 VLAN 配置统一性。VTP 在系统级管理增加，删除，调整的 VLAN，自动地将信息向网络中其它的交换机广播。此外，VTP 减小了那些可能导致安全问题的配置。便于管理,只要在 vtp server 做相应设置,vtp client 会自动学习 vtp server 上的 vlan 信息。

一、实例拓扑图



图一　核心交换机 Cisco 3560

二、配置 VTP

核心交换机 Cisco 3560 配置为 vtp Server,vtp domain 为 senya。

```
CoreSW#vlan database
% Warning: It is recommended to configure VLAN from config mode,
  as VLAN database mode is being deprecated. Please consult user
  documentation for configuring VTP/VLAN in config mode.

CoreSW(vlan)#vtp domain senya
Domain name already set to senya.
CoreSW(vlan)#vtp server
Device mode already VTP SERVER.
CoreSW(vlan)#
```

图二

```
CoreSW(config-if)#int fa 0/1
CoreSW(config-if)#switchport mode trunk
CoreSW(config-if)#int fa 0/2
CoreSW(config-if)#switchport mode trunk

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state t
o down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state t
o up
CoreSW(config-if)#
```

图三　配置 trunk 链路，允许带 vlan 标记的以太网帧通过该链路

```
SW1(vlan)#vtp domain senya
Domain name already set to senya.
SW1(vlan)#vtp client
Setting device to VTP CLIENT mode.
SW1(vlan)#
```

图四　配置汇聚层（接入层）交换机

```
SW2(vlan)#vtp domain senya
Domain name already set to senya.
SW2(vlan)#vtp client
Setting device to VTP CLIENT mode.
SW2(vlan)#
```

图五

```
SW1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
SW1(config)#interface fa 0/3
SW1(config-if)#switchport mode trunk
SW1(config-if)#
```

图六

三、创建 Vlan 及端口划分

```
CoreSW#vlan database
% Warning: It is recommended to configure VLAN from config mode,
  as VLAN database mode is being deprecated. Please consult user
  documentation for configuring VTP/VLAN in config mode.

CoreSW(vlan)#vlan 2
VLAN 2 added:
    Name: VLAN0002
```

图七　在 vtp server 上创建 vlan

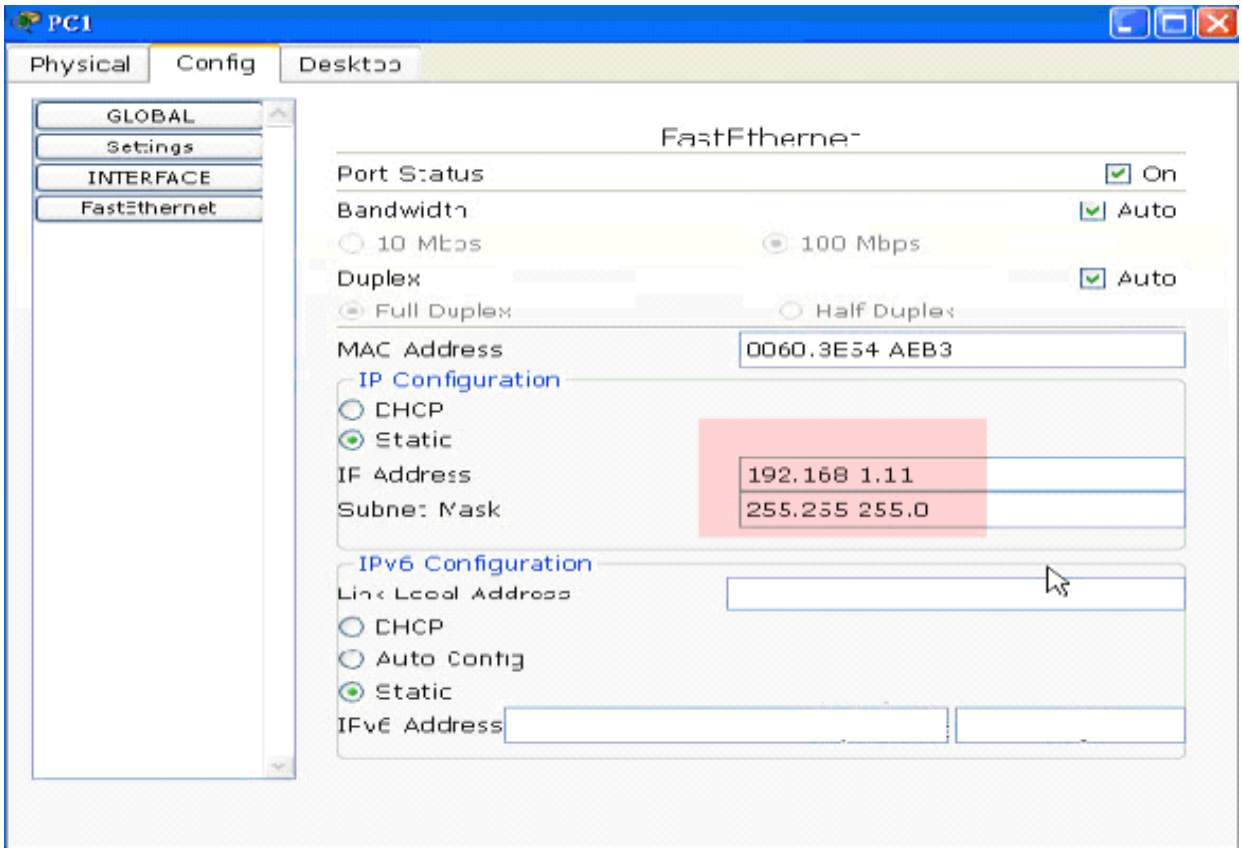
```
SW2#sho vlan

VLAN Name                                Status    Ports
---- ----------------------------------- --------- -------------------------------
1    default                             active    Fa0/2, Fa0/3, Fa0/4, Fa0/5
                                                   Fa0/6, Fa0/7, Fa0/8, Fa0/9
                                                   Fa0/10, Fa0/11, Fa0/12, Fa0/13
                                                   Fa0/14, Fa0/15, Fa0/16, Fa0/17
                                                   Fa0/18, Fa0/19, Fa0/20, Fa0/21
                                                   Fa0/22, Fa0/23, Fa0/24
2    VLAN0002                            active
3    VLAN0003                            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
---- ----- ---------- ----- ------ ------ -------- ---- -------- ------ ------
1    enet  100001     1500  -      -      -        -    -        0      0
2    enet  100002     1500  -      -      -        -    -        0      0
```

图八　在 vtp client 上查看 vlan

```
SW1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
SW1(config)#int fa 0/1
SW1(config-if)#switchport mode access
SW1(config-if)#switchport access vlan 2
SW1(config-if)#
```

图九　划分端口

四、配置 pc 及测试 vlan



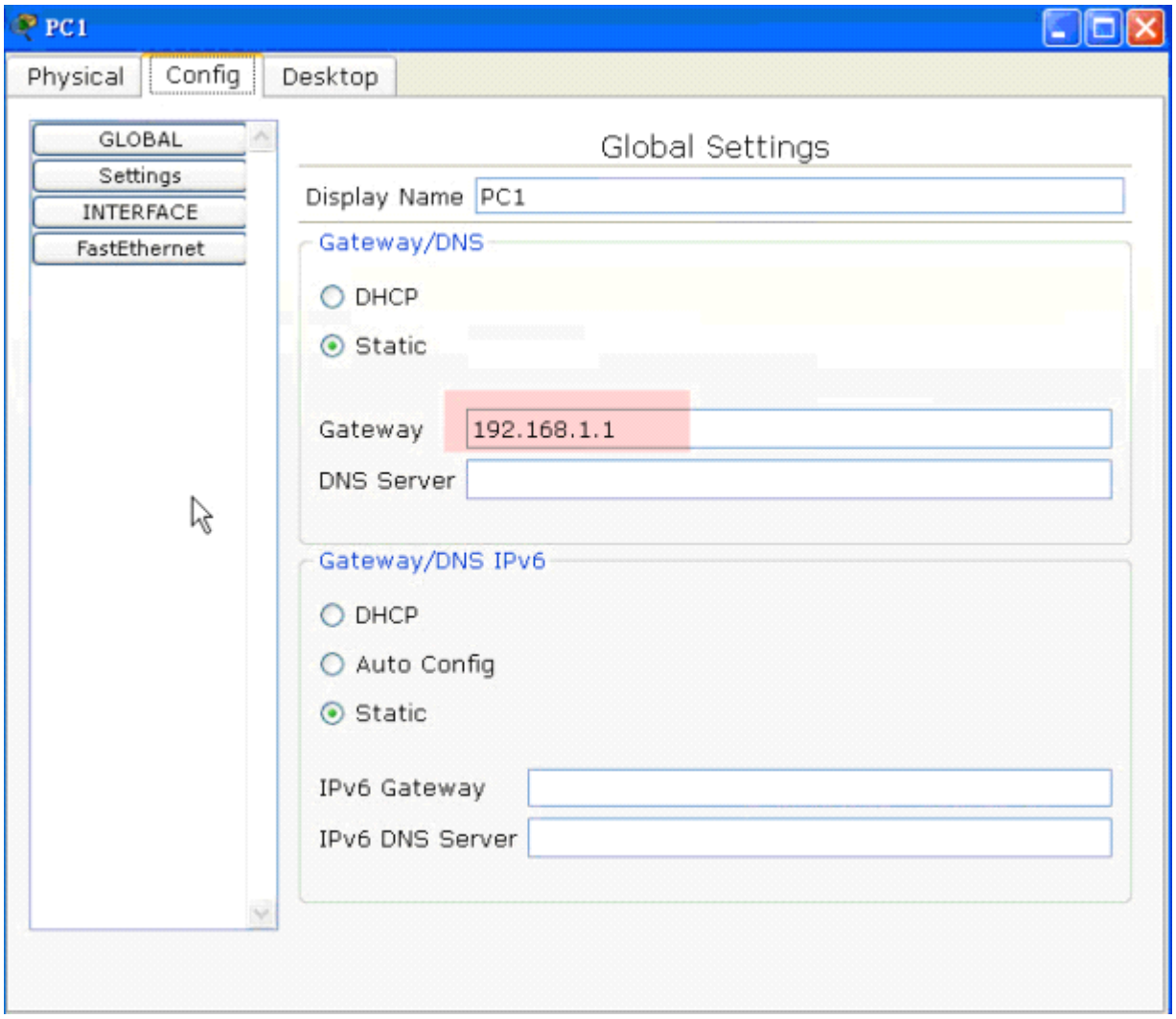
图十　为 pc 配置 ip 地址

```
PC>ipconfig /all

Physical Address.................: 0060.3E54.AEB3
IP Address.......................: 192.168.1.11
Subnet Mask......................: 255.255.255.0
Default Gateway..................: 0.0.0.0
DNS Servers......................: 0.0.0.0

PC>ping 192.168.1.22

Pinging 192.168.1.22 with 32 bytes of data:

Reply from 192.168.1.22: bytes=32 time=94ms TTL=128
Reply from 192.168.1.22: bytes=32 time=125ms TTL=128
Reply from 192.168.1.22: bytes=32 time=110ms TTL=128
Reply from 192.168.1.22: bytes=32 time=125ms TTL=128

Ping statistics for 192.168.1.22:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 94ms, Maximum = 125ms, Average = 113ms

PC>
```

图十一　本网段内互 ping

```
CoreSW(config)#
CoreSW(config)#int vlan 2
CoreSW(config-if)#ip address 192.168.1.1 255.255.255.0
CoreSW(config-if)#no shutdown
CoreSW(config-if)#int vlan 3

%LINK-5-CHANGED: Interface Vlan3, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan3,
(config-if)#ip address 192.168.2.1 255.255.255.0
CoreSW(config-if)#no shutdown
CoreSW(config-if)#
```

图十二　为 vlan 配置 ip 地址



图十三　为 pc 配置网关

```
PC>ipconfig /all

Physical Address.................: 0060.3E54.AEB3
IP Address.......................: 192.168.1.11
Subnet Mask......................: 255.255.255.0
Default Gateway..................: 192.168.1.1
DNS Servers......................: 0.0.0.0

PC>ping 192.168.2.1

Pinging 192.168.2.1 with 32 bytes of data:

Reply from 192.168.2.1: bytes=32 time=63ms TTL=255
Reply from 192.168.2.1: bytes=32 time=62ms TTL=255
Reply from 192.168.2.1: bytes=32 time=63ms TTL=255
Reply from 192.168.2.1: bytes=32 time=63ms TTL=255

Ping statistics for 192.168.2.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 62ms, Maximum = 63ms, Average = 62ms

PC>ping 192.168.2.11

Pinging 192.168.2.11 with 32 bytes of data:

Reply from 192.168.2.11: bytes=32 time=78ms TTL=127
Reply from 192.168.2.11: bytes=32 time=125ms TTL=127
```

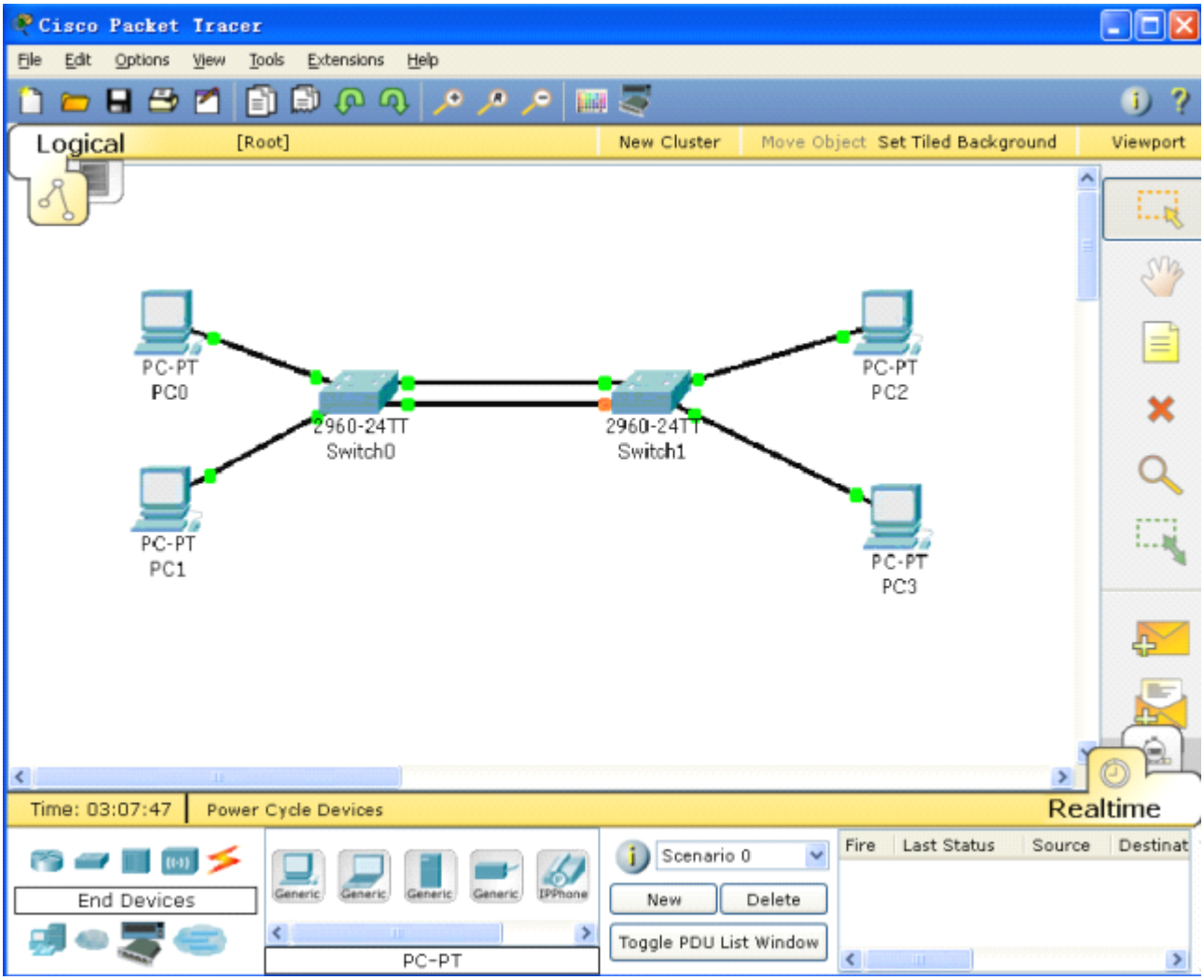
图十四　不同网段 pc 互相 ping

如果要限制不同网段的某些 pc 相互通信，可以使用访问控制列表进行控制。

Packet Tracer 5.0 建构 CCNA 实验攻略(4)——STP 生成树协议

STP 的全称是 spanning-tree protocol,STP 协议是一个二层的链路管理协议，它在提供链路冗余的同时防止网络产生环路，与 VLAN 配合可以提供链路负载均衡。生成树协议现已经发展为多生成树协议和快速生成树协议(RSTP,Rapid Spanning Tree Protocol,IEEE802.1W)。

一、配置实例拓扑图



图一

两台 Cisco 2960 交换机使用两个千兆端口相连，默认情况下 STP 协议启用的。通过两台交换机之间传送 BPDU 协议数据单元，选出根交换机、根端口等，以便确定端口的转发状态。上图中标记为黄色的端口处于 block 状态。

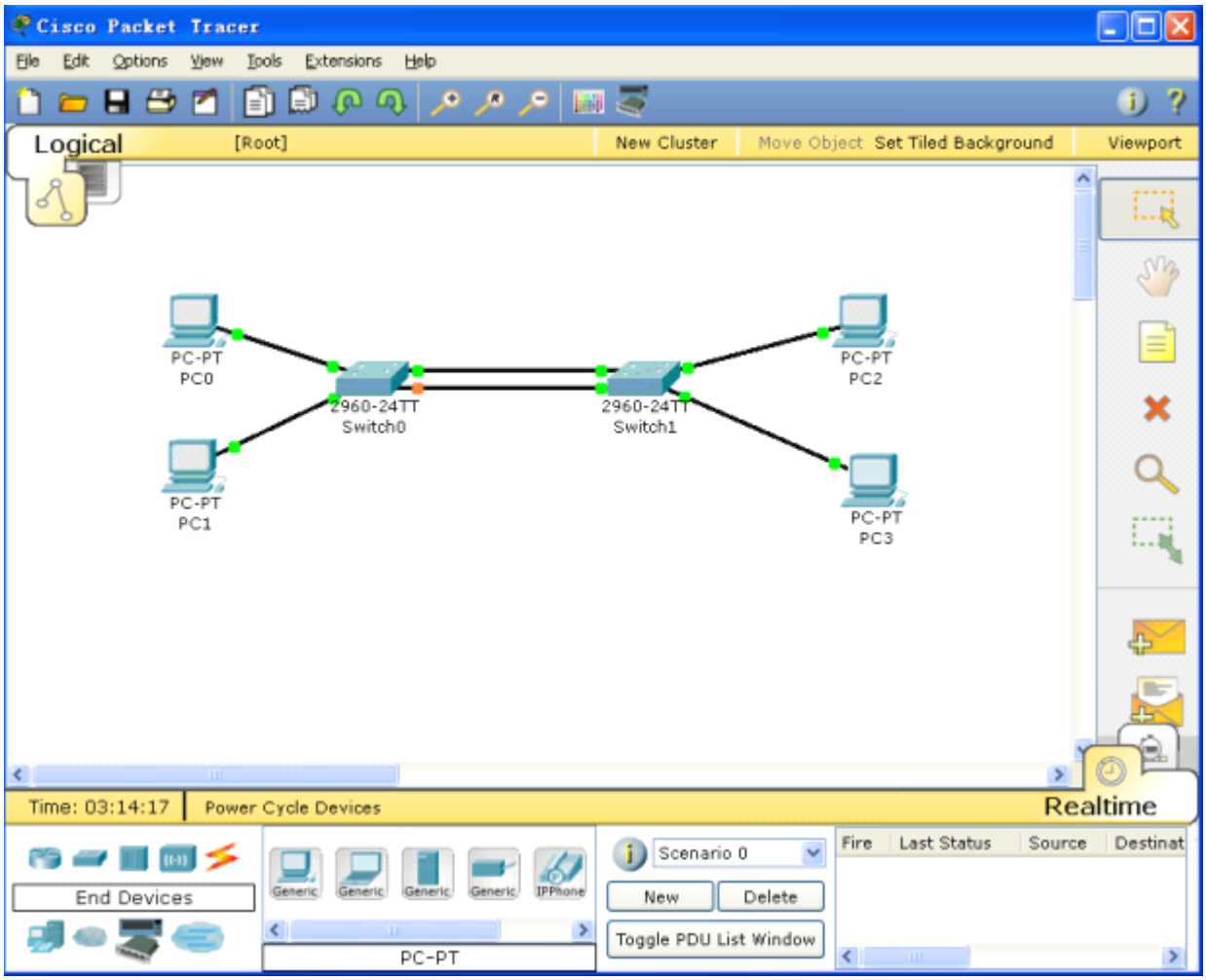
二、STP 基本配置命令

1、修改 Brigde ID，重新选根网桥

```
switch(config)#spanning-tree vlan 1 priority 4096
```

```
SW1(config)#spanning-tree vlan 1 priority 4096
SW1(config)#do show spanning-tree
VLAN0001
  Spanning tree enabled protocol ieee
  Root ID     Priority    4097
              Address     00E0.B04B.352B
              This bridge is the root
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID   Priority    4097  (priority 4096 sys-id-ext 1)
              Address     00E0.B04B.352B
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
              Aging Time  20

Interface        Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------------
Gi1/1            Desg FWD 4         128.25   P2p
Fa0/2            Desg FWD 19        128.2    P2p
Fa0/1            Desg FWD 19        128.1    P2p
Gi1/2            Desg FWD 4         128.26   P2p
```

图二



图三　根网桥改变，交换机端口的状态也发生了变化（与图一比较）

switch(config-if)spanning-tree vlan vlan-id port-priority 优先级值　交换机端口优先级值修改命令,通过修改端口优先值也可以更改端口的转发状态。

2、查看、检验 STP（生成树协议）配置

switch#show spanning-tree

switch#show spanning-tree active

switch#show spanning-tree detail

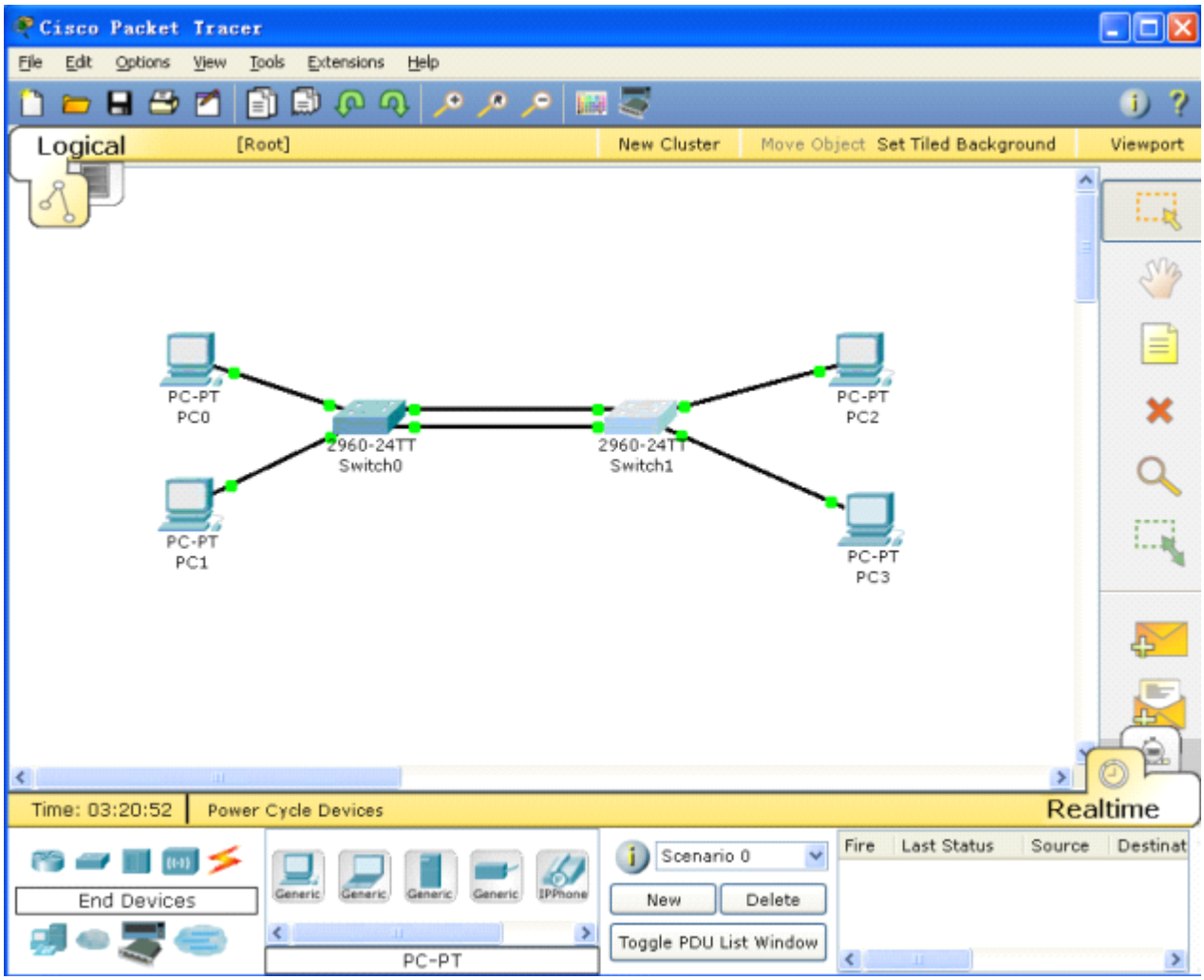
switch#show spanning-tree interface interface-id

switch#show spanning-tree vlan vlanid

```
SW0#sh spanning-tree vlan 1
VLAN0001
  Spanning tree enabled protocol ieee
  Root ID     Priority    4097
              Address     00E0.B04B.352B
              Cost        4
              Port        25(GigabitEthernet1/1)
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID   Priority    32769  (priority 32768 sys-id-ext 1)
              Address     0030.F276.3E28
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
              Aging Time  20

Interface        Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- -------- ------- ---------------- ---- ---
Gi1/1            Root FWD 4         128.25   P2p
Gi1/2            Altn BLK 4         160.26   P2p
Fa0/2            Desg FWD 19        128.2    P2p
Fa0/1            Desg FWD 19        128.1    P2p
```

图四

三、STP 与 VLAN 负载均衡配置



图五

配置负载均衡后，每个 VLAN 有自己的根网桥。每条 vlan 中继链路只转发所允许的 Vlan 数据帧。

switch(config-if)switchport trunk allowed vlan vlanid 这条命令配置某条 trunk 中继链路只能转发该 vlan

```
SW1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
SW1(config)#int gil/1
SW1(config-if)#switchport trunk allowed vlan 10
SW1(config-if)#int gil/2
SW1(config-if)#switchport trunk allowed vlan 20
SW1(config-if)#end
```

图六

```
VLAN0010
  Spanning tree enabled protocol ieee
  Root ID     Priority    32778
              Address     0030.F276.3E28
              Cost        4
              Port        25(GigabitEthernet1/1)
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID   Priority    32778  (priority 32768 sys-id-ext 10)
              Address     00E0.B04B.352B
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
              Aging Time  20

Interface        Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------------
Gi1/1            Root FWD 4         128.25   P2p
Gi1/2            Desg FWD 4         128.26   P2p

VLAN0020
  Spanning tree enabled protocol ieee
  Root ID     Priority    32788
              Address     0030.F276.3E28
              Cost        4
              Port        26(GigabitEthernet1/2)
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID   Priority    32788  (priority 32768 sys-id-ext 20)
              Address     00E0.B04B.352B
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
              Aging Time  20

Interface        Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------------
Gi1/1            Desg FWD 4         128.25   P2p
Gi1/2            Root FWD 4         128.26   P2p
```

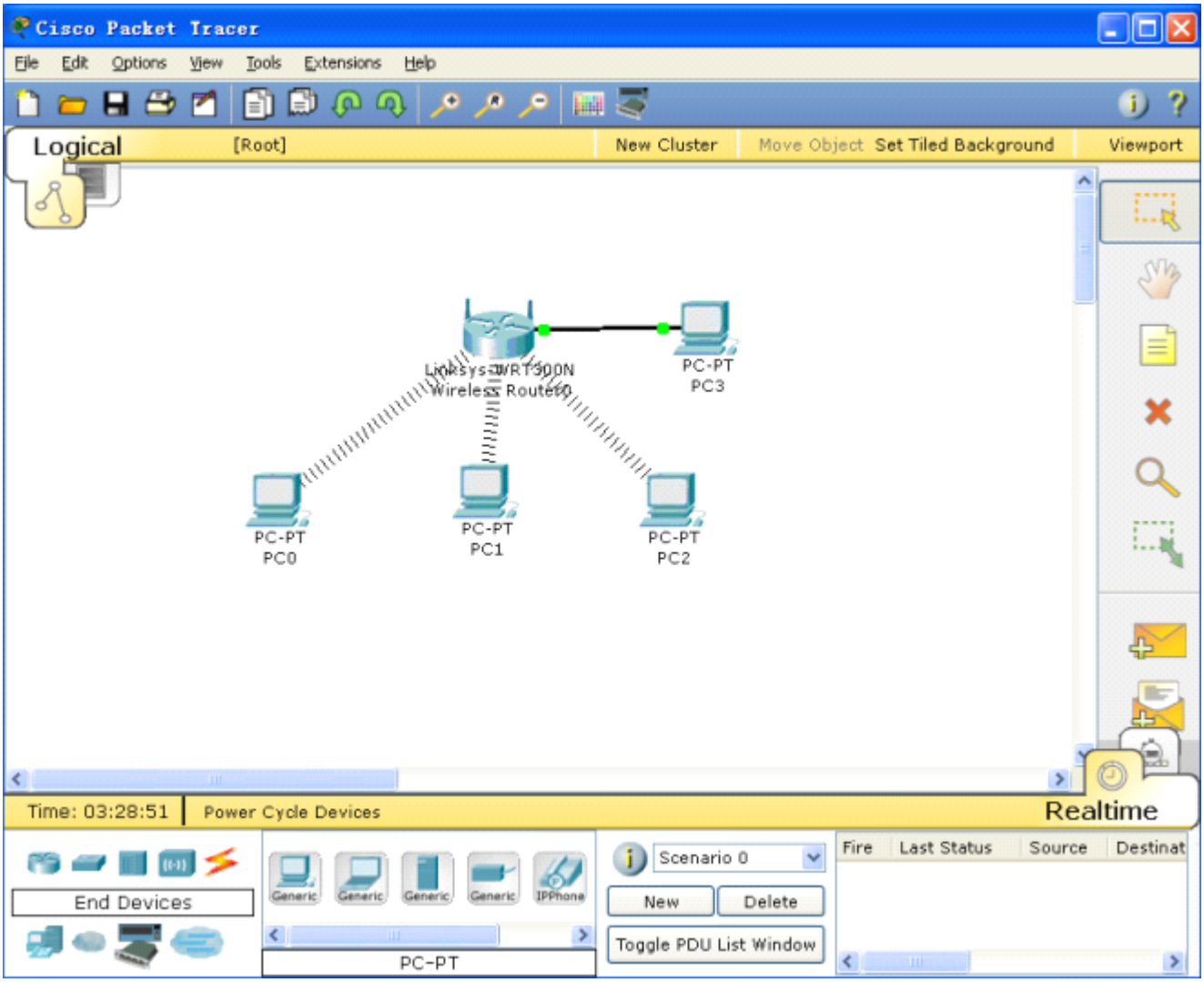
图七　查看每个 Vlan 的 STP 状态

switch(config)#spanning-tree vlan vlandid root primary　　该命令配置某个 vlan 的根网桥。利用这个命令可以使用 Vlan 利用 VTP 进行负载均衡。

Packet Tracer 5.0 建构 CCNA 实验攻略(5)——WLAN

Packet Tracer 5.0 对网络设备的模拟很真实，在 Packet Tracer 5.0 中操作与真实中操作设备几乎相当。

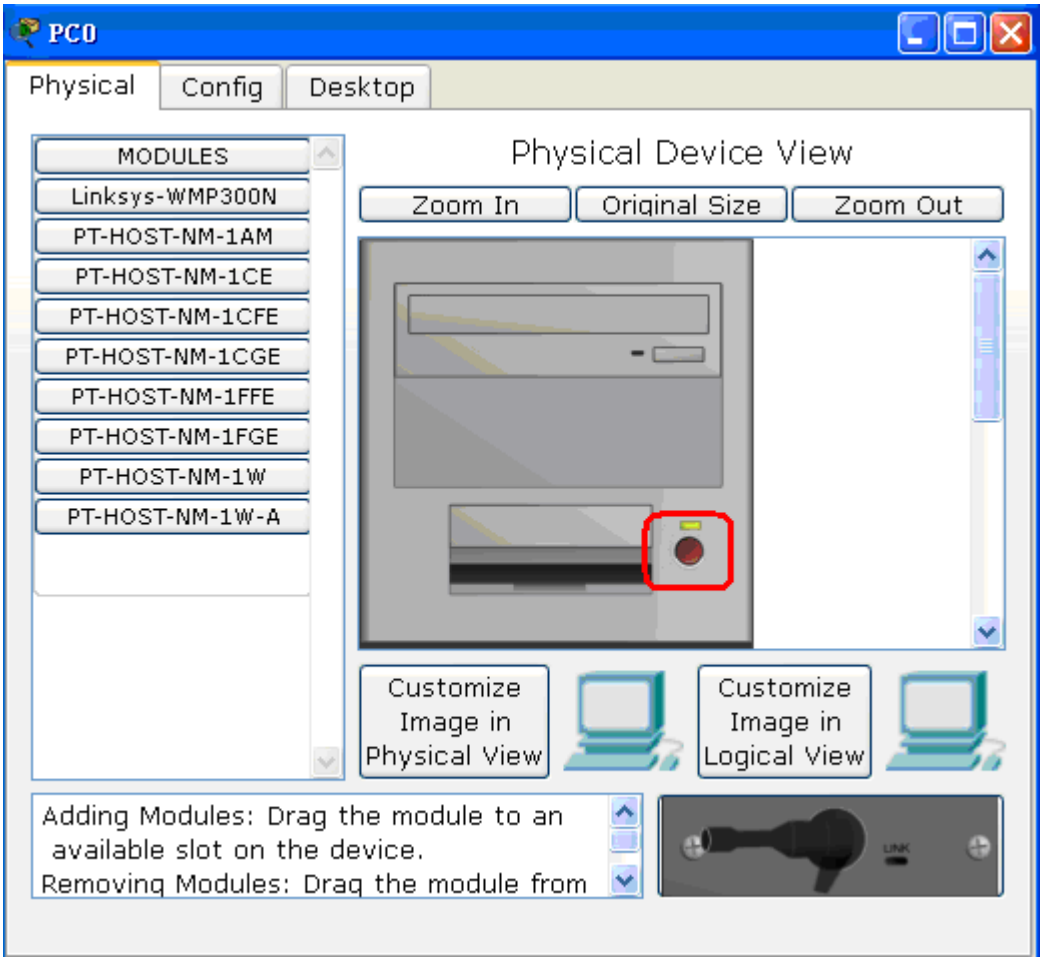
一、配置实例拓扑图

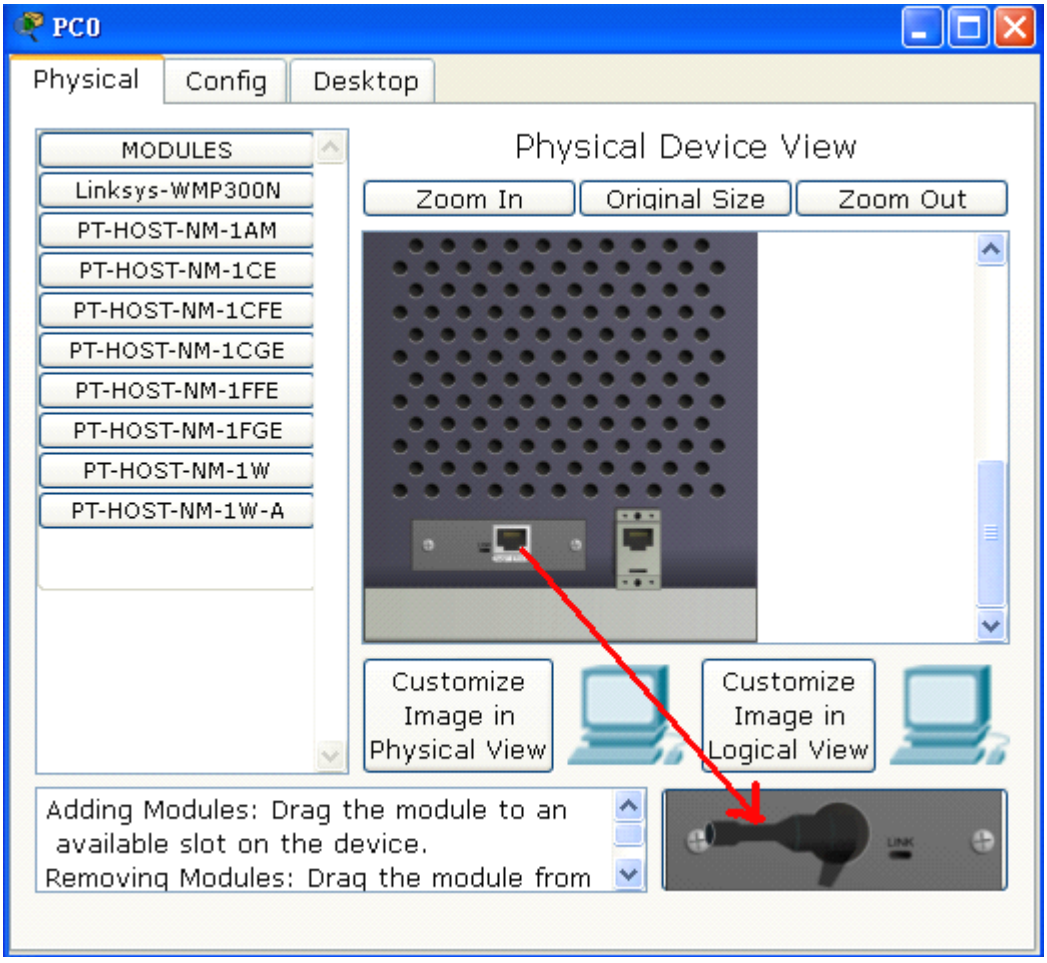


图一

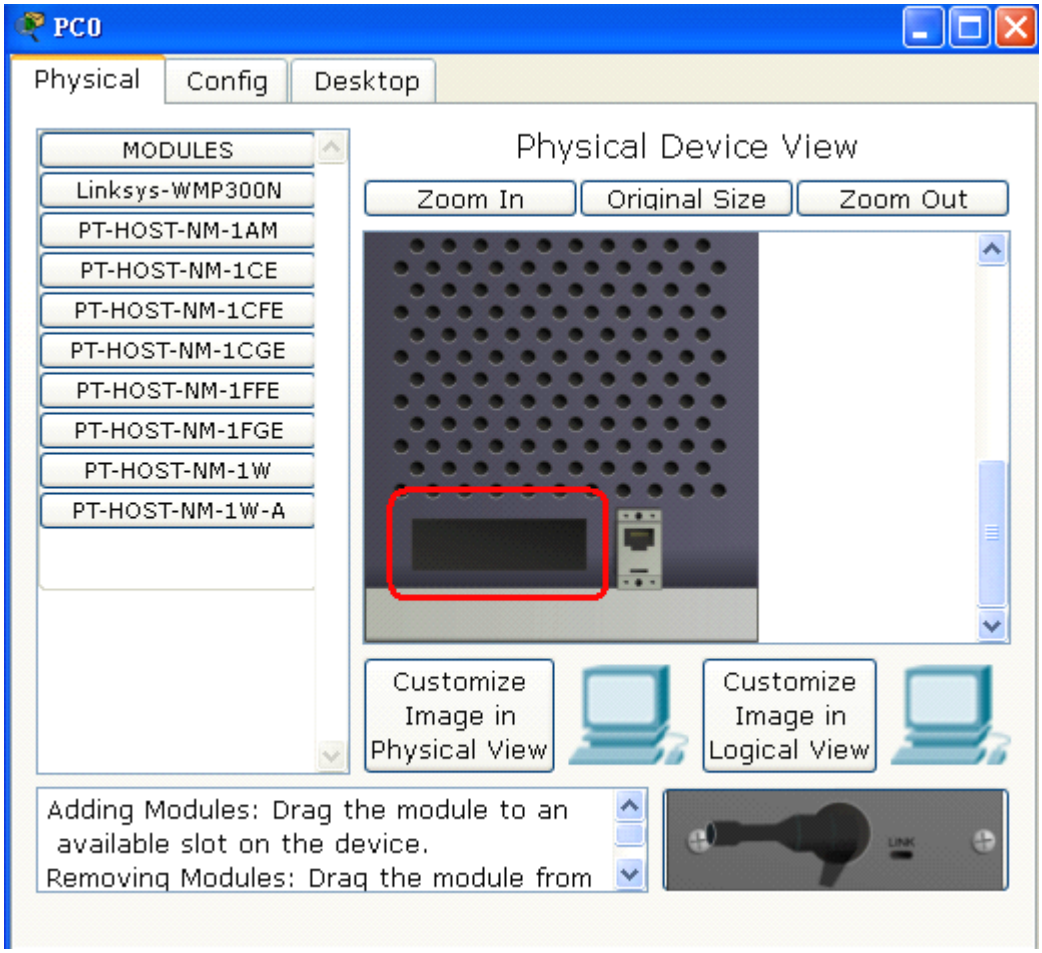
拓扑图的说明：Packet Tracer 5.0 中无线设备是 Linksys WRT300N 无线路由器，该无线路由器共有四个 RJ45 插口，一个 WAN 口，四个 LANEthernet 口；计算机都配置有无线网卡模块，需要我们手动添加该无线网卡模块。计算机添加了无线网卡后会自动与 Linksys WRT300N 相连。在上图中，我另添加了一台计算机与无线路由器的 Ethernet 端口相连，对 Linksys WRT300N 进行配置。

以下是为计算机添加无网卡的步骤，先要关闭计算机电源：

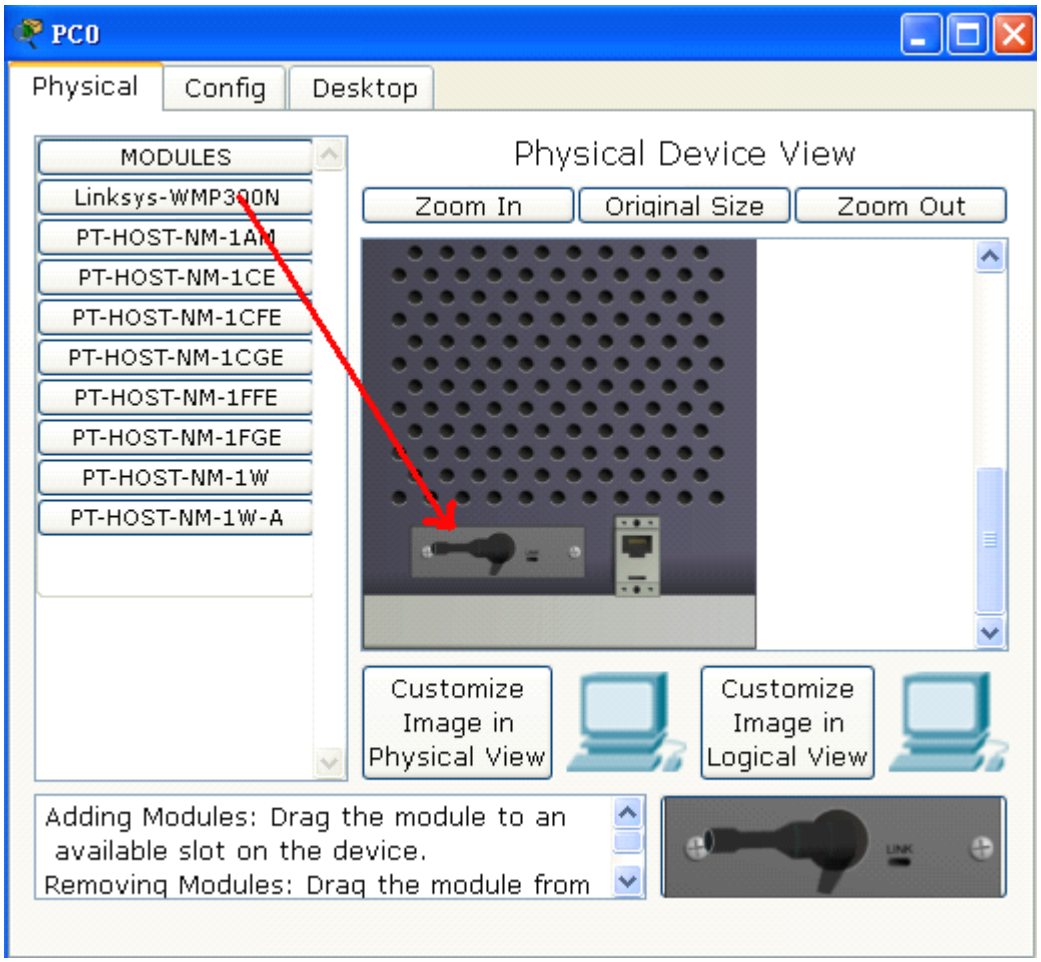




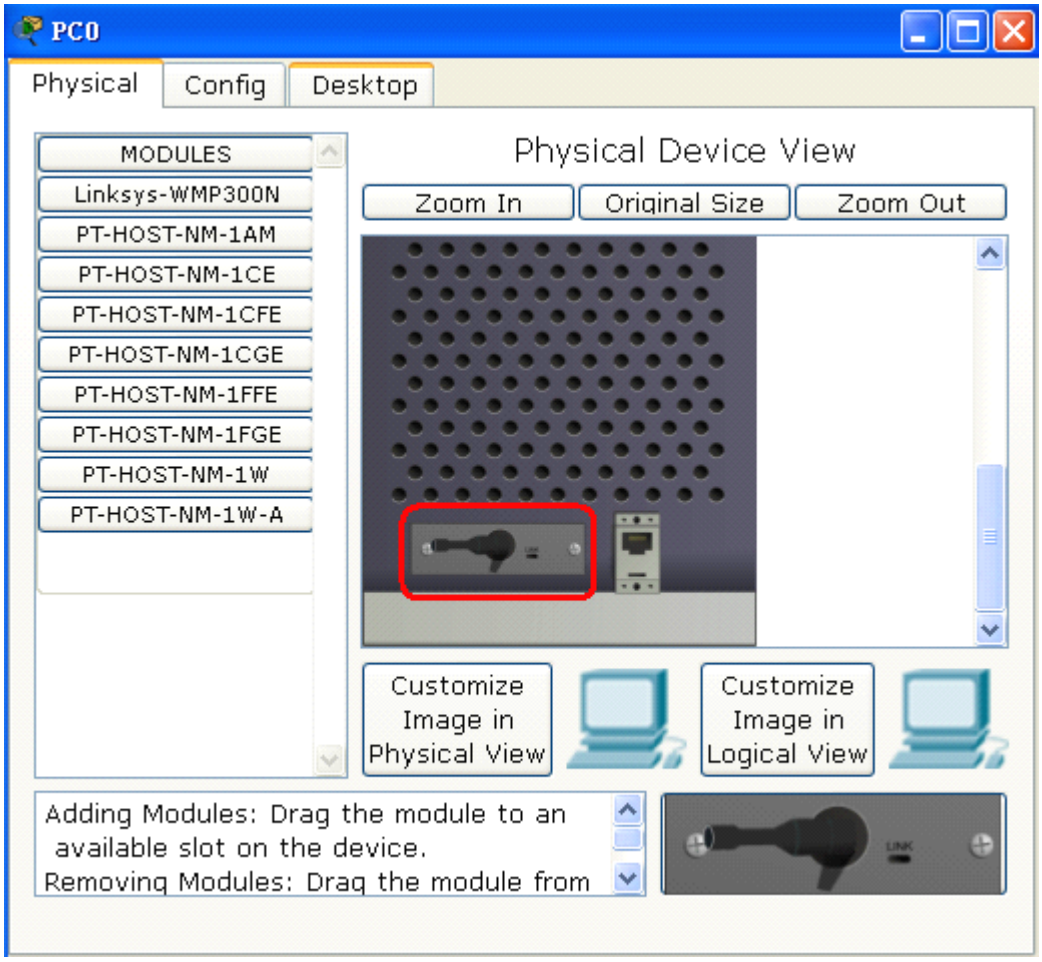
图二　移去计算机的中有线网卡，按箭头方向拖动



图三　此时，插槽为空



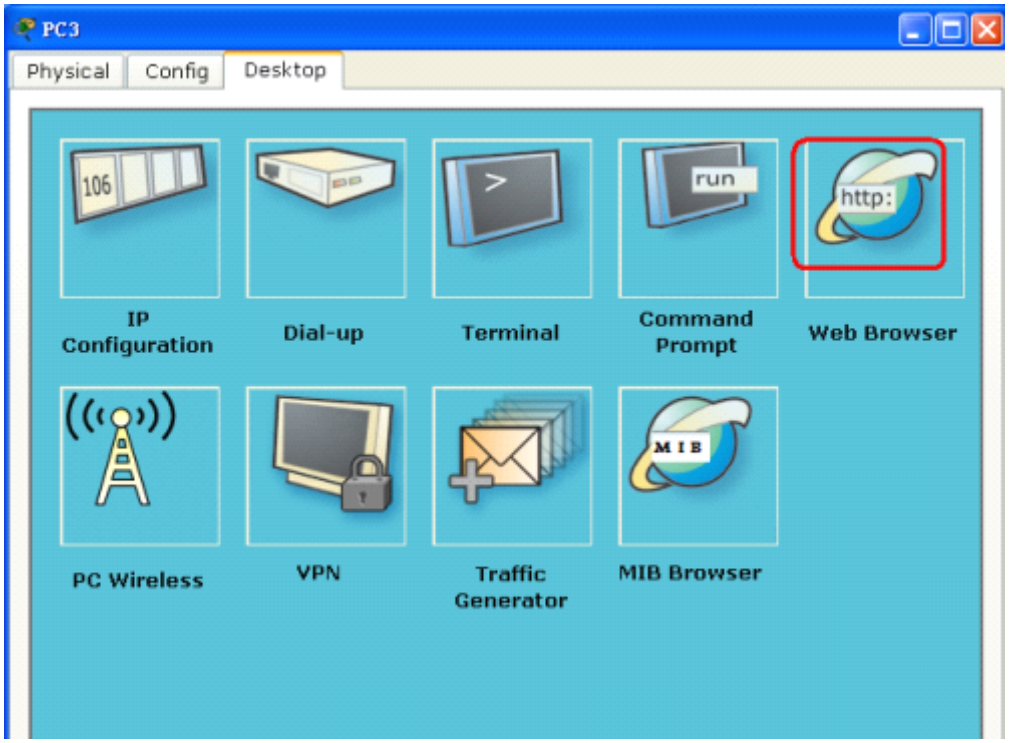
图四　拖动添加无线网卡



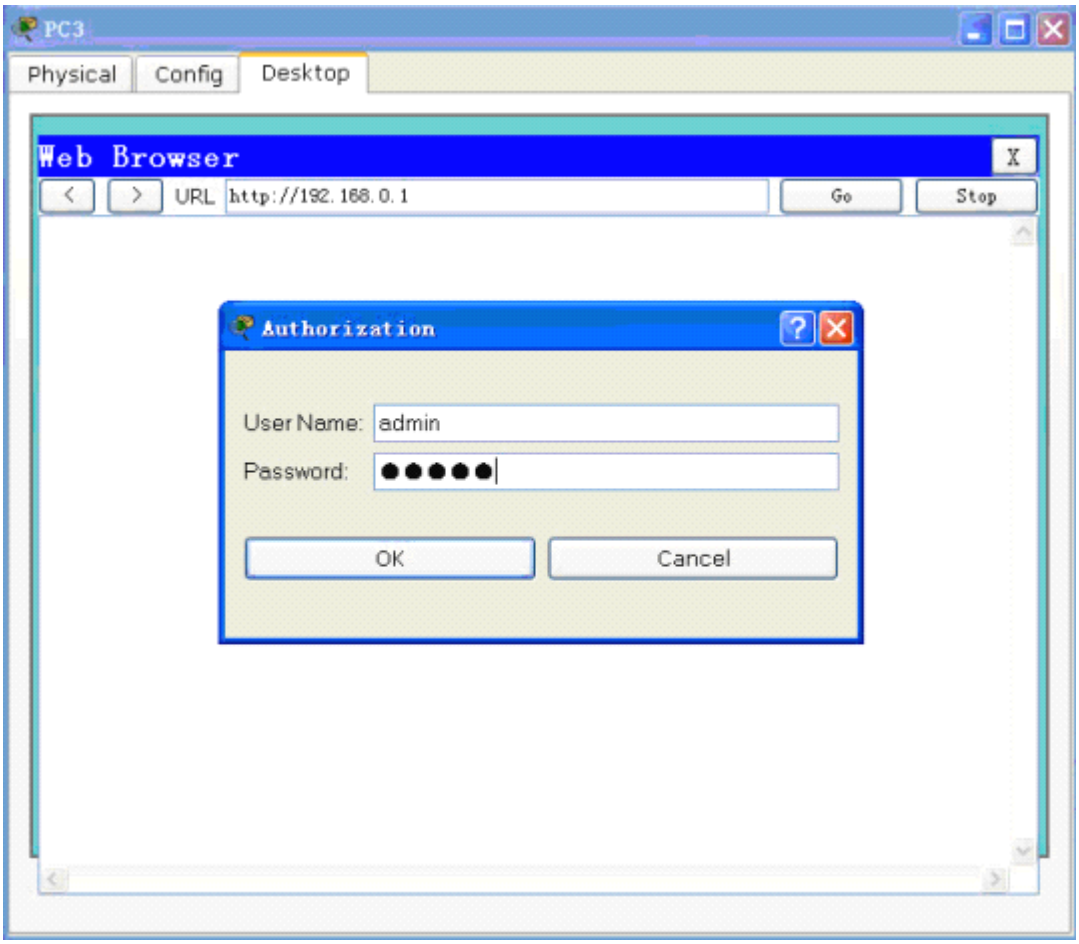
图五　成功添加无线卡

二、配置 Linksys WRT300N

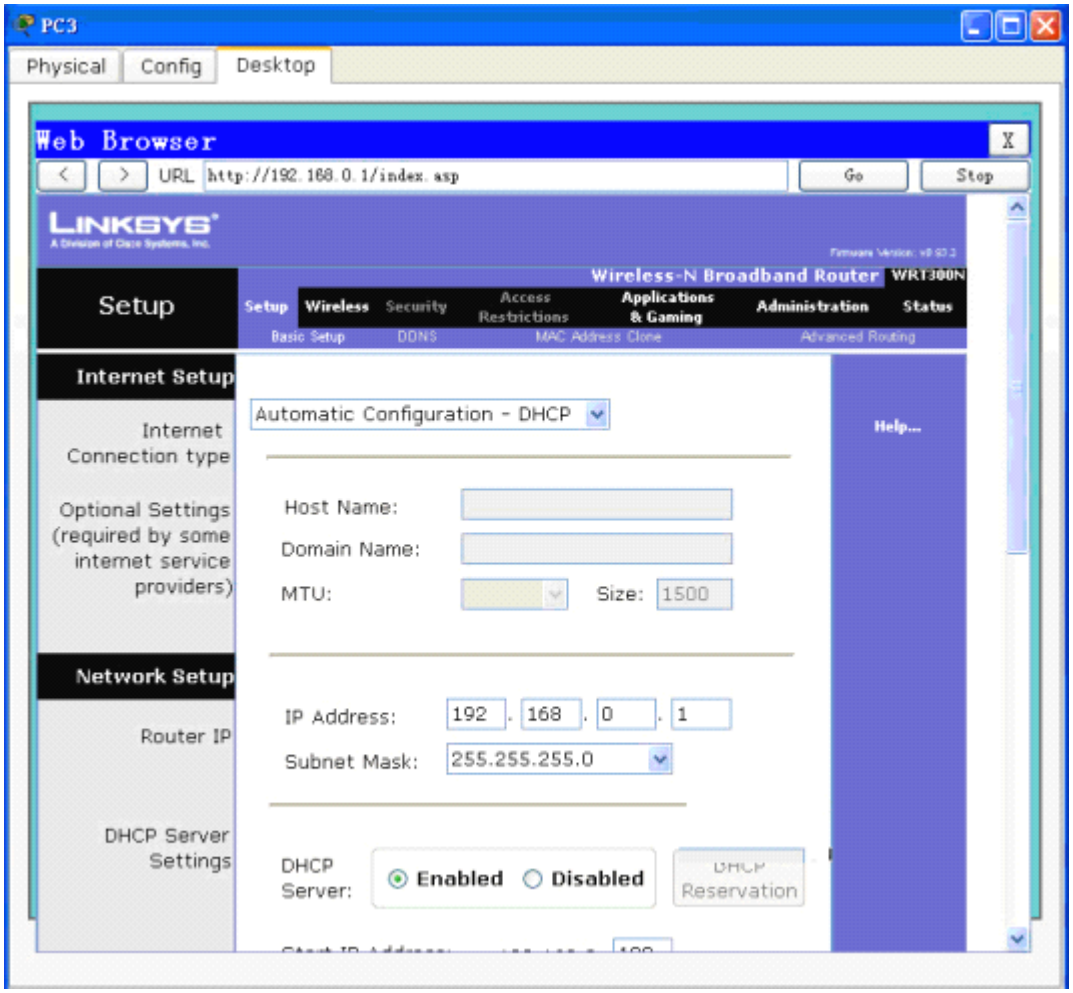
配置 pc3 的 ip 地址与 Linksys WRT300N (默认 ip:192.168.0.1)在同一网段。双击图一中的 PC3，然后切换到“Desktop”选项卡：



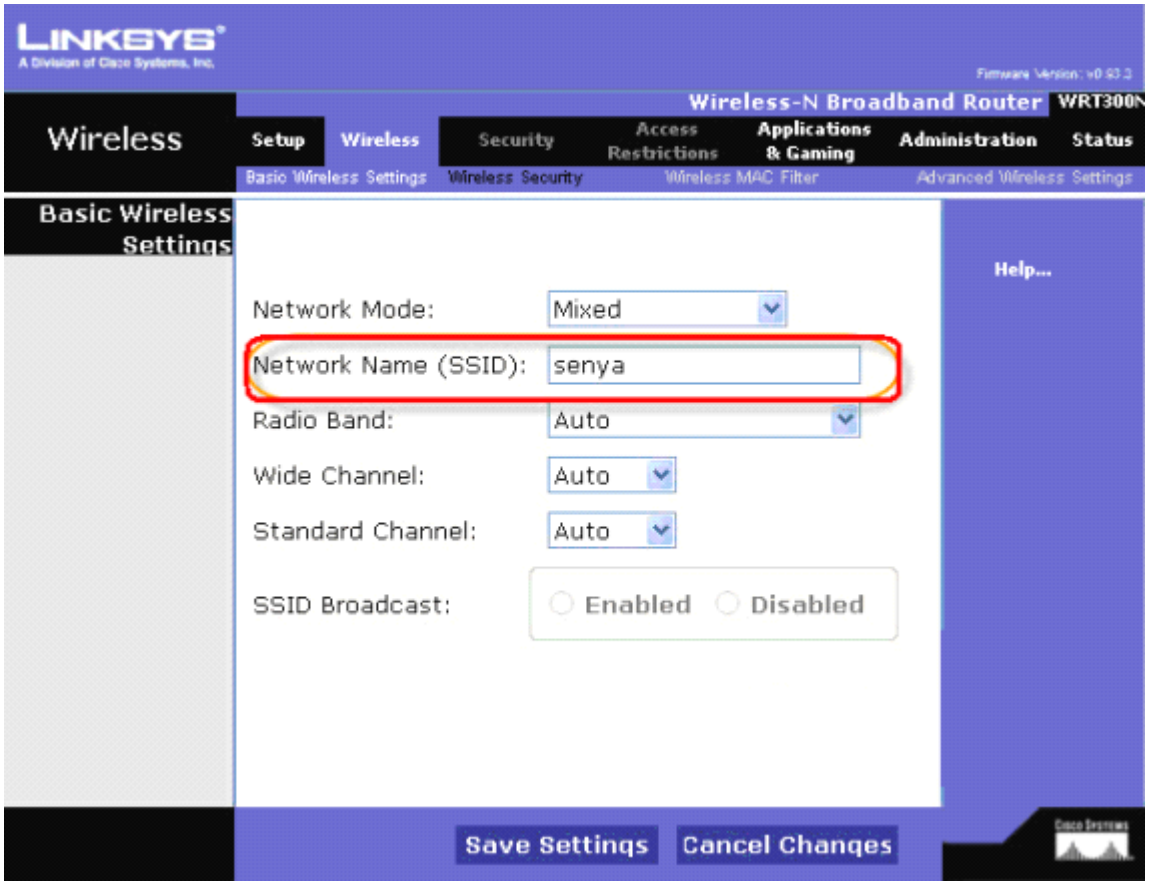
图六



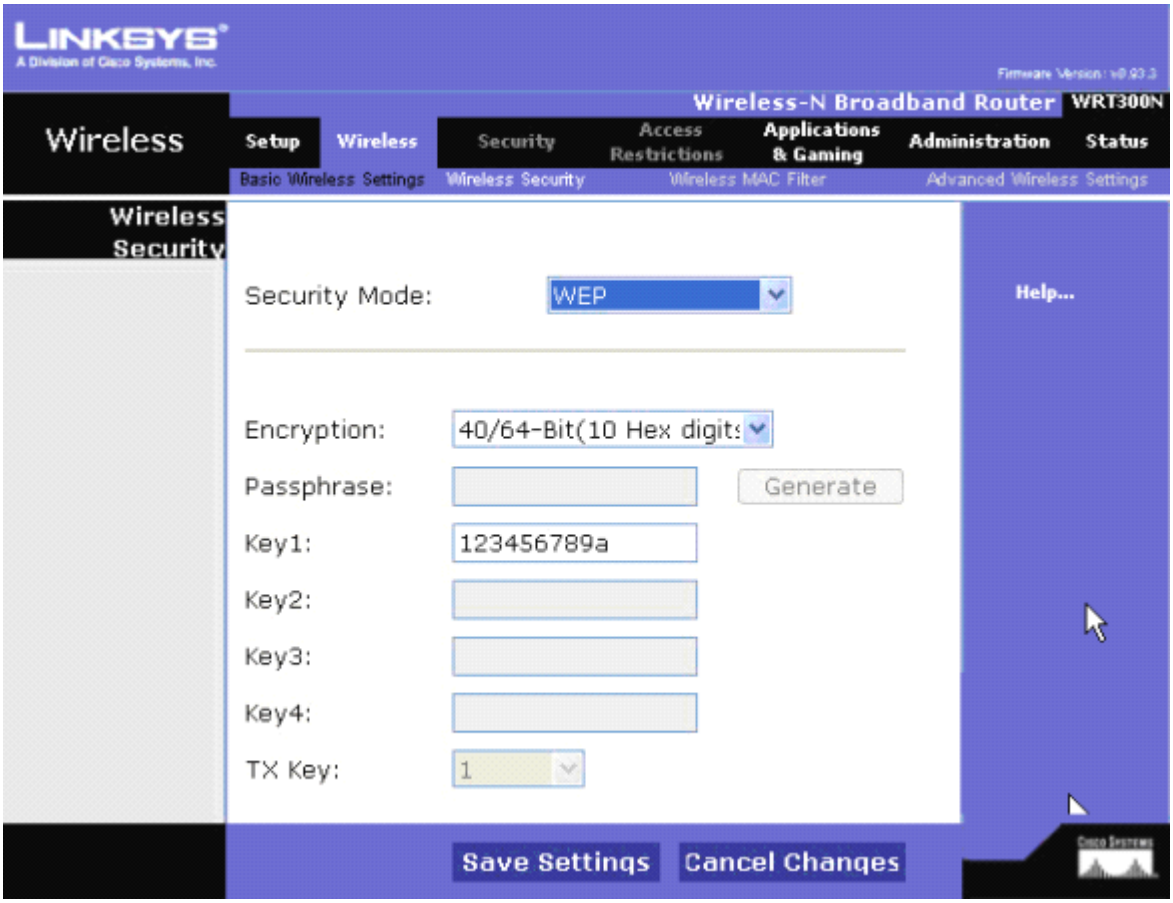
图七　双击“Web Browser”图标运行 web 浏览器



图八　以 web 的方式配置 Linksys WRT300N



图九　配置 WLAN 的 SSID，无线路由器与计算机无线网卡的 SSID 相同



图十　配置 wep 加密密钥

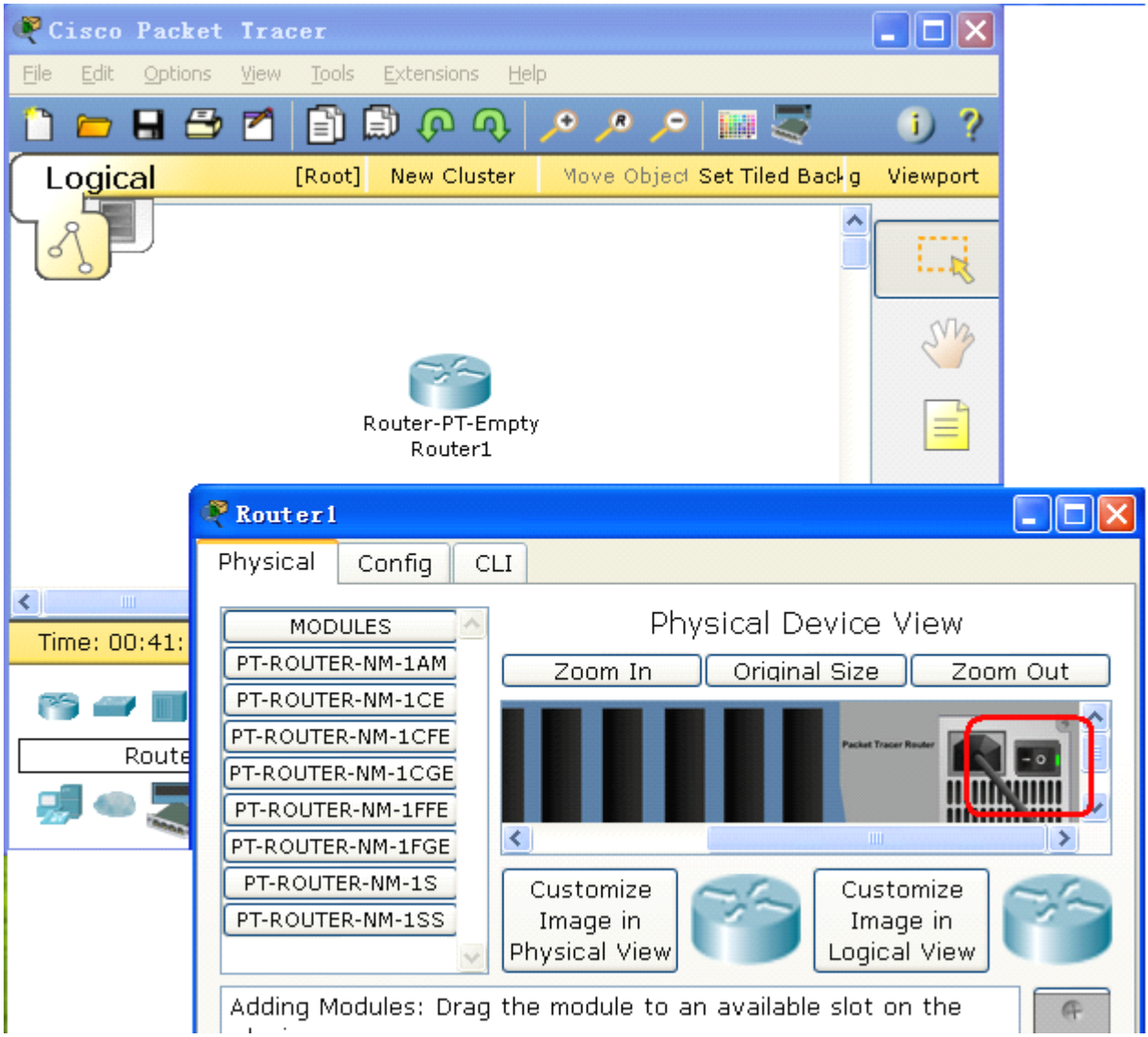
如果对 WLAN 有兴趣，可以更多地配置，使用更多的功能。

Packet Tracer 5.0 建构 CCNA 实验攻略(6)——配置单个的路由器

此次试验目的是了解思科网络设备的配置基本特点及 IOS 命令基本操作方法。这些是配置思科设备的重要前提。

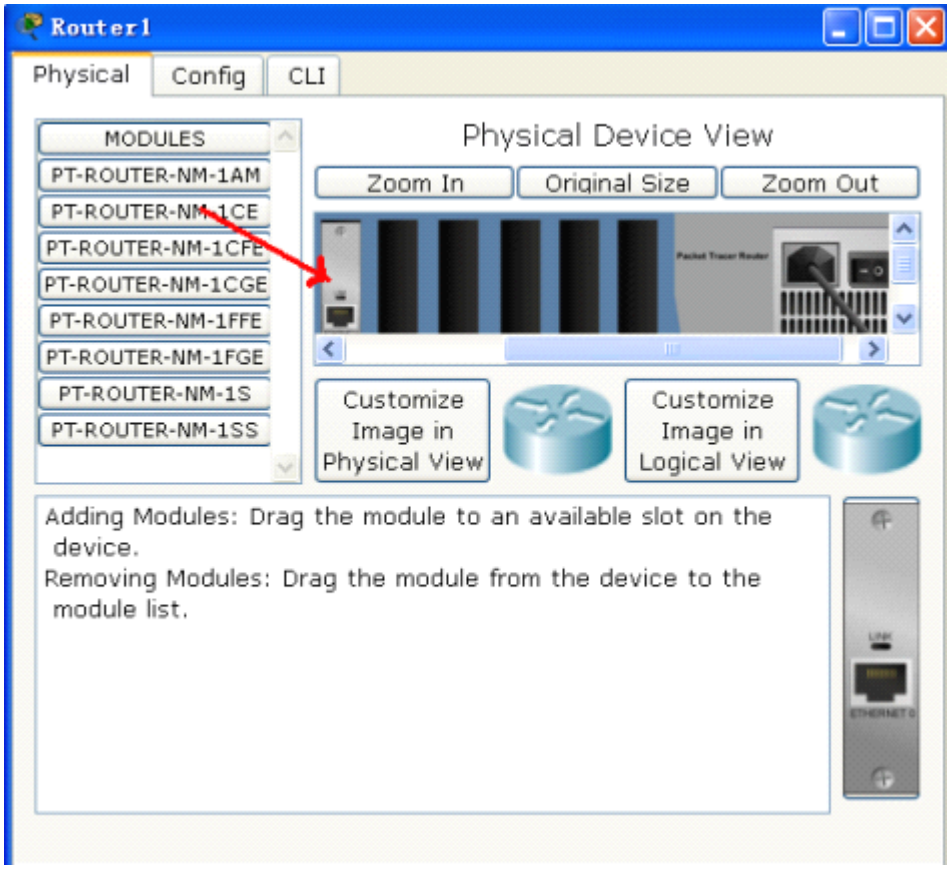
一、实验环境搭建

添加一个模块化的路由器，单击 Packet Tracer 5.0 的工作区中刚添加的路由器，在弹出的配置窗口上添加一些模块：



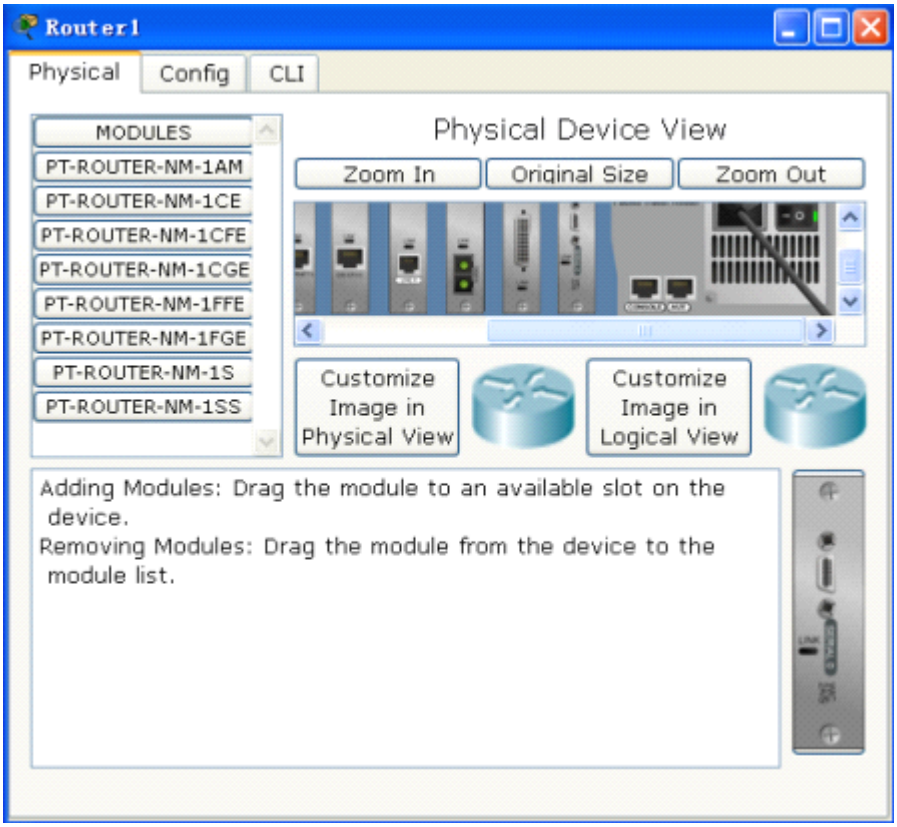
图一

默认情况下，路由器的电源是打开的，添加模块时需要关闭路由器的电源，单击图一箭头所指的电源开关，将其关闭，路由器的电源关闭后绿色的电源指示灯也将变暗。

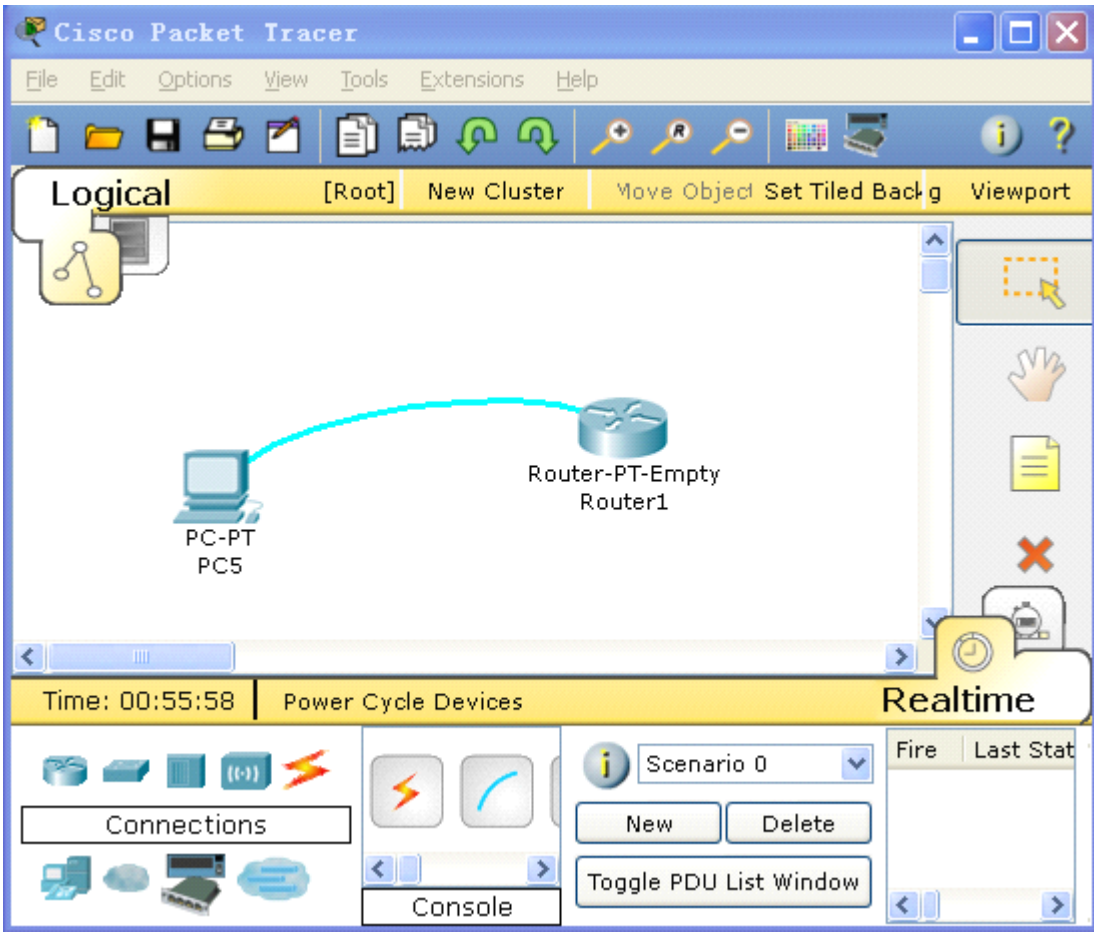


图二　添加所需要的模块

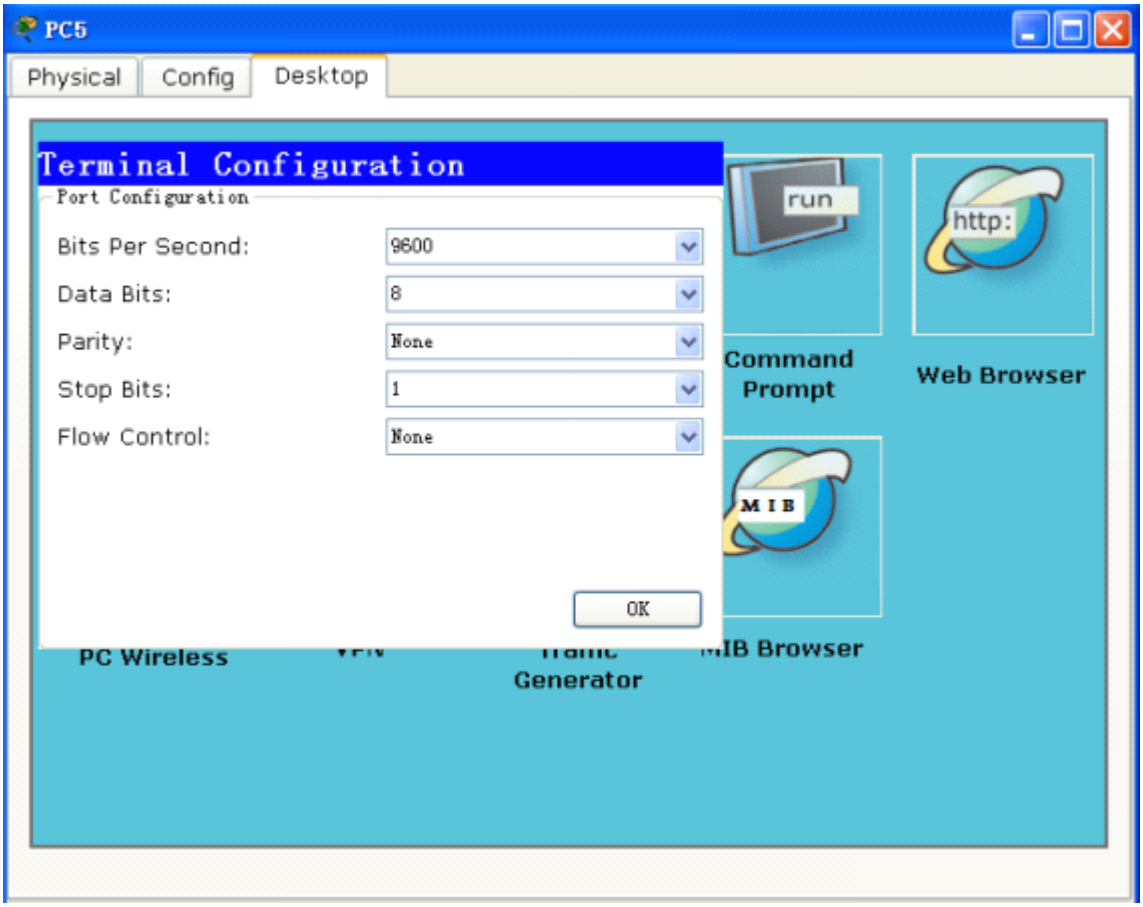
在“MODULES”下寻找所需要的模块，选中某个模块时会在下方显示该模块的信息。然后拖到路由器的空插槽上即可。



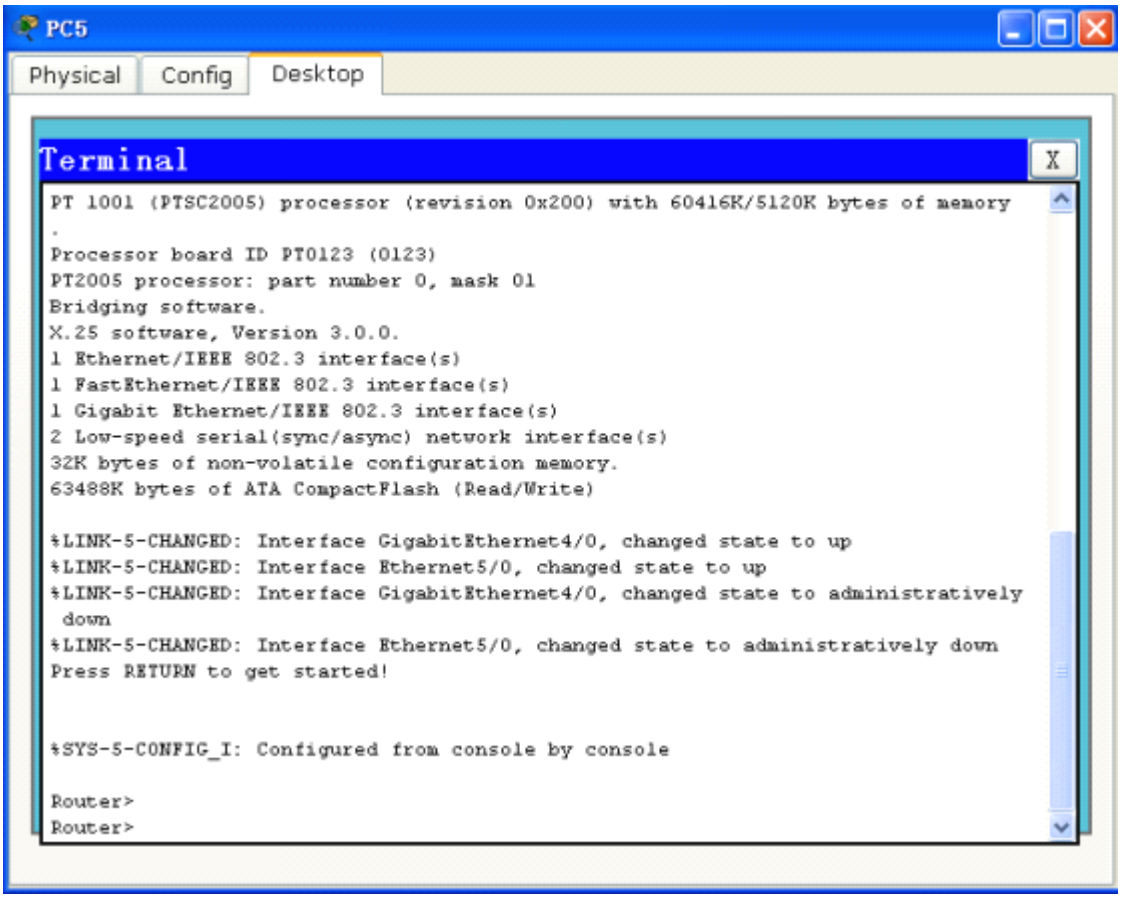
图三　各种模块添加完成，打开路由器的电源



图四　添加一计算机，其 RS-232 与路由器的 Console 端口相连



图五　用计算机的终端连接路由器



图六　实验环境搭建完成

二、配置单个的路由器

路由器的几种模式：User mode(用户模式)、Privileged mode (特权模式)、Global configuration mode(全局配置模式)、Interface mode(接口配置模式)、Subinterface mode(子接口配置模式)、Line mode、Router configuration mode（路由配置模式）。每种模式对应不同的提示符。

```
Router>          user mode
Router>enable
Router#configure terminal   Privileged mode
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface serial 4/0     全局配置模式
Router(config-if)#line con   Interface mode
Router(config-line)#         Line mode
```

图七　几各配置命令提示符

```
Router>
Router>enable
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname SenyaR
SenyaR(config)#
```

图八　配置路由器的名字

```
Router>
Router>enable
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname SenyaR
SenyaR(config)#enable password myrouter

SenyaR>enable
Password:
Password:
Password:
SenyaR#
```

图九 配置 enable 密码

```
SenyaR#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
SenyaR(config)#line con 0
SenyaR(config-line)#password myrouter
SenyaR(config-line)#login
SenyaR(config-line)#
```

图十　配置 Console 登录时的密码

图十一　通过 Console 端口登录到路由器需要输入密码

```
SenyaR(config)#line vty 0 4
SenyaR(config-line)#password senya
SenyaR(config-line)#login
SenyaR(config-line)#
```

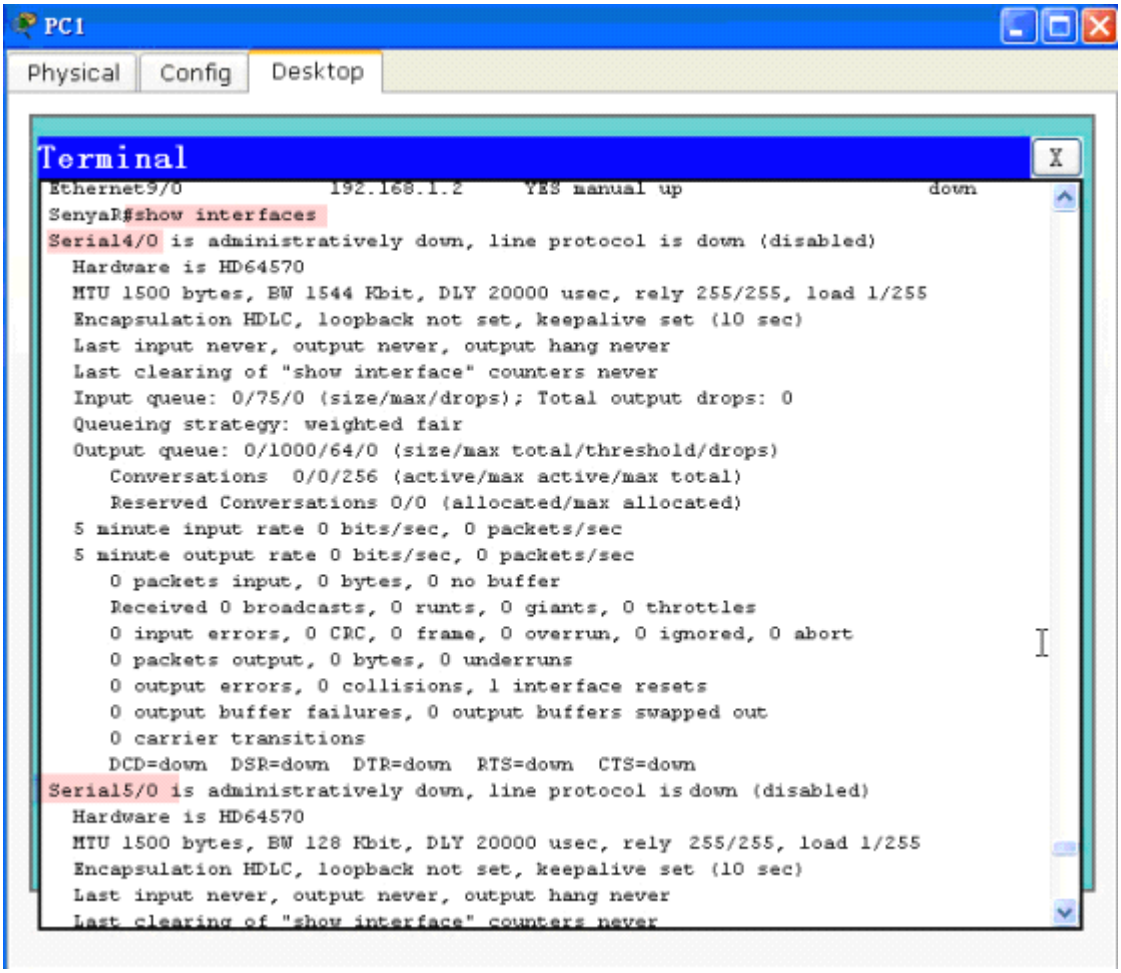
图十二　配置终端登录方式的密码

默认情况下路由器中的各种密码以明文形式保存。在全局配置模式下使用 service password-encryption 命令加密口令。

```
SenyaR#sh ip interface brief
Interface              IP-Address      OK? Method Status                Protocol

Serial4/0              unassigned      YES manual administratively down down

Serial5/0              unassigned      YES manual administratively down down

FastEthernet6/0        unassigned      YES manual administratively down down

GigabitEthernet7/0     unassigned      YES manual administratively down down

FastEthernet8/0        unassigned      YES manual administratively down down

Ethernet9/0            192.168.1.2     YES manual up                    down
SenyaR#
```

图十三　查看路由器接口的 IP 配置信息

首先要明白接口名称表示方式：接口类型 接口数字标识/插槽数字标识，如 Serial 4/0 表示该接口为串口，第一个插槽的第 4 个接口。插槽的数字标识是从零开始的。



图十四　显示所有接口的详细信息

```
SenyaR#show interfaces fa 6/0
FastEthernet6/0 is administratively down, line protocol is down (disabled)
  Hardware is Lance, address is 00e0.f75c.caa2 (bia 00e0.f75c.caa2)
  MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set
  ARP type: ARPA, ARP Timeout 04:00:00,
  Last input 00:00:08, output 00:00:05, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy: fifo
  Output queue :0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 input packets with dribble condition detected
     0 packets output, 0 bytes, 0 underruns
     0 output errors, 0 collisions, 1 interface res
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier
     0 output buffer failures, 0 output buffers swapped out
```

图十五　显示某个指定端口的详细信息

```
SenyaR(config)#banner login #Hello,Welcome Administrator#
SenyaR(config)#
```

图十六　配置登录时的欢迎信息

```
SenyaR#write
Building configuration...
[OK]
SenyaR#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
```

图十七　保存配置信息

```
SenyaR#show ?
  access-lists    List access lists
  arp             Arp table
  cdp             CDP information
  clock           Display the system clock
  controllers     Interface controllers status
  crypto          Encryption module
  debugging       State of each debugging option
  dhcp            Dynamic Host Configuration Protocol status
  flash:          display information about flash: file system
  frame-relay     Frame-Relay information
  history         Display the session command history
  hosts           IP domain-name, lookup style, nameservers, and host table
  interfaces      Interface status and configuration
  ip              IP information
  ospf            For OSPF debug only
  ospfv3          For OSPFv3 debug only
  processes       Active process statistics
  protocols       Active network routing protocols
  running-config  Current operating configuration
  sessions        Information about Telnet connections
  ssh             Status of SSH server connections
  startup-config  Contents of startup configuration
 --More--
```

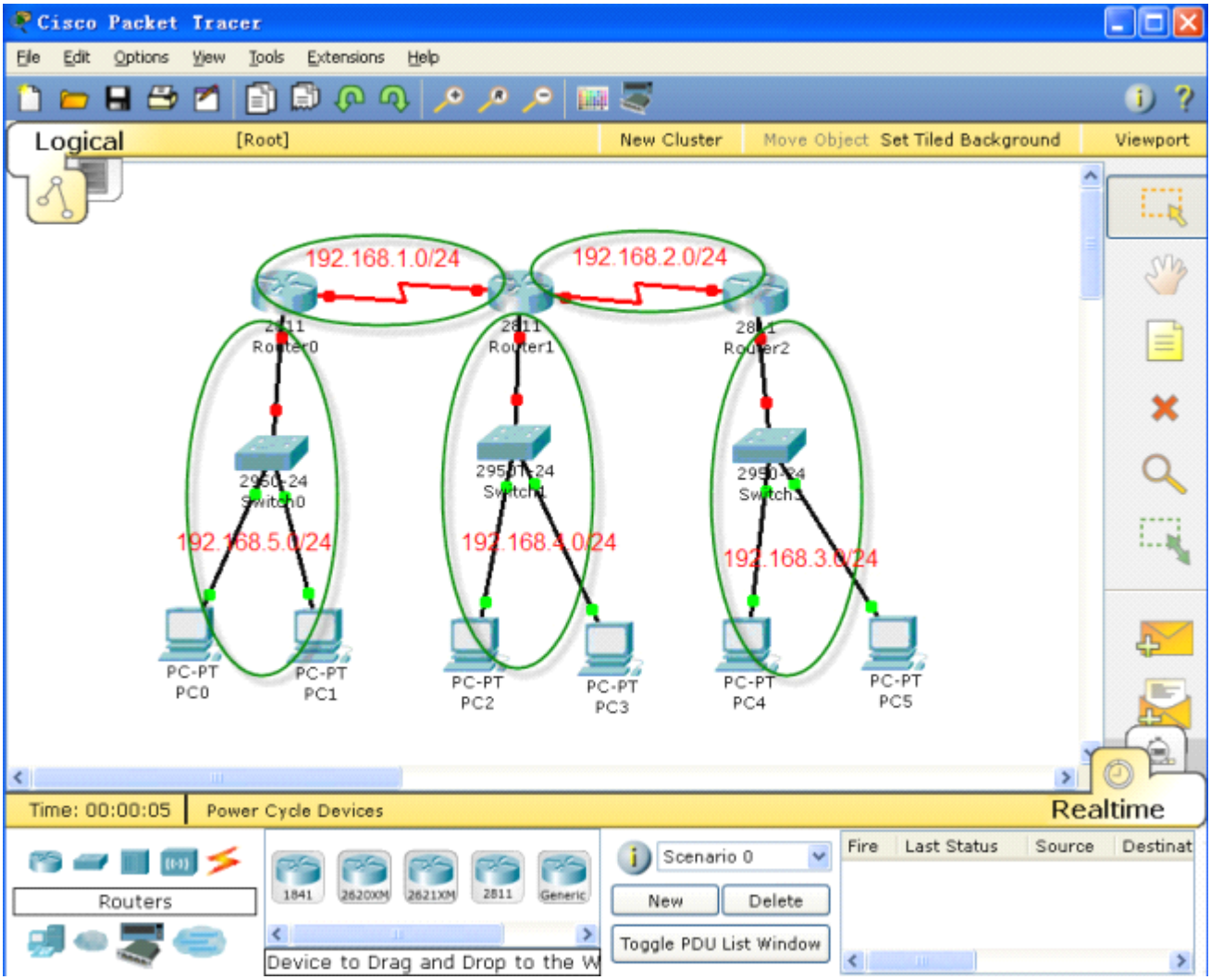
图十八　各显示显示信息的命令

思科的 IOS 命令非常庞大，不同的硬件，不同的版本，它们的命令是不同的。只有多练习才能掌握。

Packet Tracer 5.0 建构 CCNA 实验攻略(7)——配置静态路由

静态路由是非自适应性路由计算协议，是由管理人员手动配置的，不能够根据网络拓扑的变化而改变。因此，静态路由非常简单，适用于非常简单的网络。

一、实验环境构建



图一

网络拓扑图说明：路由器的串口是背对背的直接连接，因此，有一个串口要配置时钟速率，使用 clock rate 命令进行配置，配置时钟速率的一串口为 DCE 端。

二、配置实验

1、基本配置

```
239K bytes of non-volatile configuration memory.
62720K bytes of  ATA CompactFlash (Read/Write)
Cisco IOS Software, 2800 Software (C2800NM-ADVIPSERVICESK9-M), Version 12.4(15)T
1, RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2007 by Cisco Systems, Inc.
Compiled Wed 18-Jul-07 06:21 by pt_rel_team


         --- System Configuration Dialog ---

Continue with configuration dialog? [yes/no]: no


Press RETURN to get started!



Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname Router0
Router0(config)#
```

图二 配置路由器、交换机的名字

```
Router0(config-if)#ip address 192.168.5.1 255.255.255.0
Router0(config-if)#no shutdown

%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state t
o up
Router0(config-if)#
```

图三　配置路由器 FastEthernet 接口 IP 地址

```
Router0(config-if)#interface seria 1/0/0
Router0(config-if)#ip address 192.168.1.1 255.255.255.0
Router0(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial1/0/0, changed state to down
Router0(config-if)#
```

图四　配置路由器 Serial 口 ip 地址

```
Router1(config)#interface serial 0/3/0
Router1(config-if)#clock rate 64000
Router1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/3/0, changed state to up
```

图五　设置串口时钟速率(DCE)

由于实验环境中的路由器是背对背连接（直接连接）因此把两个背对背连接的串口其中一个设置为 DCE。

2、配置各个路由器上的静态路由

```
Router0#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router0(config)#ip route 192.168.4.0 255.255.255.0 192.168.1.2
Router0(config)#exit
%SYS-5-CONFIG_I: Configured from console by console
Router0#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, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

C    192.168.1.0/24 is directly connected, Serial1/0/0
S    192.168.2.0/24 [1/0] via 192.168.1.2
S    192.168.4.0/24 [1/0] via 192.168.1.2
C    192.168.5.0/24 is directly connected, FastEthernet0/0
Router0#
```

图六　配置 Router0 的静态路由，并查看路由表

```
Router3#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router3(config)#no ip route 192.168.1.0 255.255.255.0 192.168.2.1
```

图七　删除一条静态路由表

```
Router3(config)#ip route 0.0.0.0 0.0.0.0 serial 0/3/0
Router3(config)#exit
```

图八　配置默认路由

```
interface Serial1/0/0
 ip address 192.168.1.1 255.255.255.0
 clock rate 64000
!
interface Vlan1
 no ip address
 shutdown
!
ip classless
ip route 192.168.2.0 255.255.255.0 192.168.1.2
ip route 192.168.4.0 255.255.255.0 192.168.1.2
ip route 192.168.3.0 255.255.255.0 192.168.1.2
!
!
!
!
!
line con 0
line vty 0 4
 login
```

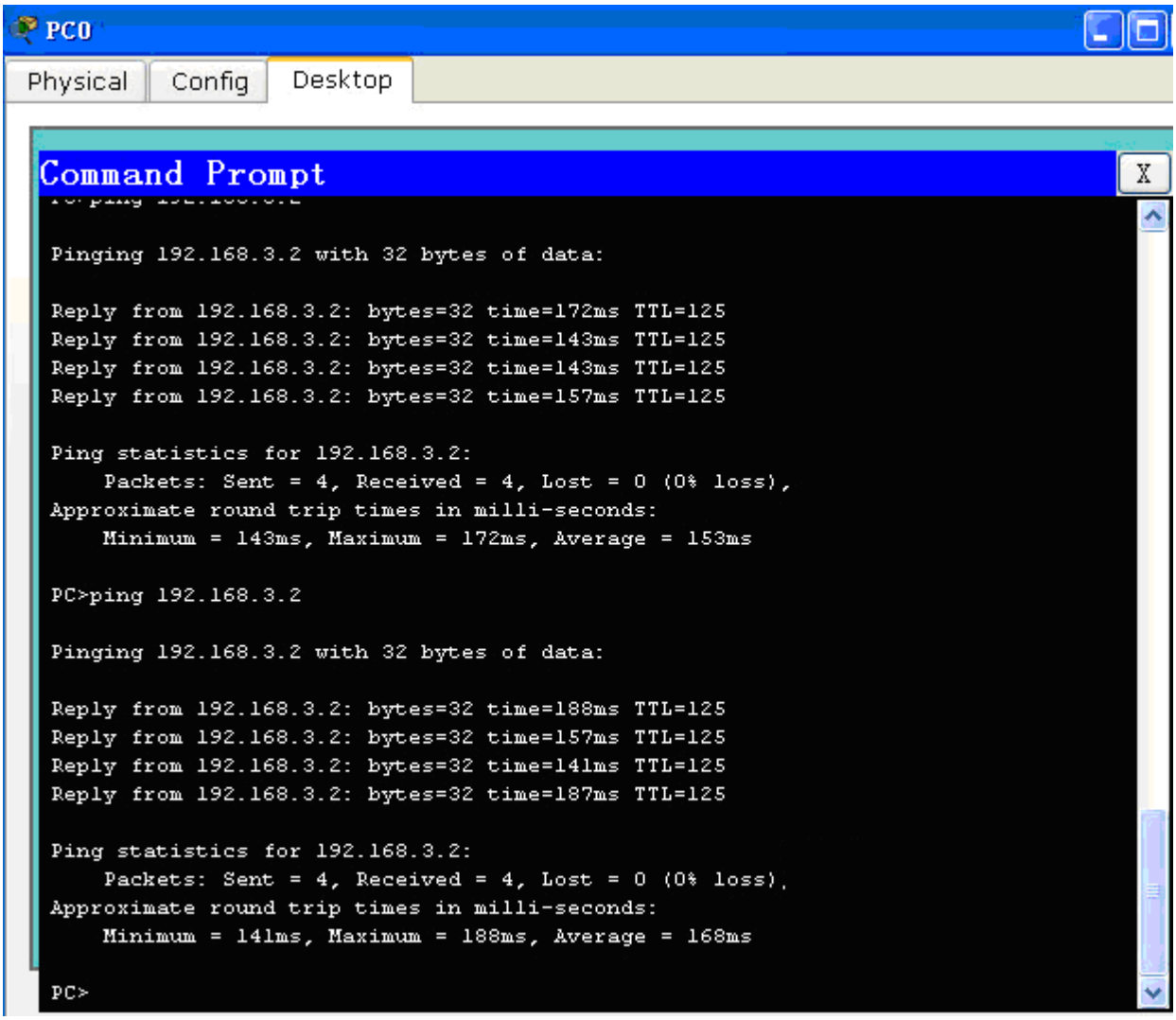
图九　本实验环境中 Router0 的静态路由配置

```
  ip classless
  ip route 192.168.5.0 255.255.255.0 192.168.1.1
  ip route 192.168.3.0 255.255.255.0 192.168.2.2
  !
```

图十　本实验环境中 Router 1 的静态路由配置

```
ip classless
ip route 0.0.0.0 0.0.0.0 Serial0/3/0
!
```

图十一　本实验环境中 Router 3 的默认路由配置



图十二　PC0 ping 通 PC5，验证配置

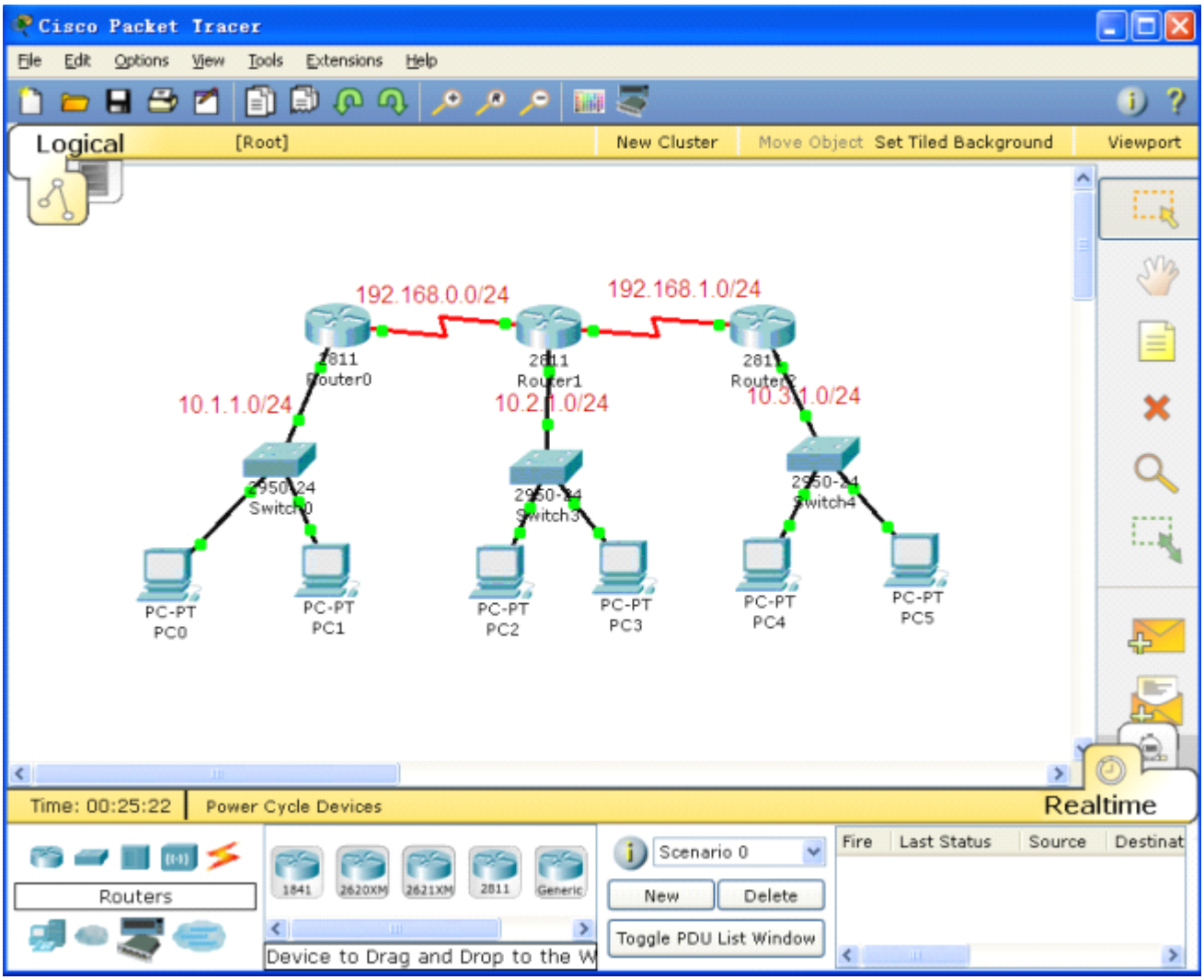
虽然说静态路由简单，不常使用，随着互联网用户、计算机的增加，路由表越来越庞大，配置默认路由往往也很重要。

Packet Tracer 5.0 建构 CCNA 实验攻略(8)——配置动态路由 RIP

动态路由协议采用自适应路由算法，能够根据网络拓扑的变化而重新计算机最佳路由。由于路由的复杂性，路由算法也是分层次的，通常把路由协议（算法）划分为自治系统(AS)内的(IGP, Interior Gateway Protocol)与自治系统之间(EGP, External Gateway Protocol)的路由协议。

RIP 的全称是 Routing Information Protocol, 是 IGP，采用 Bellman-Ford 算法。RFC1058 是 RIP version 1 标准文件，RFC2453 是 RIP Version 2 的标准文档。

一、实验环境构建



图一

实验环境中各个网段与路由器接口 IP 地址分配如上图所示。

二、RIP 协议基本配置命令

Router(config)#ip classless　让路由器支持无类编址，RIPv1 是不支持无类 IP 编址的。

RIP 基本配置命令：

Router(config)#router rip

Router(config-router)#network w.x.y.z

可选的配置命令：

Router(config)#no router rip　在路由器上关闭 RIP 协议

Router(config-router)#no network w.x.y.z　从 RIP 协议中移除 w.x.y.z 网络

Router(config-router)#version 2　RIP 协议为第 2 版

Router(config-if)#ip rip send version 2　该接口仅发送 RIP ver 2 报文

Router(config-if)#ip rip send version 1　该接口仅发送 RIP ver 1 报文

Router(conifg-if)#ip rip send version 1 2　该接口发送 RIP ver 1 报文和 RIP ver 2 报文

Router(config-if)#ip rip receive version 2　该接口仅接收 RIP ver 2 报文

Router(config-router)#no auto-summary　关闭路由协议的自动聚合功能

Router(config-router)#ip split-horizon　配置水平分割

```
Router0(config-if)#ip split-horizon
Router0(config-if)#
```

图二

三、RIP 配置实验

首选根据实验需要配置好 PC 机及路由器各个接口的 IP 地址等参数。

1、三个路由器的基本配置

```
Router0(config)#int serial0/3/0
Router0(config-if)#
Router0(config-if)#clock rate 64000
Router0(config-if)#ip address 192.168.0.1 255.255.255.0
Router0(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/3/0, changed state to down
Router0(config-if)#int fa0/0
Router0(config-if)#ip address 10.1.1.1 255.255.255.0
Router0(config-if)#no shut

%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state t
o up
Router0(config-if)#
%LINK-5-CHANGED: Interface Serial0/3/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/3/0, changed state to up

Router0(config-if)#
Router0(config-if)#end
%SYS-5-CONFIG_I: Configured from console by console
Router0#sh 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
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route,
       P - periodic downloaded static route

Gateway of last resort is not set
```

图三

基本配置主要是配置路由器的名字，安全密码，各个端口的 IP 地址等。仅一个路由器配置为例，其余的路由器与该路由器配置相似。

2、RIP 路由协议配置

```
Router0(config)#router rip
Router0(config-router)#network 10.1.1.0
Router0(config-router)#network 192.168.0.0
Router0(config-router)#
```

图四　Router0 的配置；10.0.0.0 是 B 类网络，前 8bits 是网络 ID，在配置时应该是 netwok 10.0.0.0

```
Router1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router1(config)#router rip
Router1(config-router)#network 10.0.0.0
Router1(config-router)#network 192.168.0.0
Router1(config-router)#network 192.168.1.0
Router1(config-router)#
```

图五　Router1 的配置

```
Router2#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router2(config)#router rip
Router2(config-router)#network 10.0.0.0
Router2(config-router)#network 192.168.1.0
Router2(config-router)#
```

图六　Rotuer2 的配置

```
Router0#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router0(config)#router rip
Router0(config-router)#version 2
```

```
router rip
 version 2
 network 10.0.0.0
 network 192.168.0.0
```

图七　给每个路由器 RIP 协议启用第二版

3、RIP 路由协议的诊断与排错

```
Router1#sh 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, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
R       10.0.0.0/8 [120/1] via 192.168.0.1, 00:00:18,Serial0/3/0
                   [120/1] via 192.168.1.2, 00:00:01,Serial0/3/1
C       10.2.1.0/24 is directly connected, FastEthernet
C    192.168.0.0/24 is directly connected, Serial0/3/0
C    192.168.1.0/24 is directly connected, Serial0/3/1
Router1#
```

图八　查看路由表 show ip route

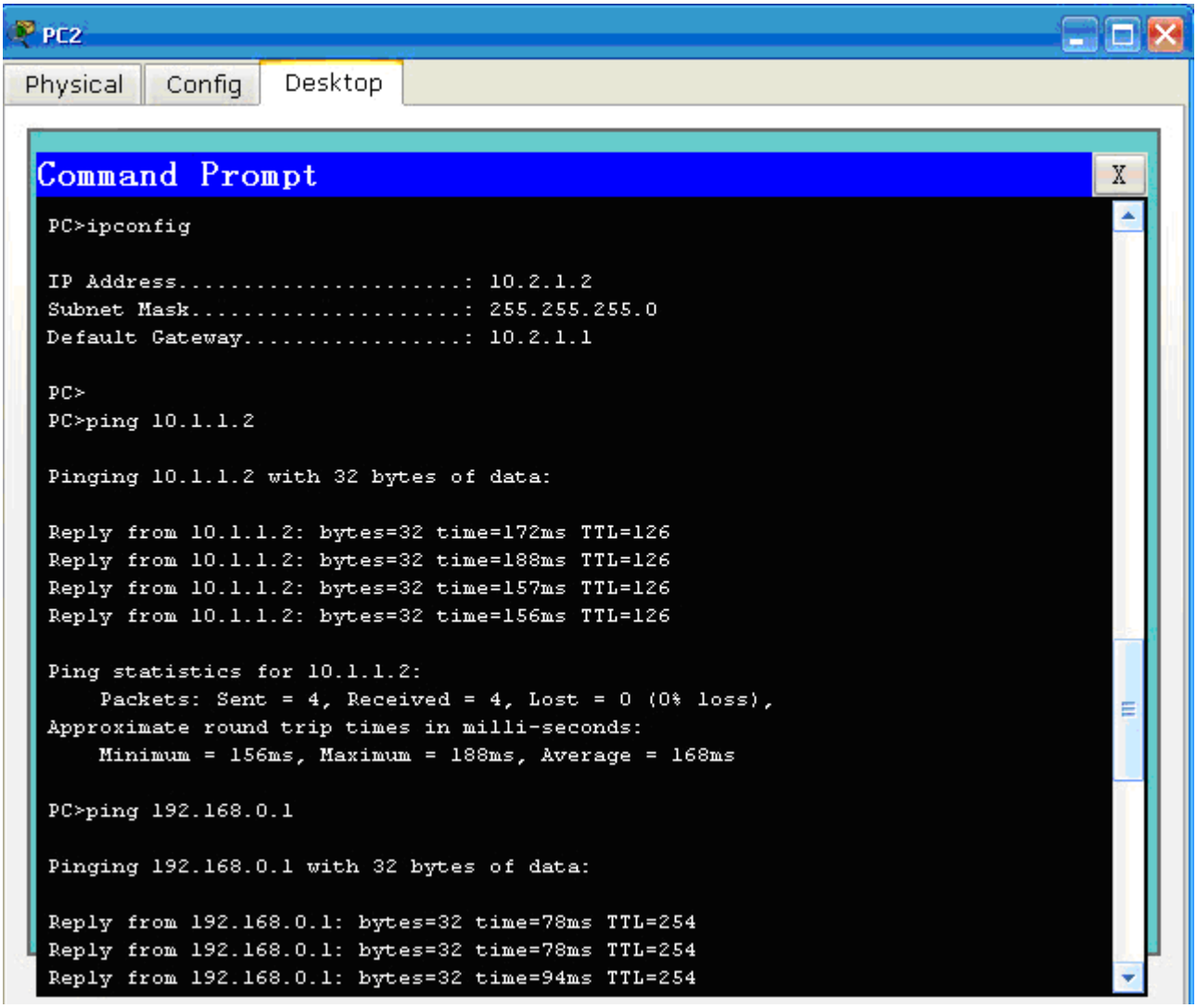
```
Router1#sh ip rip database
10.0.0.0/8
    [1] via 192.168.0.1, 00:00:19, Serial0/3/0
    [1] via 192.168.1.2, 00:00:01, Serial0/3/1
10.2.1.0/24        directly connected, FastEthernet0/0
192.168.0.0/24     directly connected, Serial0/3/0
192.168.1.0/24     directly connected, Serial0/3/1
Router1#
```

图九　show ip rip database

```
Router1#debug ip rip
RIP protocol debugging is on
Router1#RIP: sending  v2 update to 224.0.0.9 via Serial0/3/0 (192.168.0.2)
RIP: build update entries
      10.0.0.0/8 via 0.0.0.0, metric 1, tag 0
      192.168.1.0/24 via 0.0.0.0, metric 1, tag 0
RIP: sending  v2 update to 224.0.0.9 via Serial0/3/1 (192.168.1.1)
RIP: build update entries
      10.0.0.0/8 via 0.0.0.0, metric 1, tag 0
      192.168.0.0/24 via 0.0.0.0, metric 1, tag 0
RIP: sending  v2 update to 224.0.0.9 via FastEthernet0/0 (10.2.1.1)
RIP: build update entries
      10.0.0.0/8 via 0.0.0.0, metric 2, tag 0
      192.168.0.0/24 via 0.0.0.0, metric 1, tag 0
      192.168.1.0/24 via 0.0.0.0, metric 1, tag 0
```

图十　debug ip rip 开启 RIP 诊断，no debug ip rip 关闭 RIP 诊断

4、使用计算机不同网段互 ping 检查网络连通

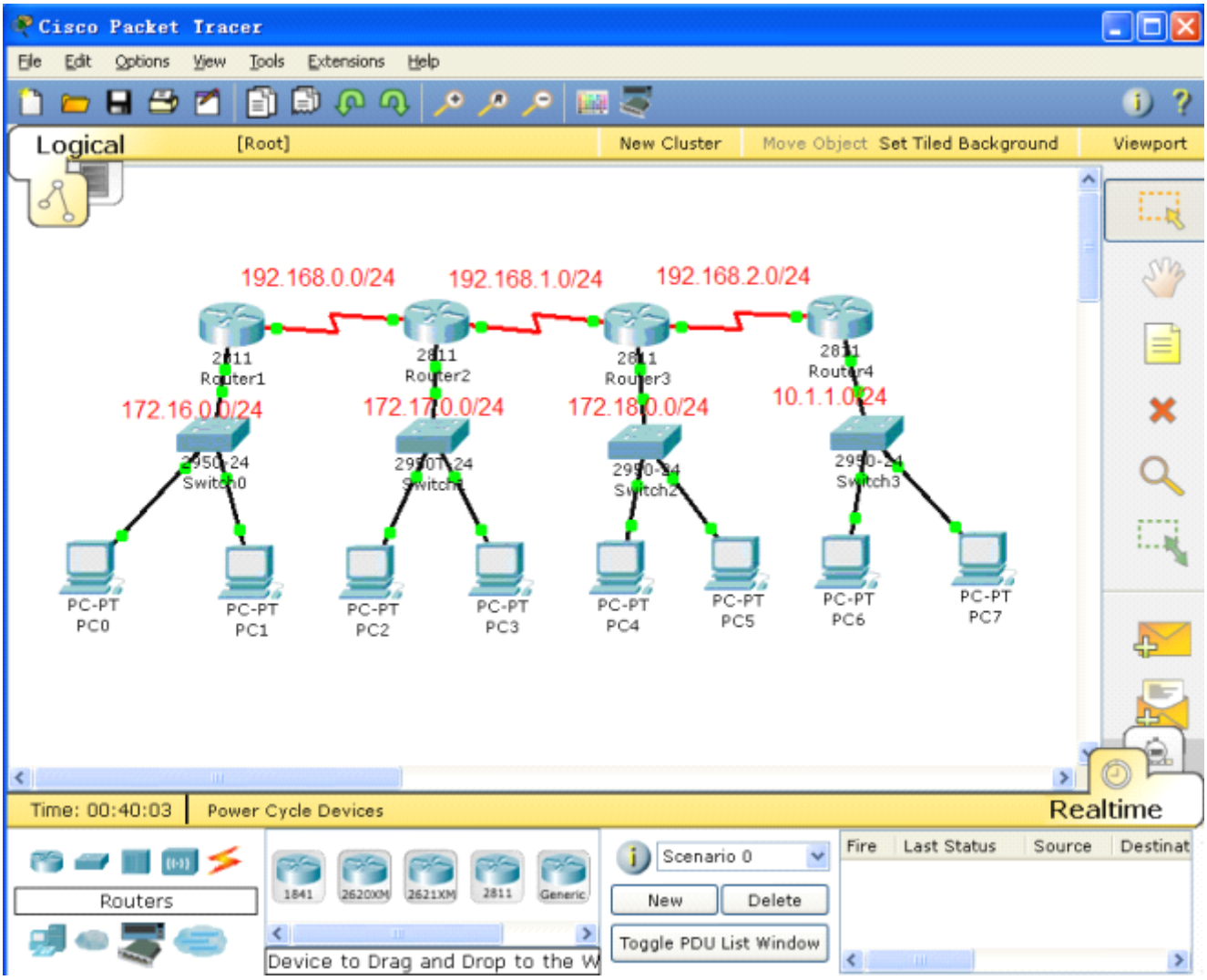


图十一　pc2 可以 ping 通所有的网段

Packet Tracer 5.0 建构 CCNA 实验攻略(9)——Cisoc EIGRP

EIGRP(Enhanced Interior Gateway Routing Protocol，增强型内部网关路由协议)是 Cisco 内部专有协议，其它公司的网络产品是不会拥有该协议的。

一、配置实例拓扑图



图一　共有四个 Cisco 2811 路由器，共六个网段

二、配置 Cisco EIGRP 的基本命令

Router(config)#router eigrp 100　开启 EIGRP 进程，100 为 AS 编号(1——65535)

Router(config-router)#network 10.0.0.0　在网络上通告自己所直接连接的网段

三、配置 Cisco EIGRP 实例

1、基本配置

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname Router2
Router2(config)#no ip domain-lookup
Router2(config)#int serial0/3/0
Router2(config-if)#ip address 192.168.0.2 255.255.255.0
Router2(config-if)#no shut

%LINK-5-CHANGED: Interface Serial0/3/0, changed state to up
Router2(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/3/0, changed state to up

Router2(config-if)#
Router2(config-if)#int fa0/0
Router2(config-if)#ip address 172.17.0.1 255.255.255.0
Router2(config-if)#no shut

%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state t
o up
Router2(config-if)#
Router2(config-if)#int serial0/3/1
Router2(config-if)#ip address 192.168.1.1 255.255.255.0
Router2(config-if)#clock rate 64000
Router2(config-if)#no shut

%LINK-5-CHANGED: Interface Serial0/3/1, changed state to down
Router2(config-if)#
%LINK-5-CHANGED: Interface Serial0/3/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/3/1, changed state to up

Router2(config-if)#
```

图二　以 Router2 为例

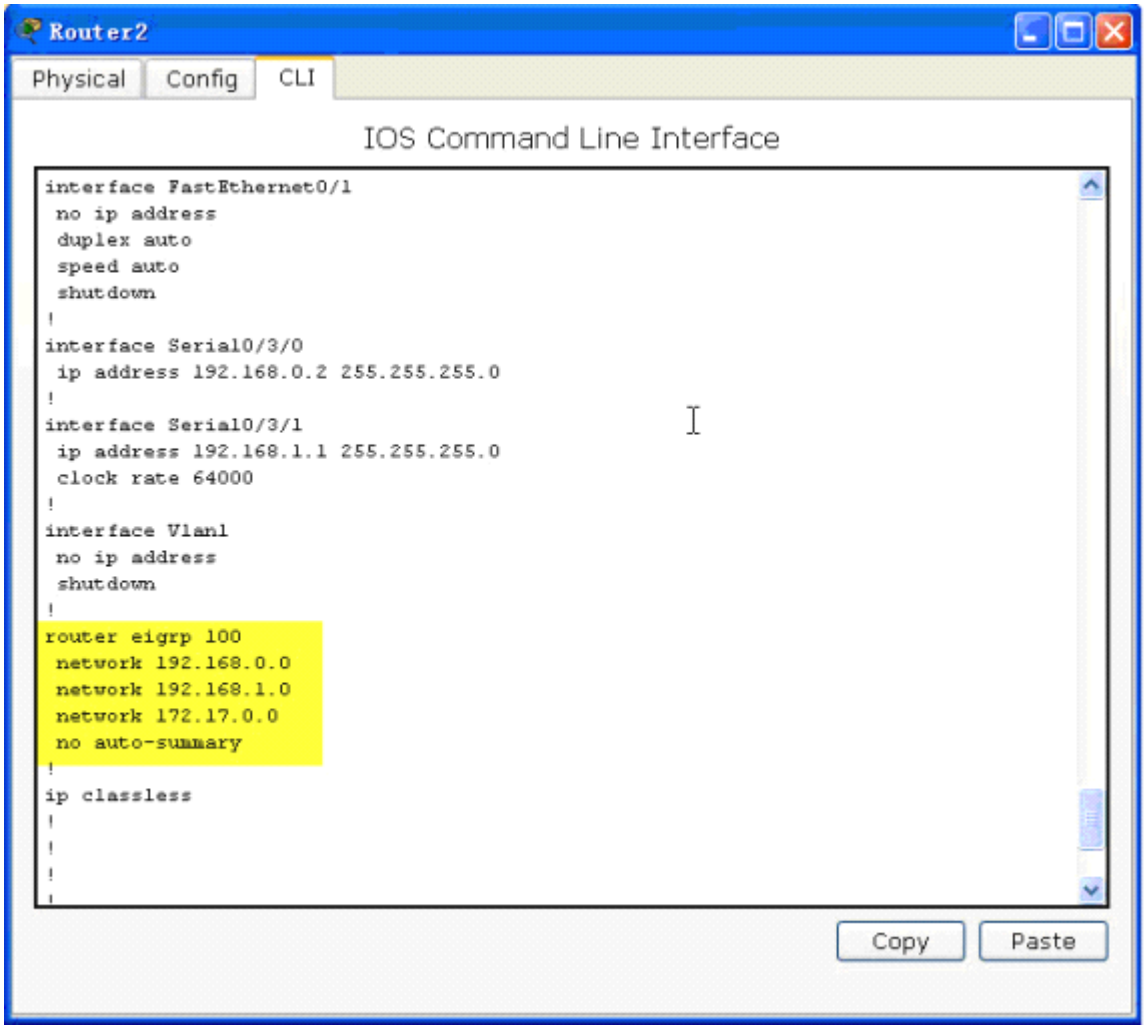
2、启用 EIGRP

```
Router3>
Router3>en
Router3#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router3(config)#router eigrp 100
Router3(config-router)#no auto-summary
Router3(config-router)#network 192.168.1.0
Router3(config-router)#
%DUAL-5-NBRCHANGE: IP-EIGRP 100: Neighbor 192.168.1.1 (Serial0/3/1) is up: new a
djacency
Router3(config-router)#network 192.168.2.0
Router3(config-router)#network 172.18.0.0
Router3(config-router)#exit
Router3(config)#end
```

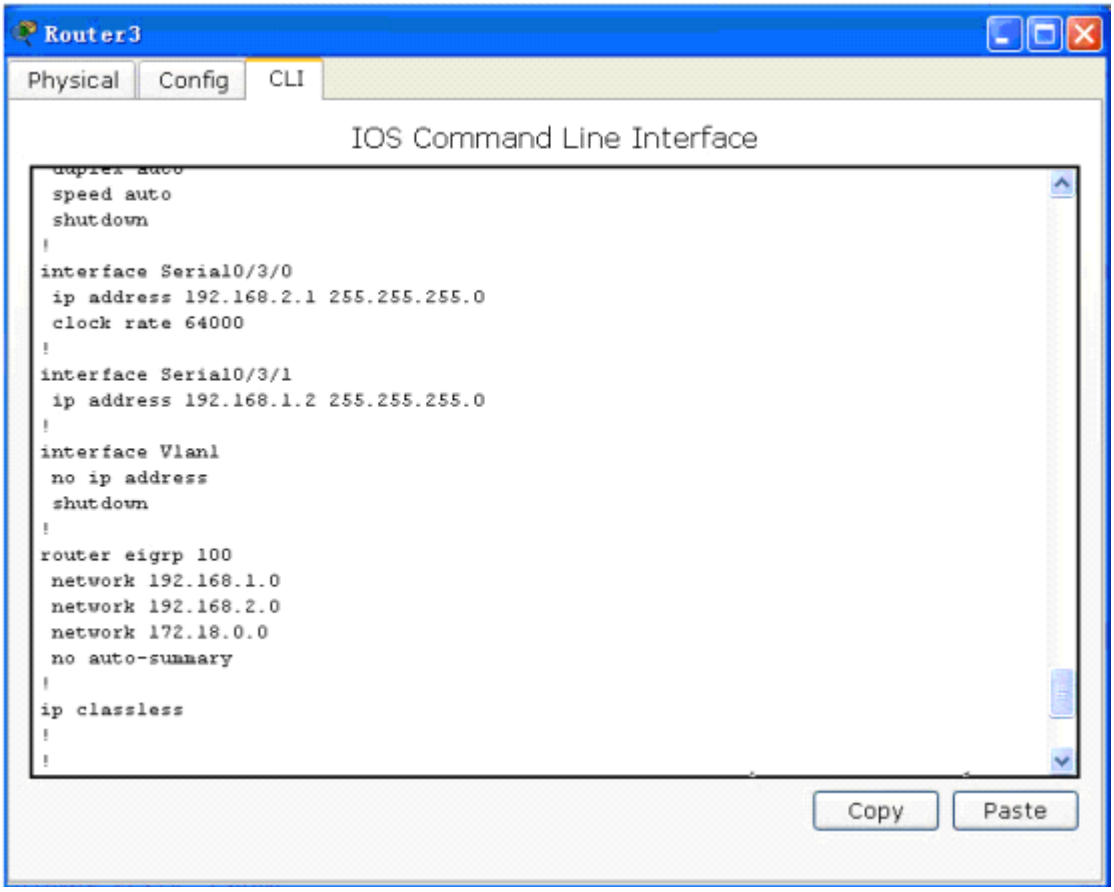
图三

```
ip ssh version 1
no ip domain-lookup
!
!
interface FastEthernet0/0
 ip address 172.16.0.1 255.255.255.0
 duplex auto
 speed auto
!
interface FastEthernet0/1
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface Serial0/3/0
 ip address 192.168.0.1 255.255.255.0
 clock rate 64000
!
interface Vlan1
 no ip address
 shutdown
!
router eigrp 100
 network 192.168.0.0
 network 172.16.0.0
 no auto-summary
!
ip classless
```

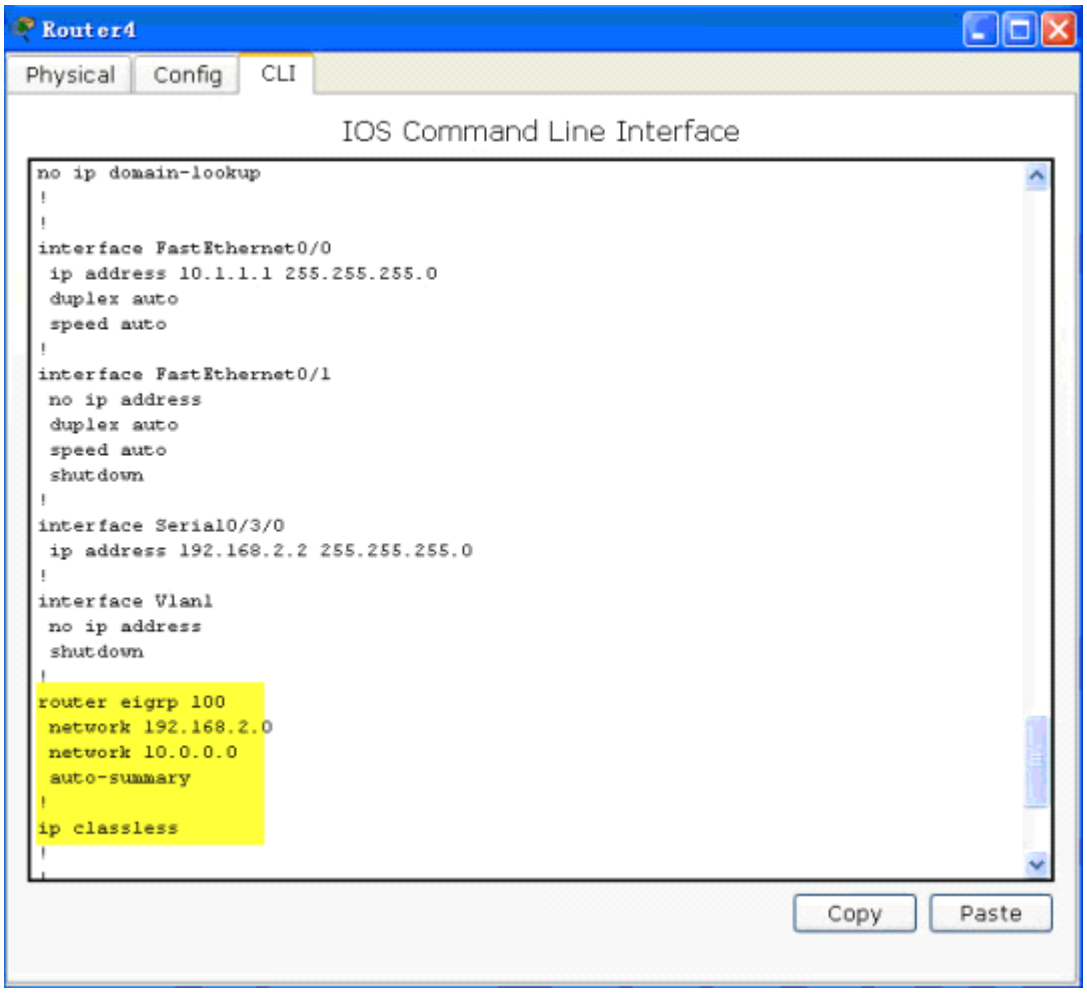
图四 Router1 的配置



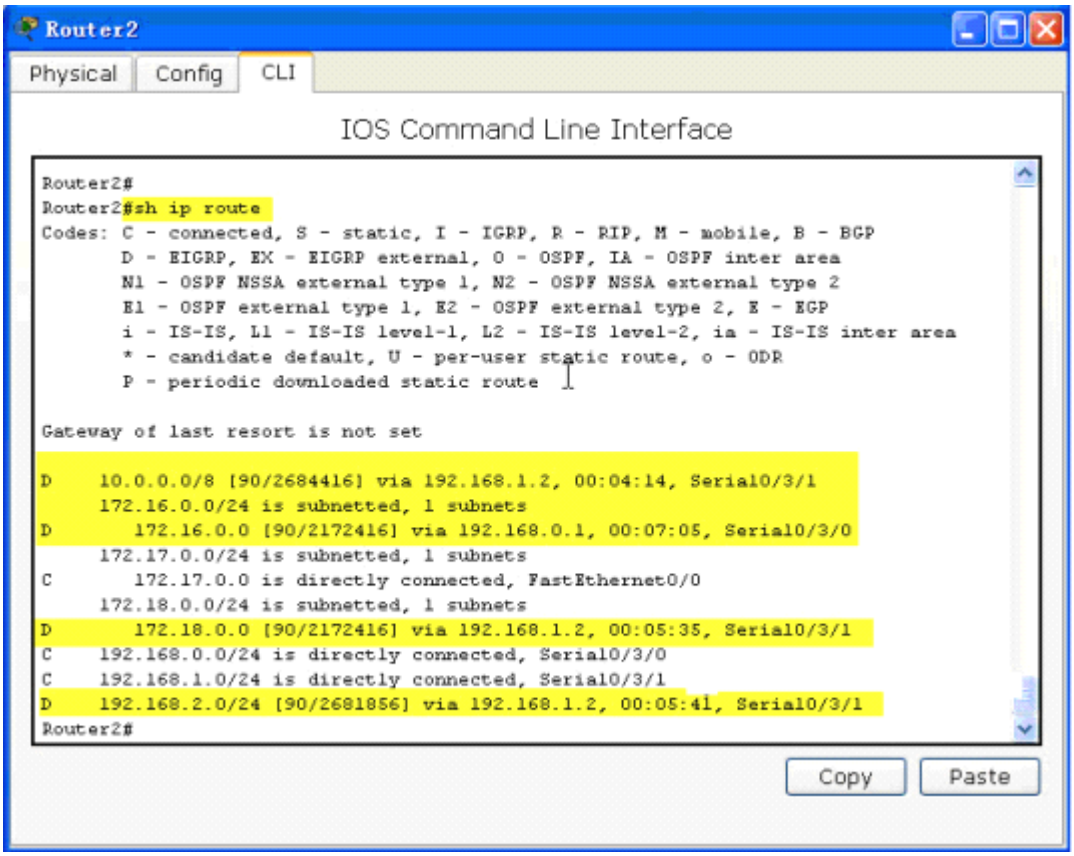
图五 Router2 的配置



图六 Router3 的配置



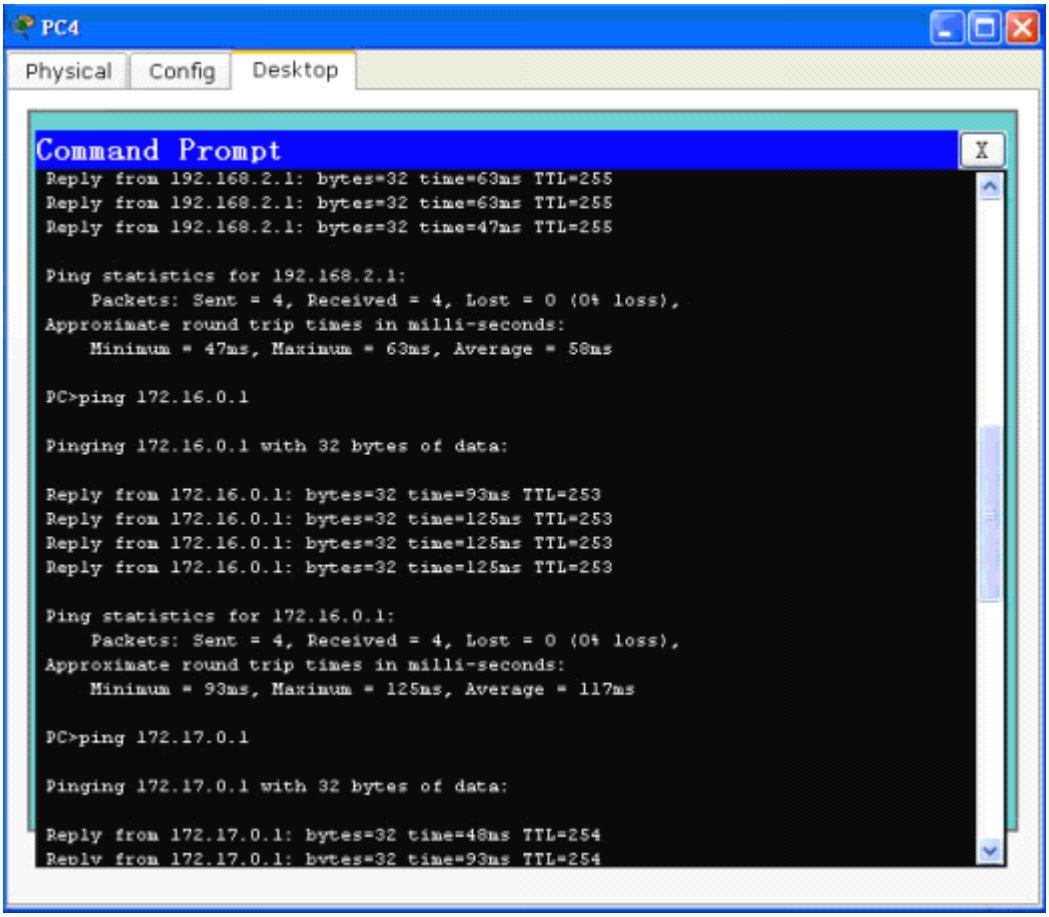
图七 Router4 的配置



图八　查看路由表

3、校验与排错

把个网段的 PC 配置好 IP 地址及网关，用 PC4 ping 所有网段都可以 ping 通。



图九

```
Router2#sh ip eigrp neighbors
IP-EIGRP neighbors for process 100
H   Address         Interface       Hold Uptime    SRTT    RTO   Q   Seq
                                    (sec)          (ms)        Cnt Num
0   192.168.0.1     Ser0/3/0        10   00:21:12  40      1000  0   11
1   192.168.1.2     Ser0/3/1        10   00:20:04  40      1000  0   13
```

图十　show ip eigrp neighbors 命令查看 EIGRP 的邻接关系

```
Router2#sh ip eigrp interfaces
IP-EIGRP interfaces for process 100

                      Xmit Queue   Mean   Pacing Time   Multicast    Pending
Interface        Peers  Un/Reliable  SRTT   Un/Reliable   Flow Timer   Routes
Ser0/3/0           1        0/0      1236       0/10          0           0
Ser0/3/1           1        0/0      1236       0/10          0           0
Fa0/0              0        0/0      1236       0/10          0           0
Router2#
```

图十一　show ip eigrp interfaces

```
Router2#sh ip eigrp topology
IP-EIGRP Topology Table for AS 100

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
       r - Reply status

P 192.168.0.0/24, 1 successors, FD is 2169856
         via Connected, Serial0/3/0
P 172.16.0.0/24, 1 successors, FD is 2172416
         via 192.168.0.1 (2172416/28160), Serial0/3/0
P 192.168.1.0/24, 1 successors, FD is 2169856
         via Connected, Serial0/3/1
P 172.17.0.0/24, 1 successors, FD is 28160
         via Connected, FastEthernet0/0
P 192.168.2.0/24, 1 successors, FD is 2681856
         via 192.168.1.2 (2681856/2169856), Serial0/3/1
P 172.18.0.0/24, 1 successors, FD is 2172416
         via 192.168.1.2 (2172416/28160), Serial0/3/1
P 10.0.0.0/8, 1 successors, FD is 2684416
         via 192.168.1.2 (2684416/2172416), Serial0/3/1
Router2#
```

图十二　show ip eigrp topology　查看拓扑表

```
Router2#sh ip eigrp traffic
IP-EIGRP Traffic Statistics for process 100
  Hellos sent/received: 919/604
  Updates sent/received: 17/13
  Queries sent/received: 0/0
  Replies sent/received:  0/0
  Acks sent/received:  13/11
  Input queue high water mark 1, 0 drops
  SIA-Queries sent/received: 0/0
  SIA-Replies sent/received: 0/0
```

图十三　show ip eigrp traffic

```
Router3#debug eigrp packets
EIGRP Packets debugging is on
    (UPDATE, REQUEST, QUERY, REPLY, HELLO, ACK )
Router3#
EIGRP: Received HELLO on Serial0/3/1 nbr 192.168.1.1
  AS 100, Flags 0x0, Seq 15/0 idbQ 0/0
EIGRP: Sending HELLO on Serial0/3/0
  AS 100, Flags 0x0, Seq 15/0 idbQ 0/0 iidbQ un/rely 0/0
EIGRP: Sending HELLO on Serial0/3/1
  AS 100, Flags 0x0, Seq 15/0 idbQ 0/0 iidbQ un/rely 0/0
EIGRP: Sending HELLO on FastEthernet0/0
  AS 100, Flags 0x0, Seq 15/0 idbQ 0/0 iidbQ un/rely 0/0
EIGRP: Received HELLO on Serial0/3/0 nbr 192.168.2.2
  AS 100, Flags 0x0, Seq 18/0 idbQ 0/0
EIGRP: Received HELLO on Serial0/3/1 nbr 192.168.1.1
  AS 100, Flags 0x0, Seq 15/0 idbQ 0/0
```

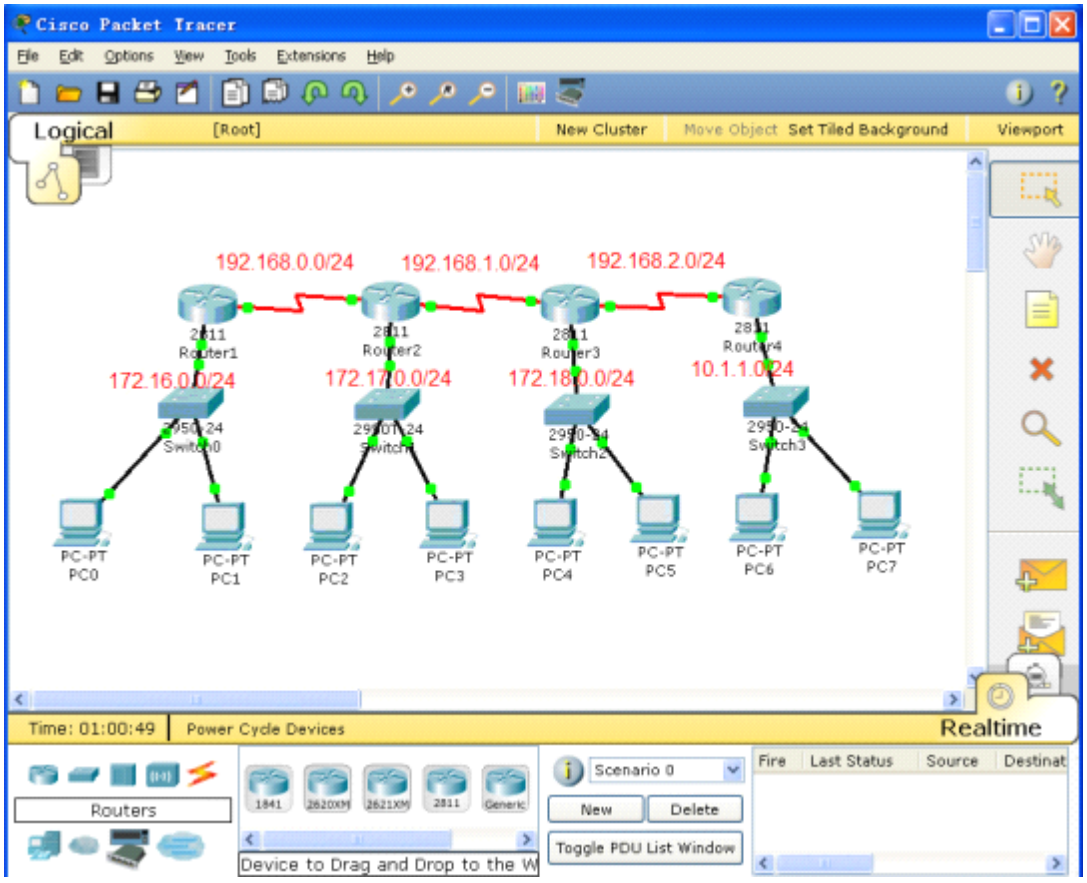
图十四 debug eigrp packets

EIGRP 支持 MD5 加密认证，但是我们的这个模拟器不支持，这个试验就不做了。

Packet Tracer 5.0 建构 CCNA 实验攻略(10)——配置单区域 OSPF

OSPF(Open Shortest Path First 开放式最短路径优先)是一个内部网关协议(Interior Gateway Protocol,简称 IGP)，用于在单一自治系统(autonomous system,AS)内决策路由。OSPF 协议比较复杂 F version 2 RFC 2328 标准文档长达 224 页，可以划分区域是 OSPF 能多适应大型复杂网络的一个特性，我们只借助完成单个 area 的简单配置。

一、配置实例拓扑图



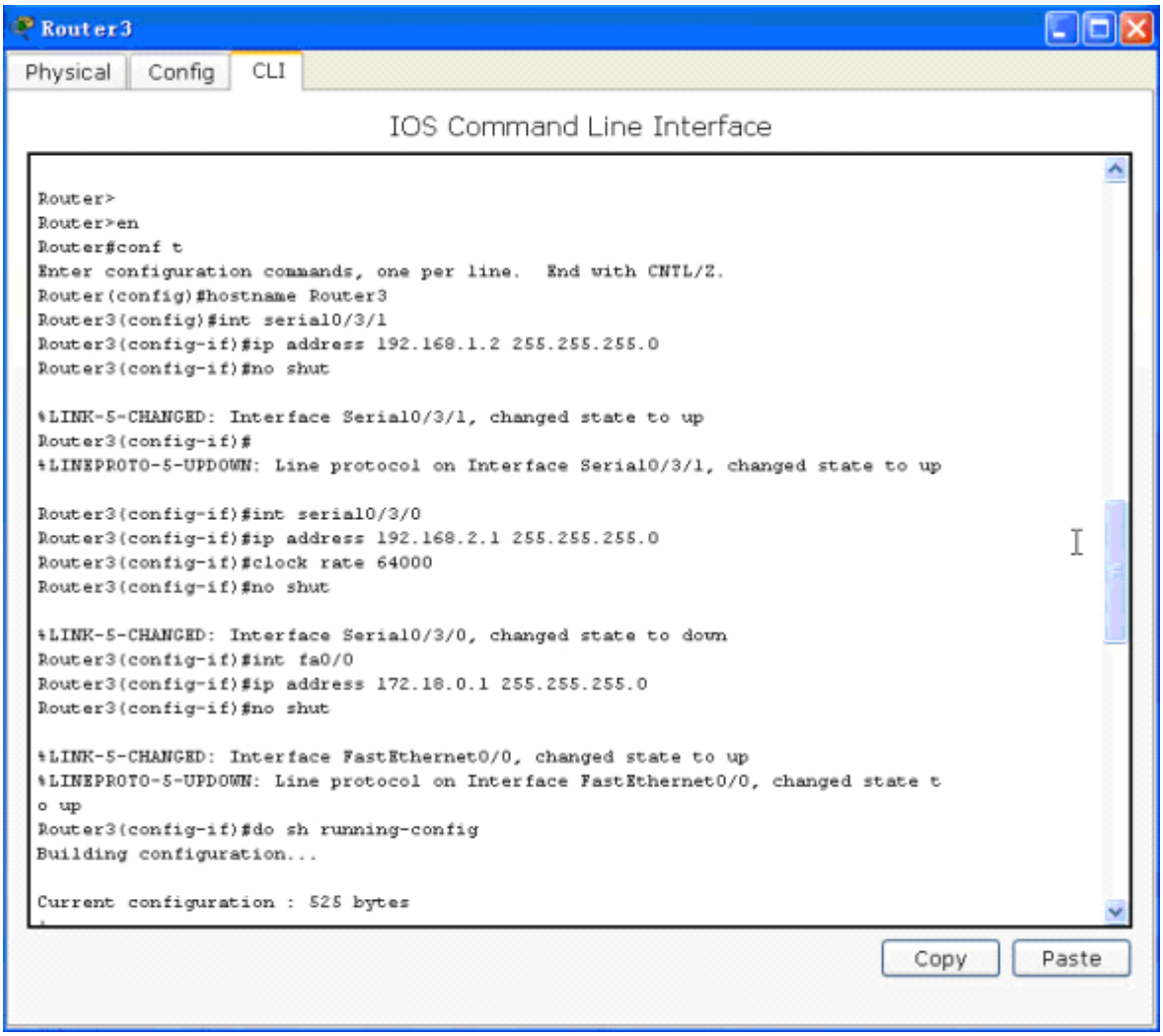
图一

二、OSPF 配置基本命令

```
Router(config)#router ospf 1
Router(config-router)#network 192.168.1.0 0.0.0.255 area 0
        Router(config-router)#router-id 10.1.1.1
```

三、OSPF 配置实例

1、路由器基本配置

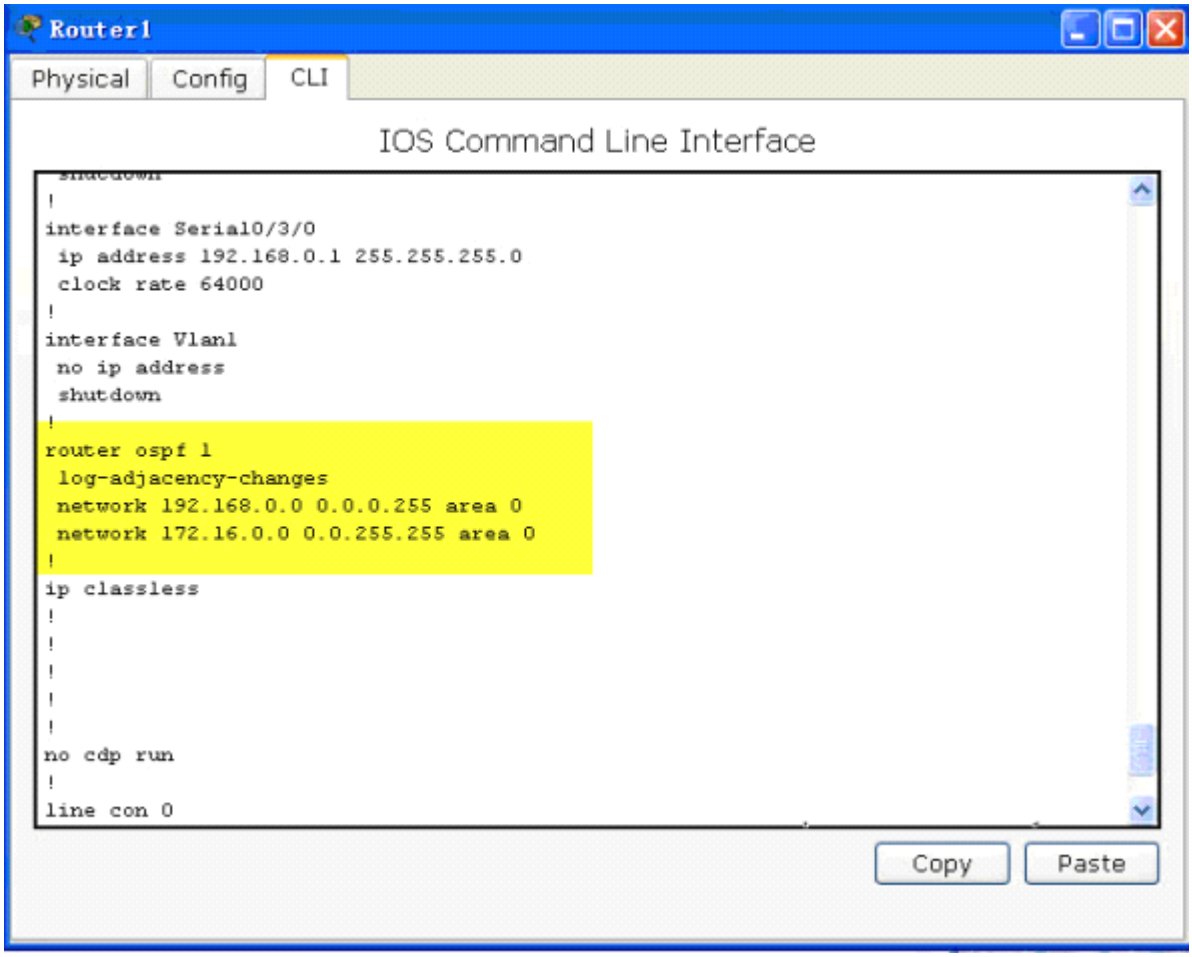


图二　以 Router1 为例介绍网络中各个路由器的基本配置

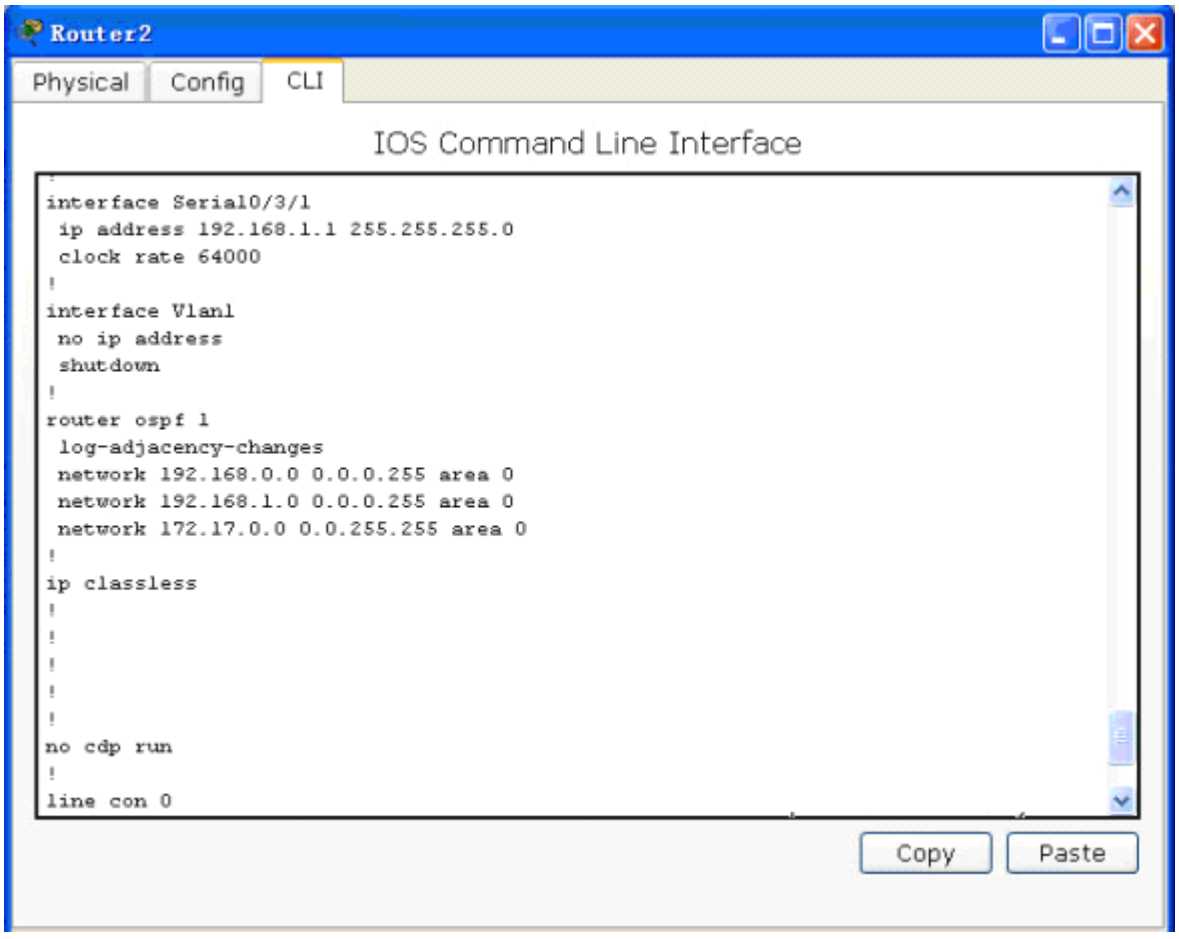
2、启动 OSPF

```
Router2#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router2(config)#router ospf 1
Router2(config-router)#network 192.168.0.0 0.0.0.255 area 0
Router2(config-router)#network 192.168.1.0 0.0.0.255 area 0
Router2(config-router)#
00:15:47: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.0.1 on Serial0/3/0 from LOADING
 to FULL, Loading Done
Router2(config-router)#network 172.17.0.0 0.0.255.255 area 0
Router2(config-router)#
```

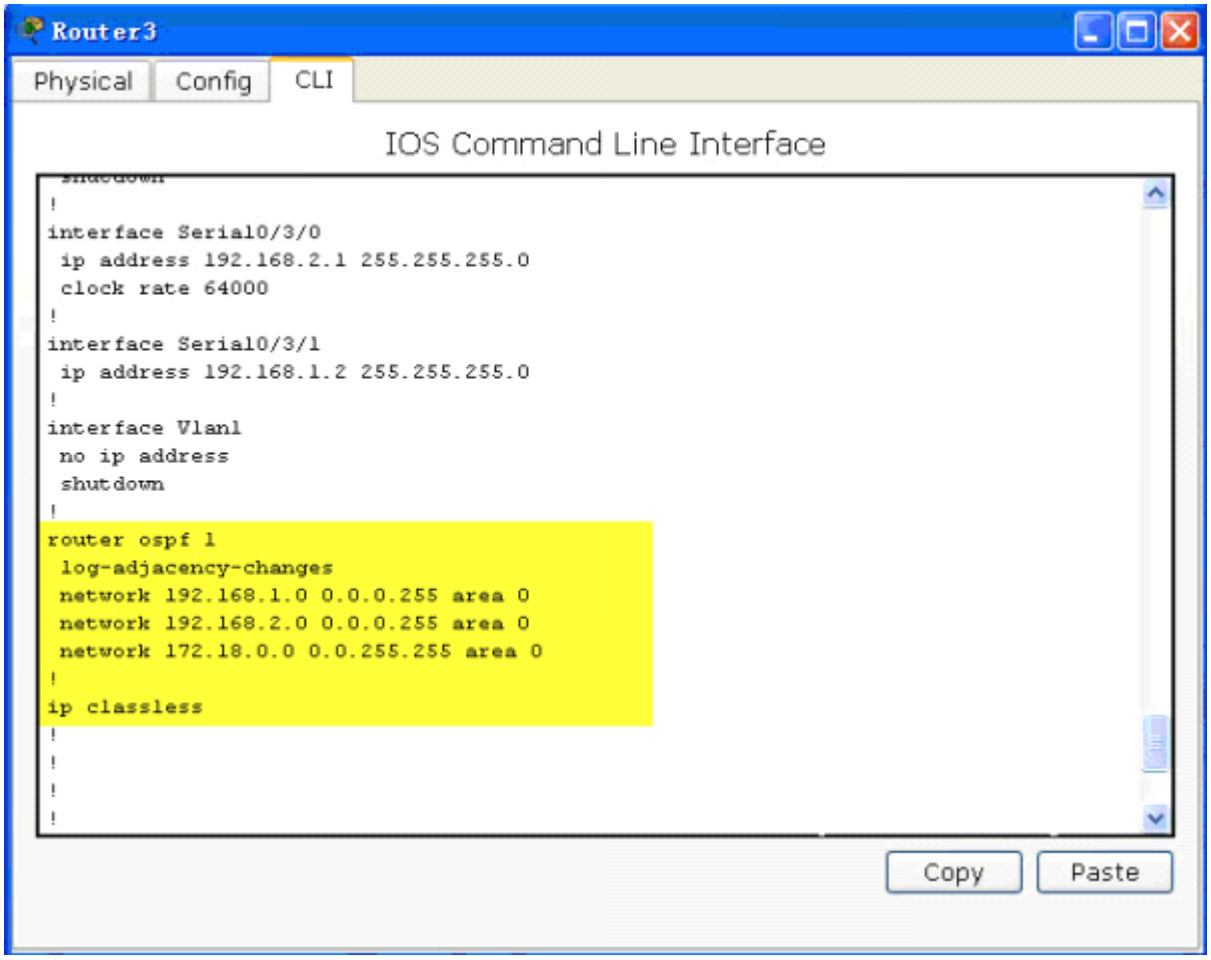
图三



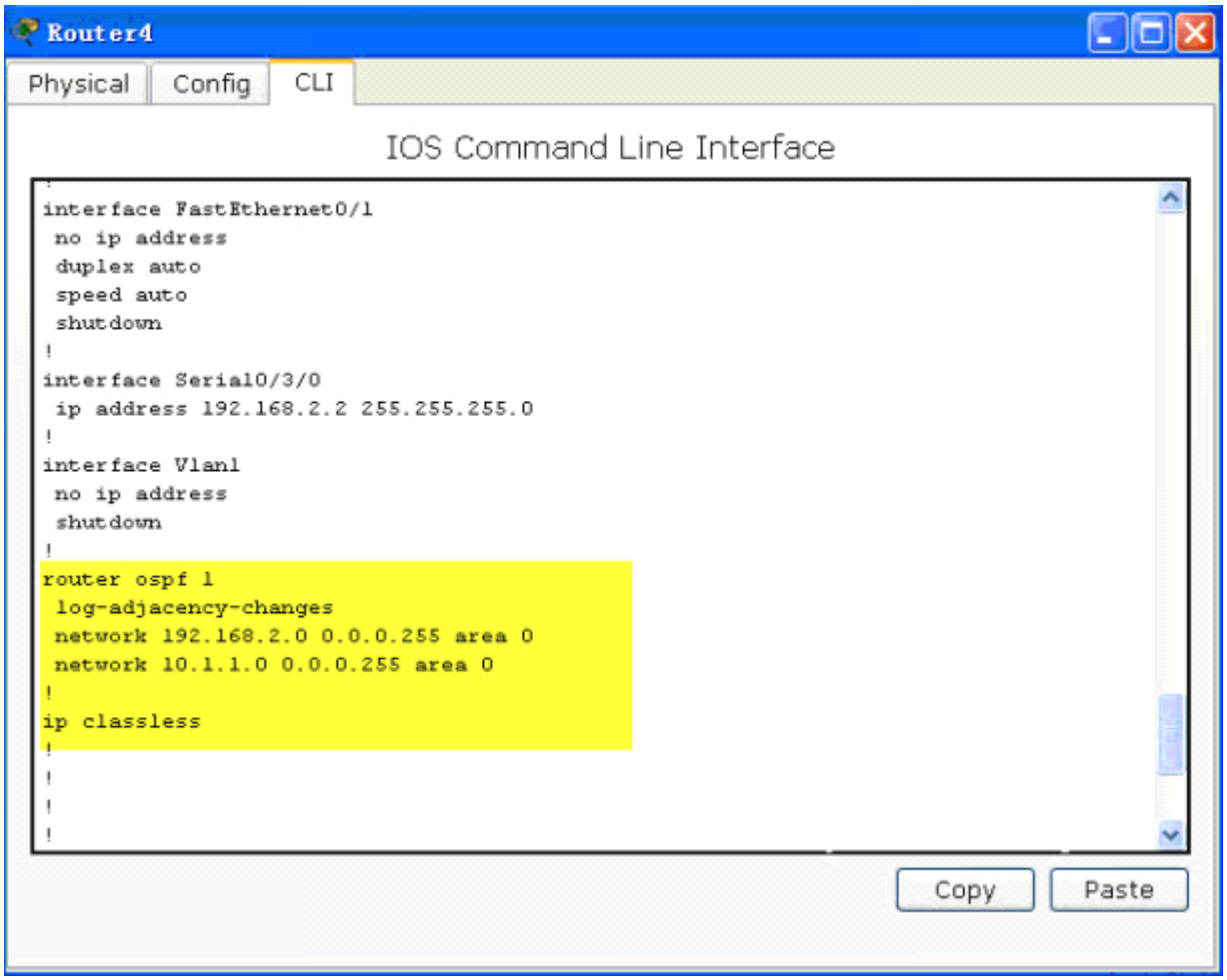
图四　　Router1 的 OSPF 配置



图五　　Router 2 的 OSPF 配置



图六　　Router3 的 OSPF 配置



图七　　Router4 的 OSPF 配置

```
Router2#sh 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, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     10.0.0.0/24 is subnetted, 1 subnets
O       10.1.1.0 [110/129] via 192.168.1.2, 00:02:43, Serial0/3/1
     172.16.0.0/24 is subnetted, 1 subnets
O       172.16.0.0 [110/65] via 192.168.0.1, 00:05:28, Serial0/3/0
     172.17.0.0/24 is subnetted, 1 subnets
C       172.17.0.0 is directly connected, FastEthernet0/0
     172.18.0.0/24 is subnetted, 1 subnets
O       172.18.0.0 [110/65] via 192.168.1.2, 00:03:38,Serial0/3/1
C    192.168.0.0/24 is directly connected, Serial0/3/0
C    192.168.1.0/24 is directly connected, Serial0/3/1
O    192.168.2.0/24 [110/128] via 192.168.1.2, 00:03:53, Serial0/3/1
Router2#
```

图八　查看路由器中的路由表

3、校验、诊断

```
Router2#sh ip protocol

Routing Protocol is "ospf 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 192.168.1.1
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    192.168.0.0 0.0.0.255 area 0
    192.168.1.0 0.0.0.255 area 0
    172.17.0.0 0.0.255.255 area 0
  Routing Information Sources:
    Gateway         Distance      Last Update
    192.168.0.1           110      00:04:07
    192.168.1.2           110      00:04:09
  Distance: (default is 110)
```

图九　show ip protocol 查看路由器中所启用的路由计算协议

```
Router2#show ip ospf
 Routing Process "ospf 1" with ID 192.168.1.1
 Supports only single TOS(TOS0) routes
 Supports opaque LSA
 SPF schedule delay 5 secs, Hold time between two SPFs 10 secs
 Minimum LSA interval 5 secs. Minimum LSA arrival 1 secs
 Number of external LSA 0. Checksum Sum 0x000000
 Number of opaque AS LSA 0. Checksum Sum 0x000000
 Number of DCbitless external and opaque AS LSA 0
 Number of DoNotAge external and opaque AS LSA 0
 Number of areas in this router is 1. 1 normal 0 stub 0 nssa
 External flood list length 0
    Area BACKBONE(0)
        Number of interfaces in this area is 3
        Area has no authentication
        SPF algorithm executed 9 times
        Area ranges are
        Number of LSA 4. Checksum Sum 0x013ddd
        Number of opaque link LSA 0. Checksum Sum
        Number of DCbitless LSA 0
        Number of indication LSA 0
        Number of DoNotAge LSA 0
```

图十　show ip ospf

```
Router2#show ip ospf interface
 Serial0/3/0 is up, line protocol is up
   Internet address is 192.168.0.2/24, Area 0
   Process ID 1, Router ID 192.168.1.1, Network Type POINT-TO-POINT, Cost: 64
   Transmit Delay is 1 sec, State POINT-TO-POINT,
   Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
     Hello due in 00:00:03
   Index 1/1, flood queue length 0
   Next 0x0(0)/0x0(0)
   Last flood scan length is 1, maximum is 1
   Last flood scan time is 0 msec, maximum is 0 msec
   Neighbor Count is 1 , Adjacent neighbor count is 1
     Adjacent with neighbor 192.168.0.1
   Suppress hello for 0 neighbor(s)
 Serial0/3/1 is up, line protocol is up
   Internet address is 192.168.1.1/24, Area 0
   Process ID 1, Router ID 192.168.1.1, Network Type POINT-TO-POINT, Cost: 64
   Transmit Delay is 1 sec, State POINT-TO-POINT,
   Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
     Hello due in 00:00:02
   Index 2/2, flood queue length 0
   Next 0x0(0)/0x0(0)
```

图十一　show ip ospf interface

```
  <cr>
Router2#show ip ospf interface serial0/3/0
Serial0/3/0 is up, line protocol is up
  Internet address is 192.168.0.2/24, Area 0
  Process ID 1, Router ID 192.168.1.1, Network Type POINT-TO-POINT, Cost: 64
  Transmit Delay is 1 sec, State POINT-TO-POINT,
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in 00:00:06
  Index 1/1, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 1, maximum is 1
  Last flood scan time is 0 msec, maximum is 0 msec
  Neighbor Count is 1 , Adjacent neighbor count is 1
    Adjacent with neighbor 192.168.0.1
  Suppress hello for 0 neighbor(s)
Router2#
```

图十二

```
Router2#show ip ospf neighbor
Neighbor ID     Pri   State           Dead Time   Address         Interface
192.168.0.1       1   FULL/-          00:00:32    192.168.0.1     Serial0/3/0
192.168.2.1       1   FULL/-          00:00:39    192.168.1.2     Serial0/3/1
Router2#
```

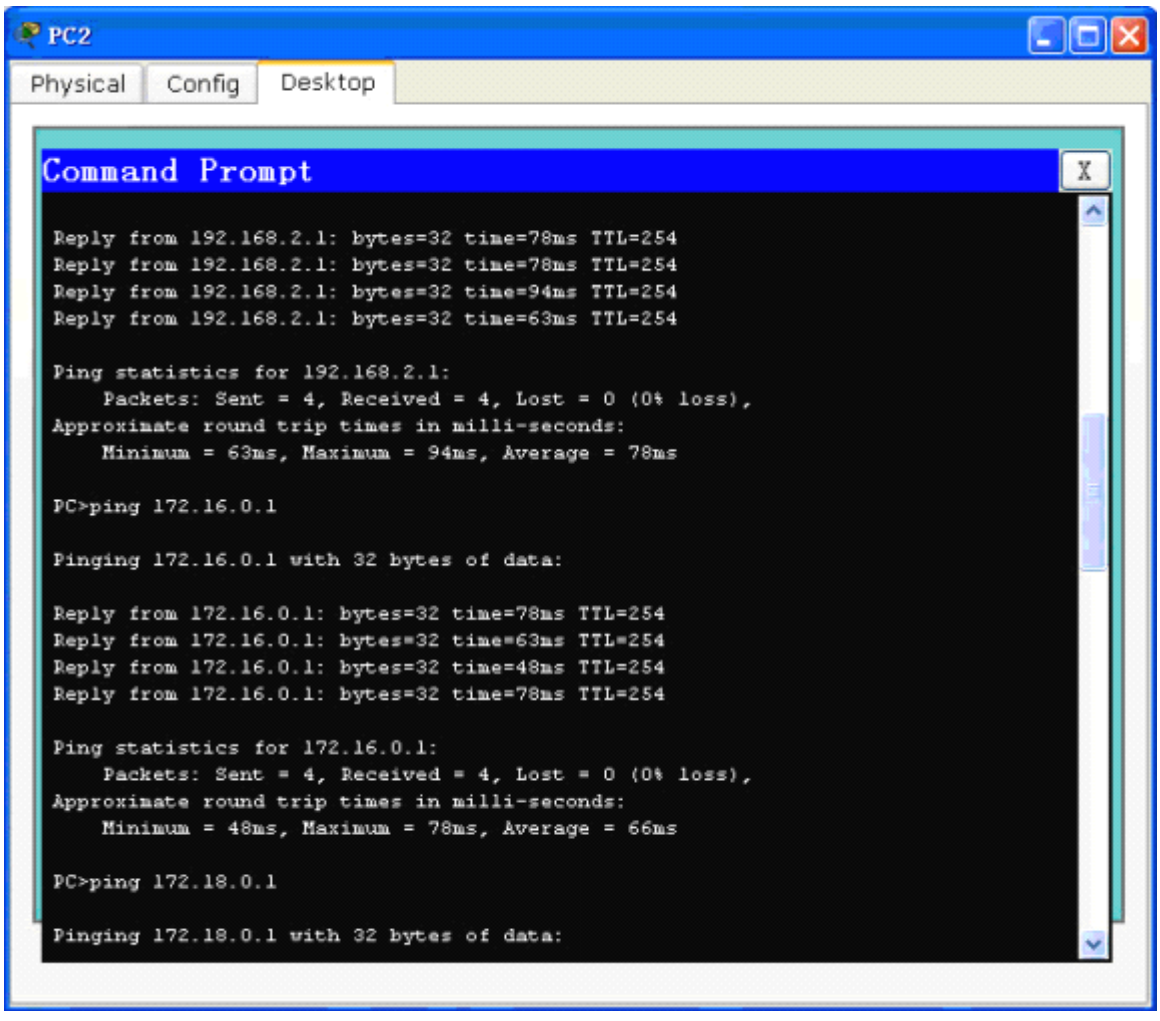
图十三　show ip ospf neighbor　想看邻居

```
Router2#show ip ospf database
            OSPF Router with ID (192.168.1.1) (Process ID 1)

                Router Link States (Area 0)

Link ID         ADV Router      Age         Seq#       Checksum Link count
192.168.0.1     192.168.0.1     581         0x80000003 0x0065dd 3
192.168.1.1     192.168.1.1     502         0x80000005 0x007
192.168.2.1     192.168.2.1     437         0x80000005 0x004
192.168.2.2     192.168.2.2     419         0x80000003 0x001acd 3
Router2#
```

图十四　show ip ospf database

```
Router3#debug ip ospf events
OSPF events debugging is on
Router3#
00:27:11: OSPF: Rcv hello from 192.168.2.2 area 0 from Serial0/3/0 192.168.2.2
00:27:11: OSPF: End of hello processing
00:27:17: OSPF: Rcv hello from 192.168.1.1 area 0 from Serial0/3/1 192.168.1.1
00:27:17: OSPF: End of hello processing
00:27:22: OSPF: Rcv hello from 192.168.2.2 area 0 from Serial0/3/0 192.168.2.2
00:27:22: OSPF: End of hello processing
00:27:27: OSPF: Rcv hello from 192.168.1.1 area 0 from Serial0/3/1 192.168.1.1
00:27:27: OSPF: End of hello processing
```

图十五　debug ip ospf events 开启诊断，no debug ip ospf events 关闭诊断

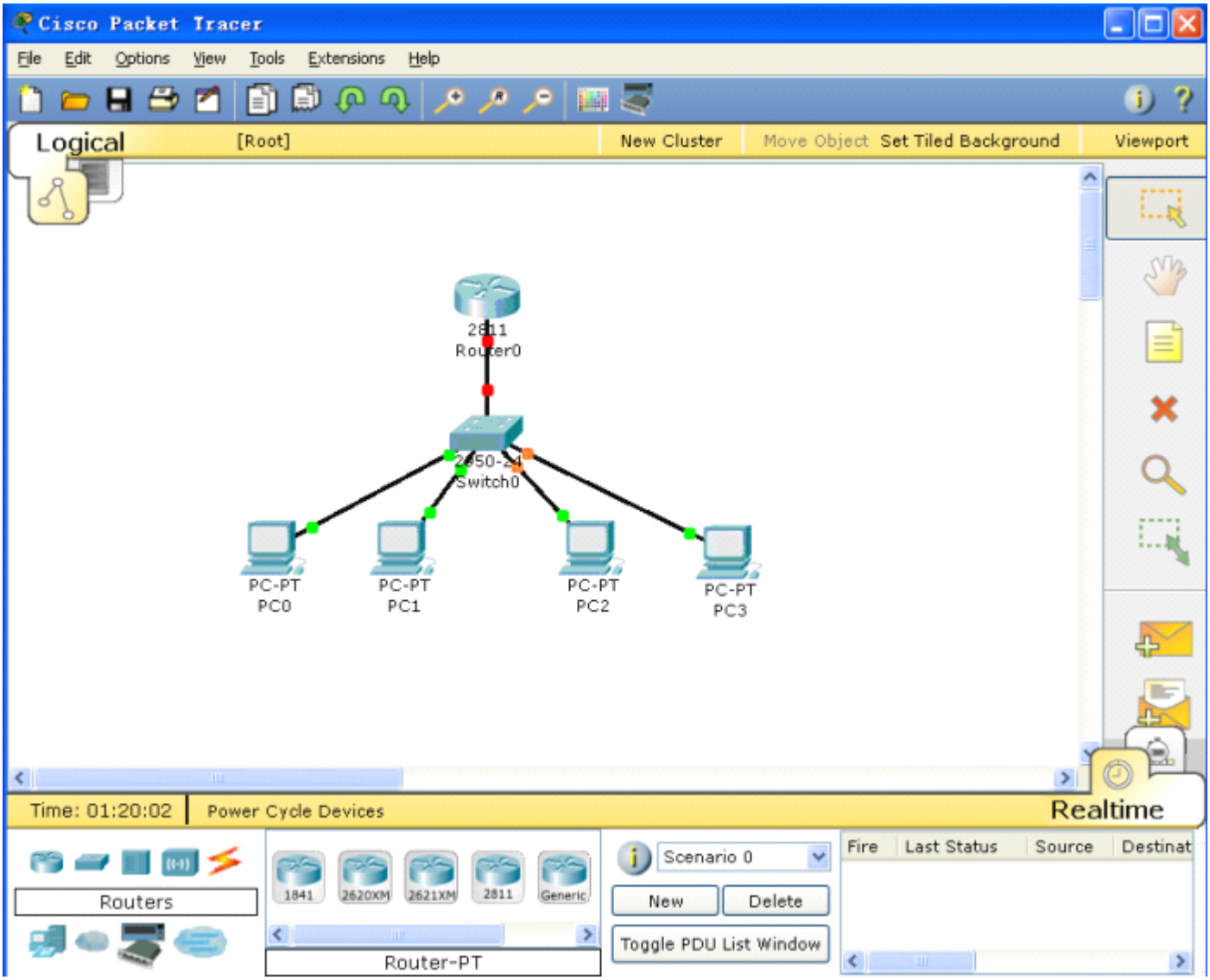


图十六　pc2 ping 通所有网段内的计算机或路由器

在这里只能进行最为简单的 OSPF 配置了，可以完成 CCNA 的实验。

Packet Tracer 5.0 建构 CCNA 实验攻略(11)——路由器实现 Vlan 间通信

一、实验拓扑图



图一　路由器：Cisco 2811，交换机：Cisco 2950

二、创建 Vlan

```
2950#vlan databae
2950(vlan)#vlan 10 name math
2950(vlan)#vlan 20 name chinese
```

```
2950#vlan database
% Warning: It is recommended to configure VLAN from config mode,
  as VLAN database mode is being deprecated. Please consult user
  documentation for configuring VTP/VLAN in config mode.

2950(vlan)#vlan 10 name math
VLAN 10 added:
    Name: math
2950(vlan)#vlan 20 name chinese
VLAN 20 added:
    Name: chinese
2950(vlan)#exit
APPLY completed.
Exiting....
2950#sh vlan

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active

                                                Fa0/9, Fa0/10, Fa0/11, Fa0/12
                                                Fa0/13, Fa0/14, Fa0/15, Fa0/16
                                                Fa0/17, Fa0/18, Fa0/19, Fa0/20
```

图二

三、把交换机端口分配给 Vlan

```
2950#conf t
2950(config)#int range fa0/2 - 3
2950(config-if-range)#switchport mode access
2950(config-if-range)#switchport access vlan 10
2950(config-if-range)#int range fa0/4 - 5
2950(config-if-range)#switchport mode access
2950(config-if-range)#switchport access vlan 20
```

```
2950#
2950#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
2950(config)#int range fa0/2 - 3
2950(config-if-range)#switchport mode access
2950(config-if-range)#switchport access vlan 10
2950(config-if-range)#int range fa0/4 - 5
2950(config-if-range)#switchport mode access
2950(config-if-range)#switchport access vlan 20
2950(config-if-range)#
```

图三

四、配置交换机 trunk 端口

```
2950(config)int fa0/1
2950(config-if)switchport mode trunk
```

```
2950(config)#int fa0/1
2950(config-if)#switchport mode trunk
2950(config-if)#no shut
2950(config-if)#
```

图四

五、配置路由器子接口

```
Router#conf t
Router(config)#int fa0/1.1
Router(config-subif)#encapsulation dot1q 10
Router(config-subif)#ip address 192.168.1.1 255.255.255.0
Router(config-subif)#int fa0/1.2
Router(config-subif)#encapsulation dot1q 20
Router(config-subif)#ip address 192.168.2.1 255.255.255.0
Router(config-subif)#int fa0/1
Router(config-if)#no shut
```

```
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int fa0/1.1
Router(config-subif)#encapsulation dot1q 10
Router(config-subif)#int fa0/1.2
Router(config-subif)#encapsulation dot1q 20
Router(config-subif)#ip address 192.168.2.1 255.255.255.0
Router(config-subif)#int fa0/1.1
Router(config-subif)#ip address 192.168.1.1 255.255.255.0
Router(config-subif)#exit
Router(config)#int fa0/1
Router(config-if)#no shut

%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state t
o up
%LINK-5-CHANGED: Interface FastEthernet0/1.1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed   state
 to up
%LINK-5-CHANGED: Interface FastEthernet0/1.2, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1.2, changed state
 to up
Router(config-if)#
```

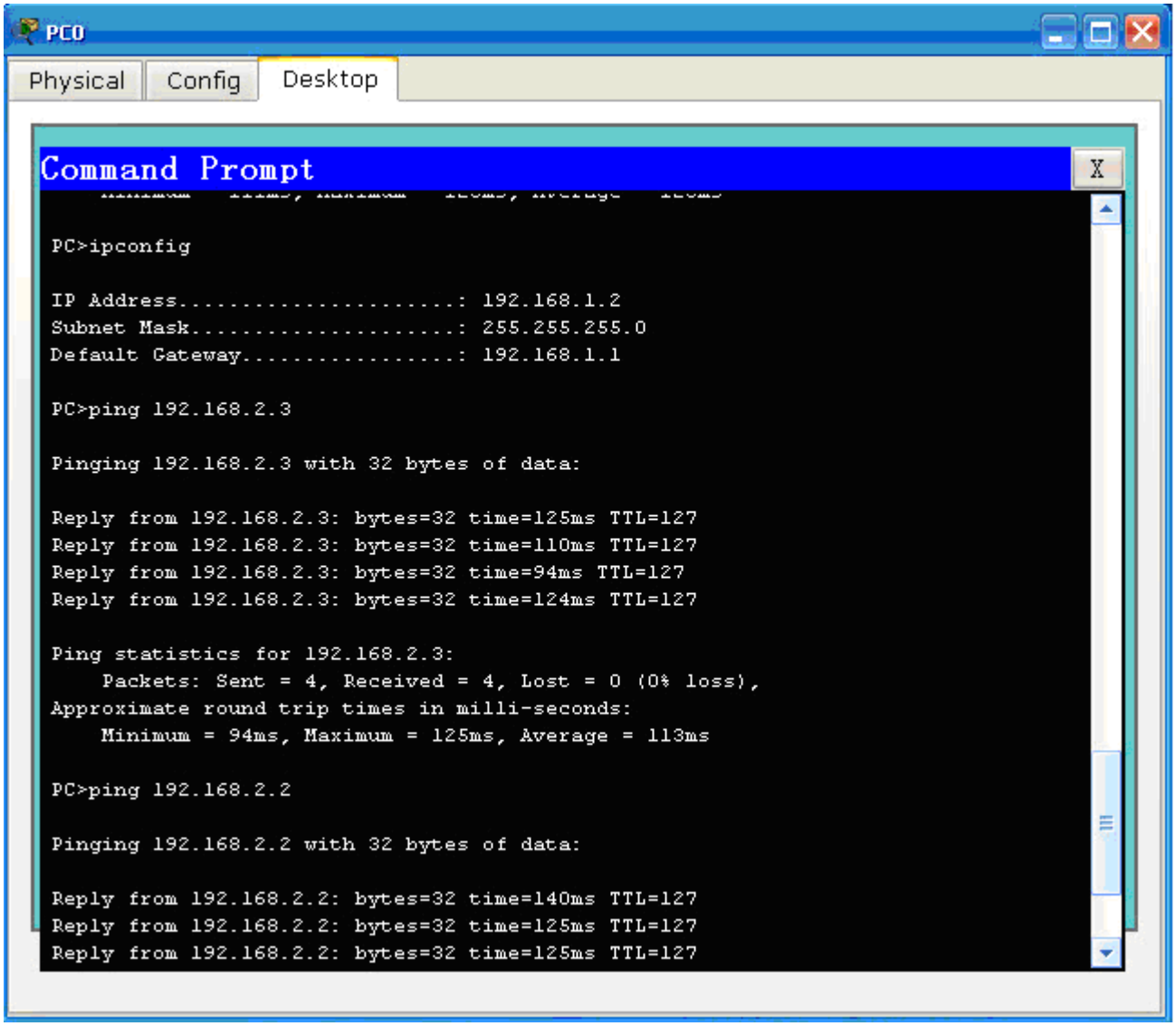
图五

```
Router#sh 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, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

C    192.168.1.0/24 is directly connected, FastEthernet0/1.1
C    192.168.2.0/24 is directly connected, FastEthernet0/1.2
Router#
```

图六　查看路由器中的路由表

六、配置计算机，测试

在本次实验中，pc0 与 pc1 同处于 vlan 10 网段 192.168.1.1；pc2 与 pc3 同处于 Vlan 20 网段 192.168.2.1。

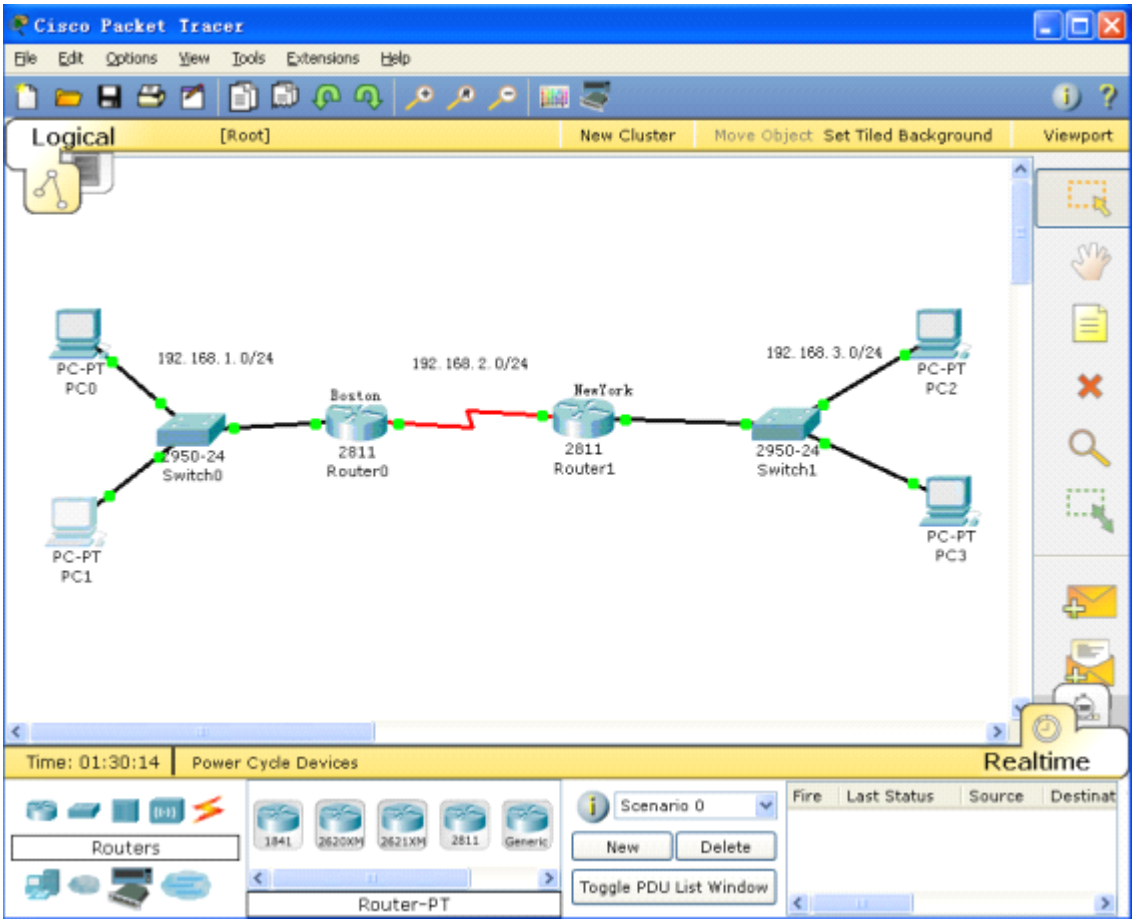


图七　不同网段中的计算机完全可以 ping 通

Packet Tracer 5.0 建构 CCNA 实验攻略(12)——PPP

PPP(Point to Point Protocol)数据链路层协议。两种认证方式：一种是 PAP，一种是 CHAP。相对来说 PAP 的认证方式安全性没有 CHAP 高。PAP 在传输 password 是明文的，而 CHAP 在传输过程中不传输密码，PAP 认证是通过两次握手实现的，而 CHAP 则是通过 3 次握手实现的。

一、实验配置拓扑图



图一

二、PPP 的基本配置命令

Router(config-if)#encapsulation PPP
Router(config-if)#PPP multilink
Router(config-if)#PPP authentication chap

三、配置 PPP

```
Boston>en
Boston#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Boston(config)#hostname Boston
Boston(config)#int serial0/3/0
Boston(config-if)#description Link to Router Newyork
Boston(config-if)#ip address 192.168.2.1 255.255.255.0
Boston(config-if)#encapsulation ppp
Boston(config-if)#ppp authentication chap
Boston(config-if)#no shut

%LINK-5-CHANGED: Interface Serial0/3/0, changed state to down
Boston(config-if)#exit
Boston(config)#username Newyork password senya
Boston(config)#exit
%SYS-5-CONFIG_I: Configured from console by console
Boston#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Boston#
```

图二　路由器 Boson 上配置 PPP 的命令

```
Route>en
Route#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Route(config)#hostname Newyork
Newyork(config)#username Boston password senya
Newyork(config)#int serial0/3/0
Newyork(config-if)#description link to Boston
Newyork(config-if)#ip address 192.168.2.2 255.255.255.0
Newyork(config-if)#encapsulation ppp
Newyork(config-if)#ppp authentication chap
Newyork(config-if)#no shut

%LINK-5-CHANGED: Interface Serial0/3/0, changed state
Newyork(config-if)#end
%SYS-5-CONFIG_I: Configured from console by console
Newyork#
```

图三　　Newyork 上配置 PPP 的命令

```
Boston(config)#router rip
Boston(config-router)#version 2
Boston(config-router)#network 192.168.1.0
Boston(config-router)#network 192.168.2.0
Boston(config-router)#end
```

图四　启用 RIP 路由协议，两个路由器要配置 RIP

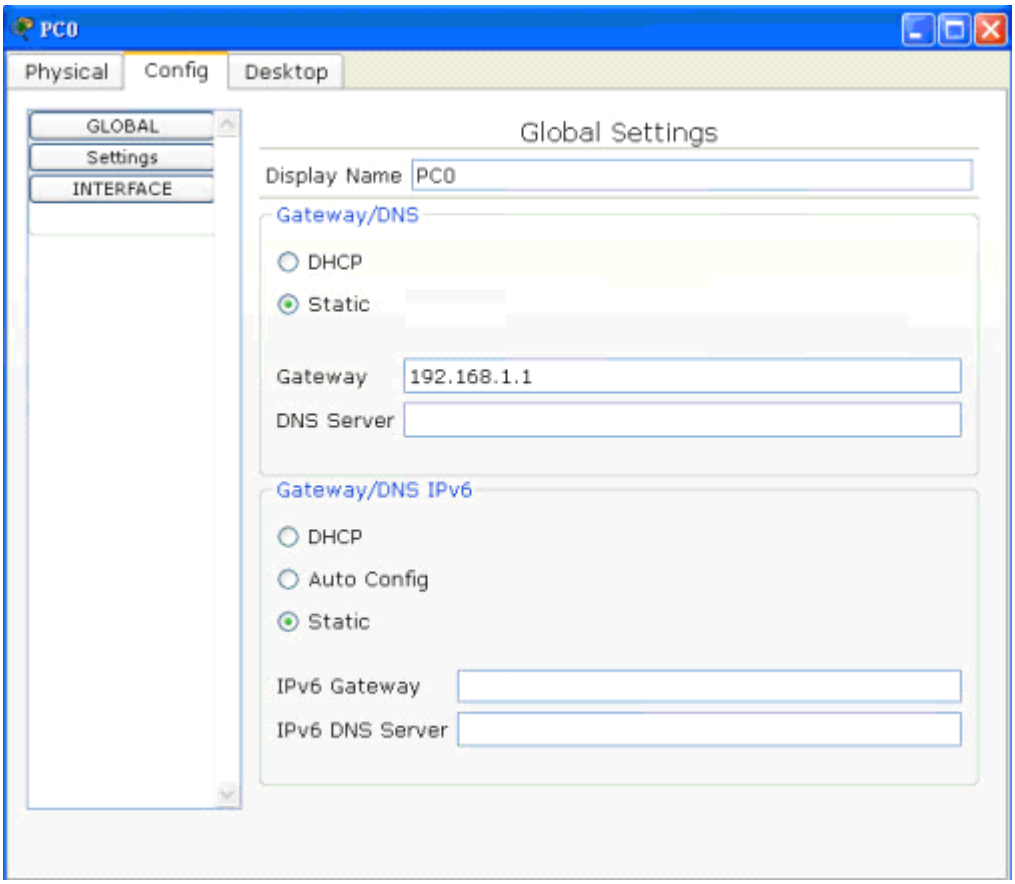
Boson 路由器的配置：

```
Boston#sh running-config
Building configuration...

Current configuration : 652 bytes
!
version 12.4
no service password-encryption
!
hostname Boston
!
username Newyork password 0 senya
!
ip ssh version 1
no ip domain-lookup
!
interface FastEthernet0/0
no ip address
duplex auto
speed auto
shutdown
!
interface FastEthernet0/1
ip address 192.168.1.1 255.255.255.0
duplex auto
speed auto
!
interface Serial0/3/0
description Link to Router Newyork
ip address 192.168.2.1 255.255.255.0
encapsulation ppp
ppp authentication chap
clock rate 56000
!
interface Vlan1
no ip address
shutdown
!
router rip
version 2
network 192.168.1.0
network 192.168.2.0
!
ip classless
!
line con 0
line vty 0 4
login
!
end
```

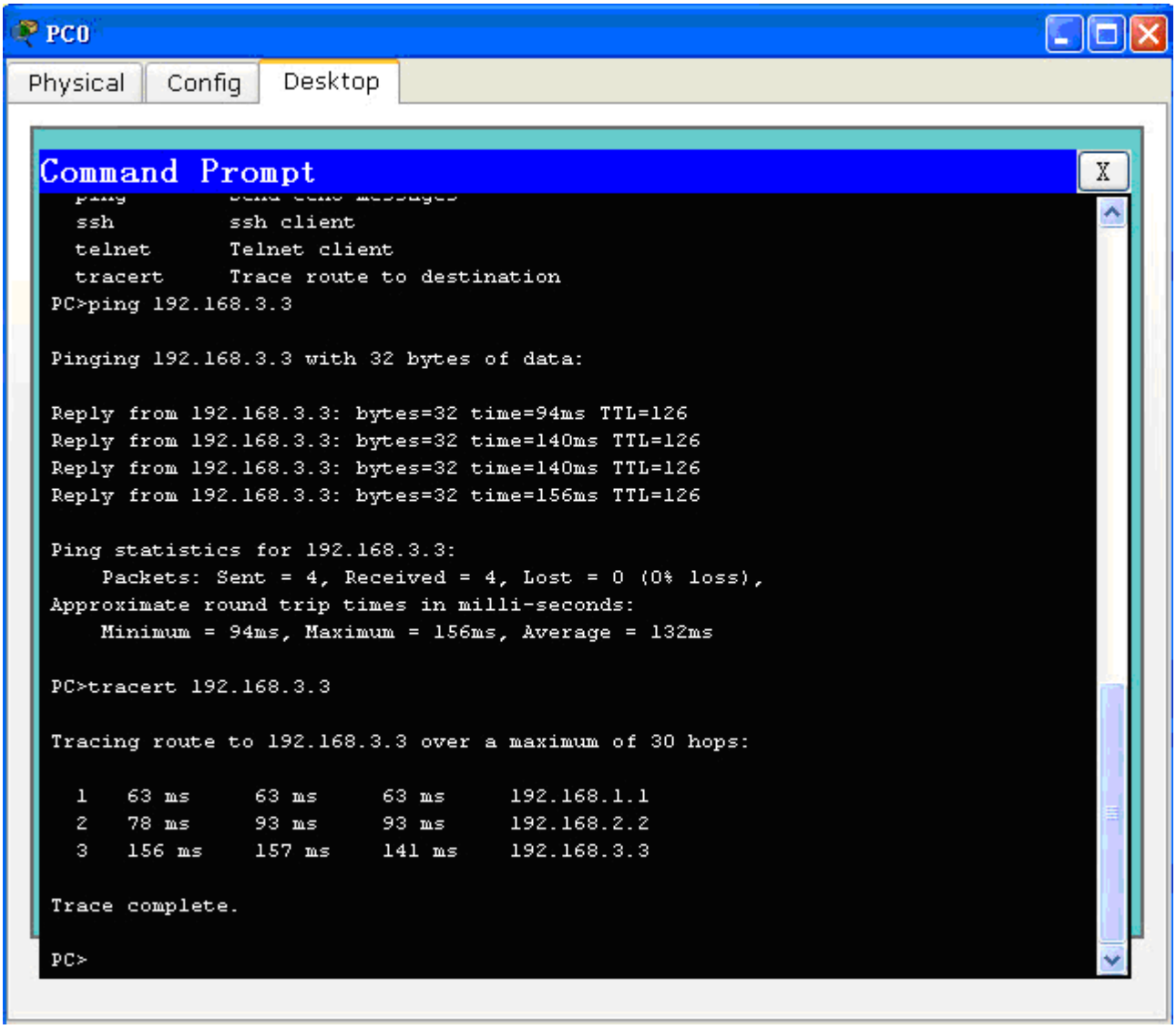
Newyork 路由器的配置：

```
Newyork#sh running-config
Building configuration...
```

```
Current configuration : 606 bytes
!
version 12.4
no service password-encryption
!
hostname Newyork
!
username Boston password 0 senya
!
ip ssh version 1
!
interface FastEthernet0/0
no ip address
duplex auto
speed auto
shutdown
!
interface FastEthernet0/1
ip address 192.168.3.1 255.255.255.0
duplex auto
speed auto
!
interface Serial0/3/0
description link to Boston
ip address 192.168.2.2 255.255.255.0
encapsulation ppp
ppp authentication chap
!
interface Vlan1
no ip address
shutdown
!
router rip
version 2
network 192.168.2.0
network 192.168.3.0
!
ip classless
!
line con 0
line vty 0 4
login
!
!
end
```



图五　配置计算机的 IP 地址及网关



图六　在计算机 PC0 上使用 ping 命令检查网络的连通性

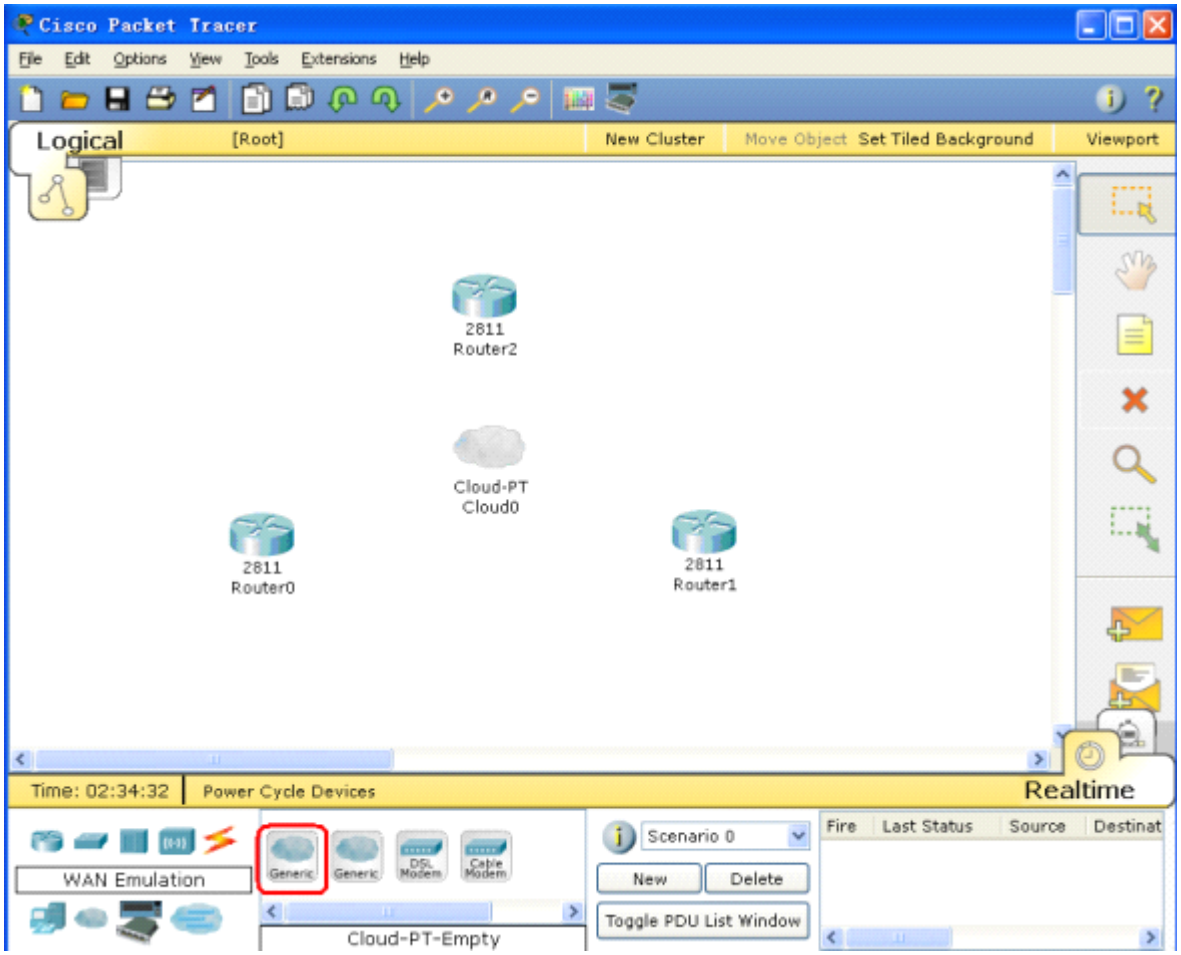
Packet Tracer 5.0 建构 CCNA 实验攻略(13)——帧中继 Frame Relay

帧中继是一种用于连接计算机系统的面向分组的通信方法。它主要用在公共或专用网上的局域网互联以及广域网连接。大多数公共电信局都提供帧中继服务，把它作为建立高性能的虚拟广域连接的一种途径。帧中继是进入带宽范围从 56Kbps 到 1．544Mbps 的广域分组交换网的用户接口。帧中继是从综合业务数字网中发展起来的，并在 1984 年推荐为国际电话电报咨询委员会（CCITT）的一项标准，另外，由美国国家标准协会授权的美国 TIS 标准委员会也对帧中继做了一些初步工作。

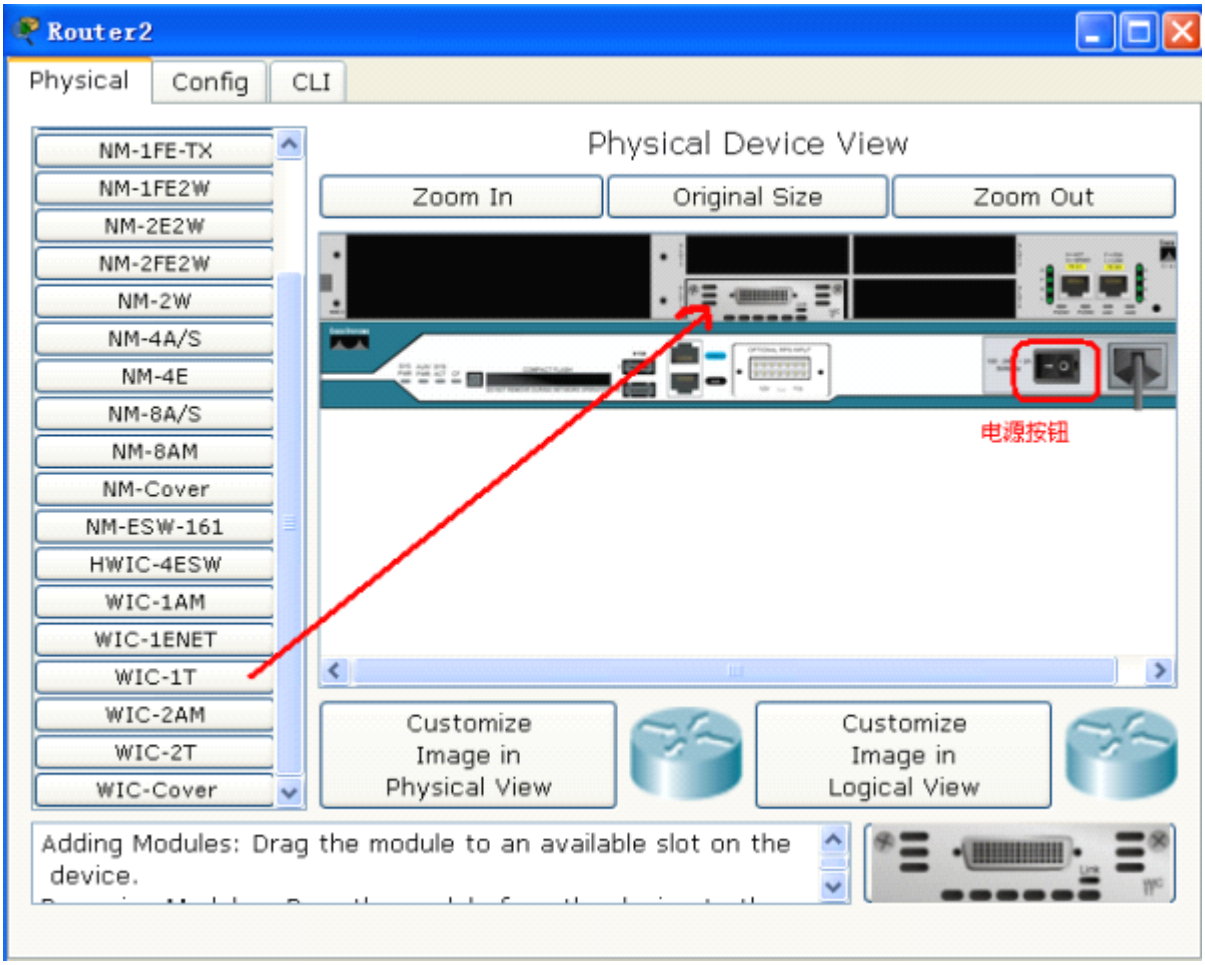
数据链路连接标识符（DLCI） 这个信息包含标识号，它标识多路复用到通道的逻辑连结。帧中继交换机将两端的 DLCI 关联起来，它是帧中继帧格式中地字段的一个重要部分之一，这是个 6 位标识，表示正在进行的客户和服务器之间的连接，用于 RFCOMM 层。 帧中继使用 DLCI 来标识 DTE 和服务商交换机之间的虚电路。DLCI 字段的长度一般为 10bit，但也可扩展为 16bit，前者用二字节地址字段，后者是三字节地址字段。23bit 用四字节地址字段。DLCI 值用于标识永久虚电路（PVC），呼叫控制或管理信息。DLCI 只具有本地意义。

一、使用 Packet Tracer 5.0 构建帧中继仿真

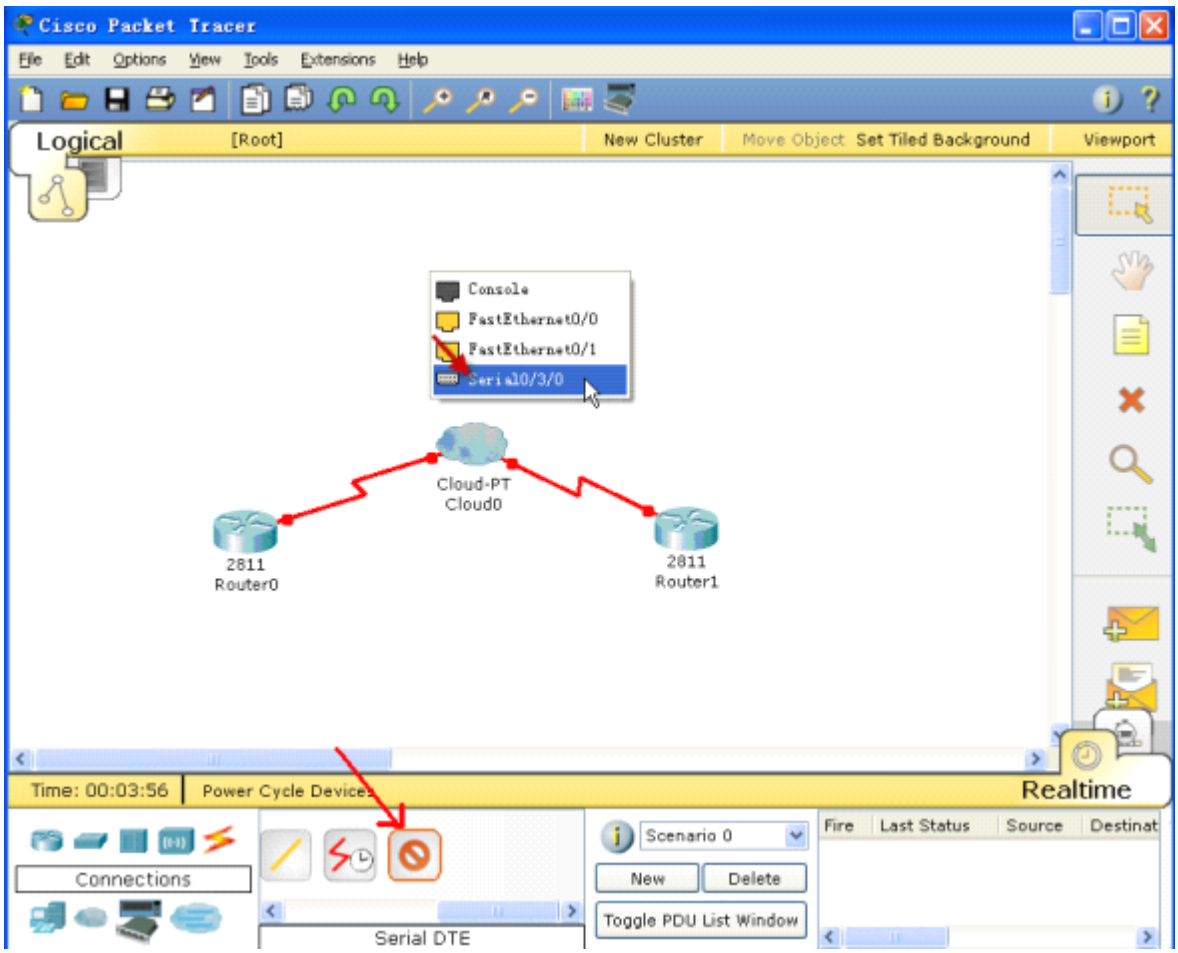
添加三个 2811 路由器和一个云



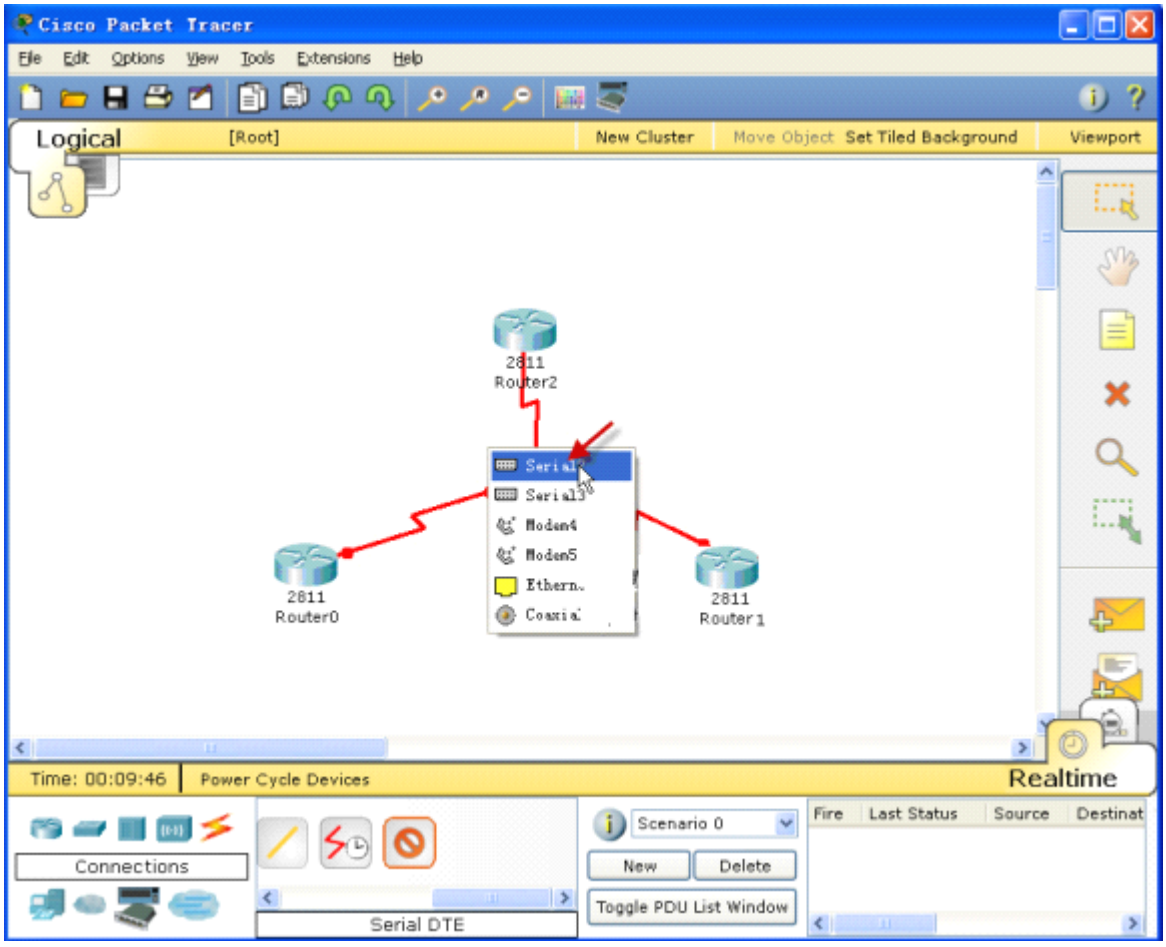
图一



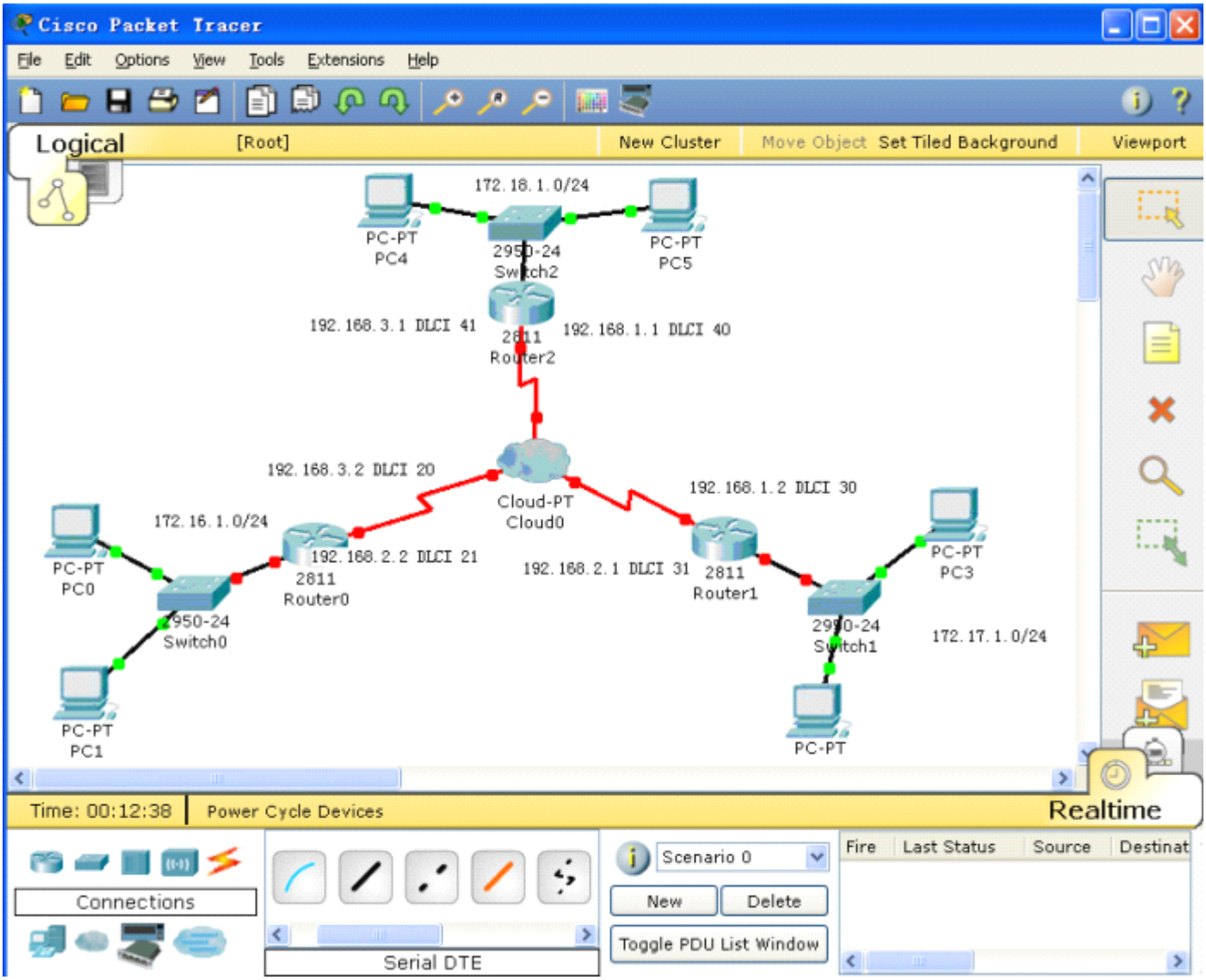
图二　给 2811 添加一个具有串口的模块



图三



图四　把路由器 2811 的串口与云的串口相连，路由器的串口为 DTE



图五　实验拓扑图及 IP 地址、DLCI 分配

二、配置 Frame Relay

以 Router2 为例，其它两个路由器相似，\\后是人为添加的注释，在实际配置时不存在

```
Router>en   \\进入特权配置模式
Router#conf t     \\进入全局配置模式
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#no ip domain-lookup   \\取消名称解析
Router(config)#hostname Router2     \\配置路由器的名字
Router2(config)#int fa0/1              \\进入接口配置模式
Router2(config-if)#ip address 172.18.1.1 255.255.255.0     \\配置 ip 地址
Router2(config-if)#no shut     \\激活端口

%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
Router2(config-if)#int serial0/3/0
Router2(config-if)#encapsulation frame-relay     \\对串口 serial0/3/0 进行 frame-relay 封装

Router2(config-if)#no shut
```

```
%LINK-5-CHANGED: Interface Serial0/3/0, changed state to up
Router2(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/3/0, changed state to up
Router2(config-if)#interface serial0/3/0.1 point-to-point    \\进入串口的子接口配置模式

%LINK-5-CHANGED: Interface Serial0/3/0.1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/3/0.1, changed state to upRouter2

(config-subif)#ip address 192.168.1.1 255.255.255.0     \\为子接口配置 IP 地址
Router2(config-subif)#description Link Router1 DLCI 30    \\为子接口添加描述
Router2(config-subif)#frame-relay interface-dlci 40          \\配置 DLCI
Router2(config-subif)#interface serial0/3/0.2 point-to-point

%LINK-5-CHANGED: Interface Serial0/3/0.2, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/3/0.2, changed state to upRouter2

(config-subif)#ip address 192.168.3.1 255.255.255.0
Router2(config-subif)#description link to Router0 DLCI20
Router2(config-subif)#frame-relay interface-dlci 41
Router2(config-subif)#end
%SYS-5-CONFIG_I: Configured from console by console
Router2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router2(config)#router eigrp 100            \\在路由器上启用 EIGRP 路由协议
Router2(config-router)#network 172.18.0.0    \\通告与自己直接想连的网段
Router2(config-router)#network 192.168.3.0
Router2(config-router)#network 192.168.1.0
Router2(config-router)#
%SYS-5-CONFIG_I: Configured from console by console
Router2#copy running-config startup-config    \\保存配置
Destination filename [startup-config]?
Building configuration...
[OK]
Router2#
```

路由器 Router0 的配置：

```
Router0#sh running-config
Building configuration...

Current configuration : 830 bytes
!
version 12.4
no service password-encryption
!
hostname Router0
!
!
ip ssh version 1
no ip domain-lookup
!
!
interface FastEthernet0/0
no ip address
duplex auto
speed auto
shutdown
!
interface FastEthernet0/1
ip address 172.16.1.1 255.255.255.0
duplex auto
```

```
speed auto
!
interface Serial0/3/0
no ip address
encapsulation frame-relay
!
interface Serial0/3/0.1 point-to-point
description Link to Router 2
ip address 192.168.3.2 255.255.255.0
frame-relay interface-dlci 20
!
interface Serial0/3/0.2 point-to-point
description Link to Router1
ip address 192.168.2.2 255.255.255.0
frame-relay interface-dlci 21
!
interface Vlan1
no ip address
shutdown
!
router eigrp 100
network 172.16.0.0
network 192.168.3.0
network 192.168.2.0
auto-summary
!
ip classless
!
line con 0
line vty 0 4
login
!
!
end
```

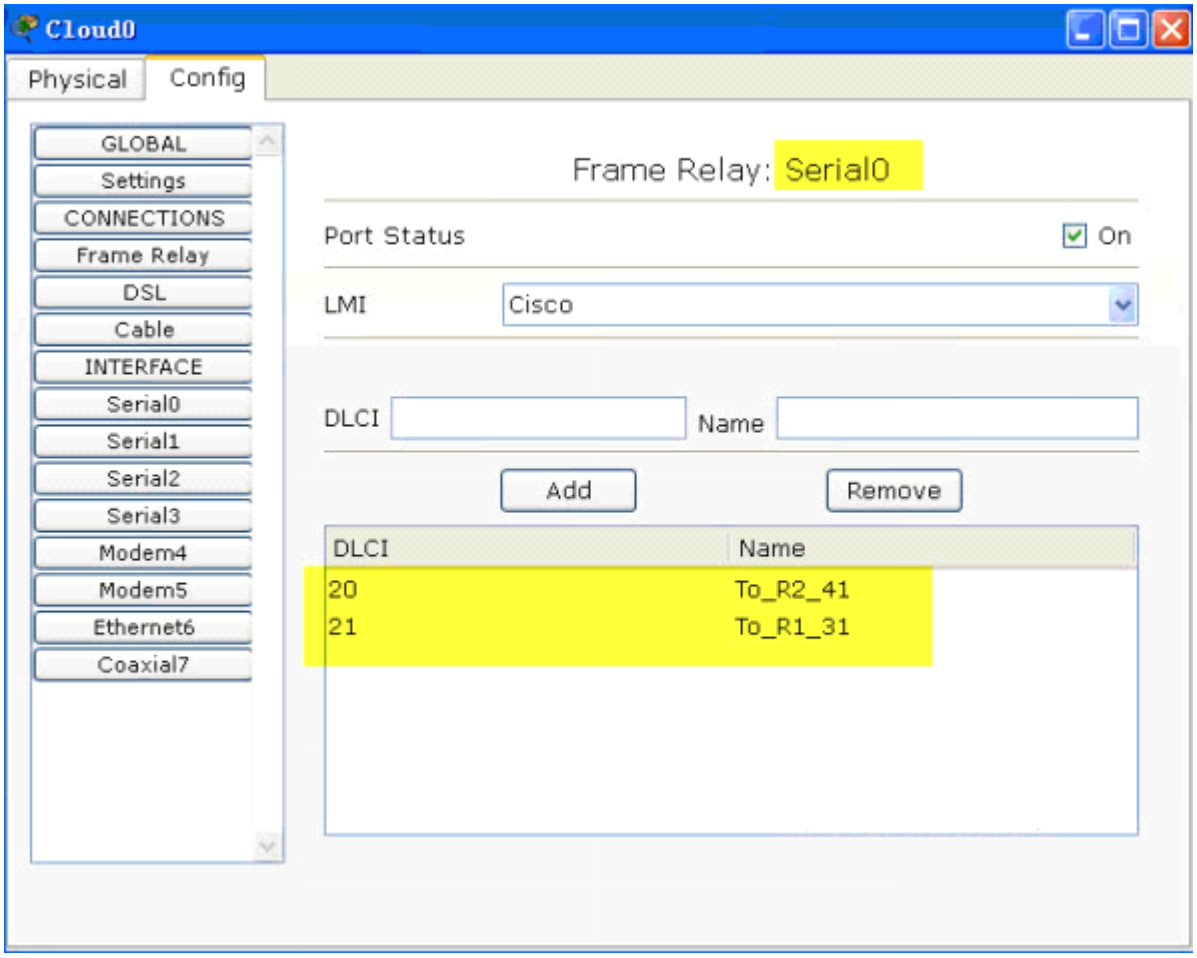
路由器 Router1 的配置

```
Router1#sh running-config
Building configuration...

Current configuration : 843 bytes
!
version 12.4
no service password-encryption
!
hostname Router1
!
ip ssh version 1
no ip domain-lookup
!
!
interface FastEthernet0/0
no ip address
duplex auto
speed auto
shutdown
!
interface FastEthernet0/1
ip address 172.17.1.1 255.255.255.0
duplex auto
speed auto
!
interface Serial0/3/0
no ip address
encapsulation frame-relay
!
interface Serial0/3/0.1 point-to-point
description link to Router2 DLCI40
ip address 192.168.1.2 255.255.255.0
frame-relay interface-dlci 30
!
interface Serial0/3/0.2 point-to-point
description link to router0 DLCI21
ip address 192.168.2.1 255.255.255.0
frame-relay interface-dlci 31
!
interface Vlan1
no ip address
shutdown
!
router eigrp 100
network 192.168.1.0
network 192.168.2.0
network 172.17.0.0
auto-summary
!
ip classless
!!
line con 0
line vty 0 4
login
!
!
end
```

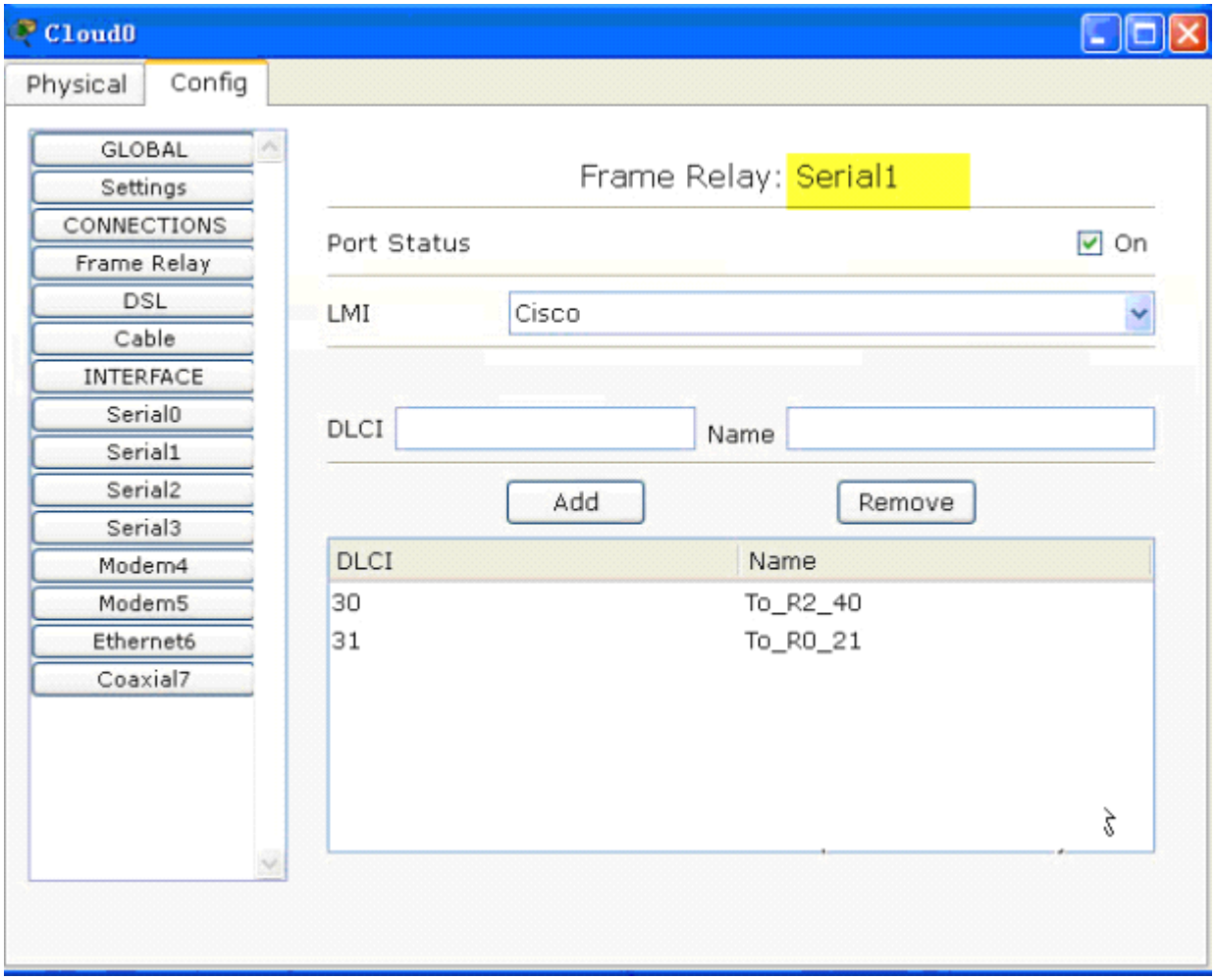
路由器 Router2 的配置

```
Router2#sh running-config
Building configuration...

Current configuration : 841 bytes
!
version 12.4
no service password-encryption
!
hostname Router2
!
!
ip ssh version 1
no ip domain-lookup
!
!
interface FastEthernet0/0
no ip address
duplex auto
speed auto
shutdown
!
interface FastEthernet0/1
ip address 172.18.1.1 255.255.255.0
duplex auto
speed auto
!
interface Serial0/3/0
no ip address
encapsulation frame-relay
!
interface Serial0/3/0.1 point-to-point
description Link Router1 DLCI 30
ip address 192.168.1.1 255.255.255.0
frame-relay interface-dlci 40
!
interface Serial0/3/0.2 point-to-point
description link to Router0 DLCI20
ip address 192.168.3.1 255.255.255.0
frame-relay interface-dlci 41
!
interface Vlan1
no ip address
shutdown
!
router eigrp 100
network 172.18.0.0
network 192.168.3.0
network 192.168.1.0
auto-summary
!
ip classless
!
line con 0
line vty 0 4
login
!
!
end
```

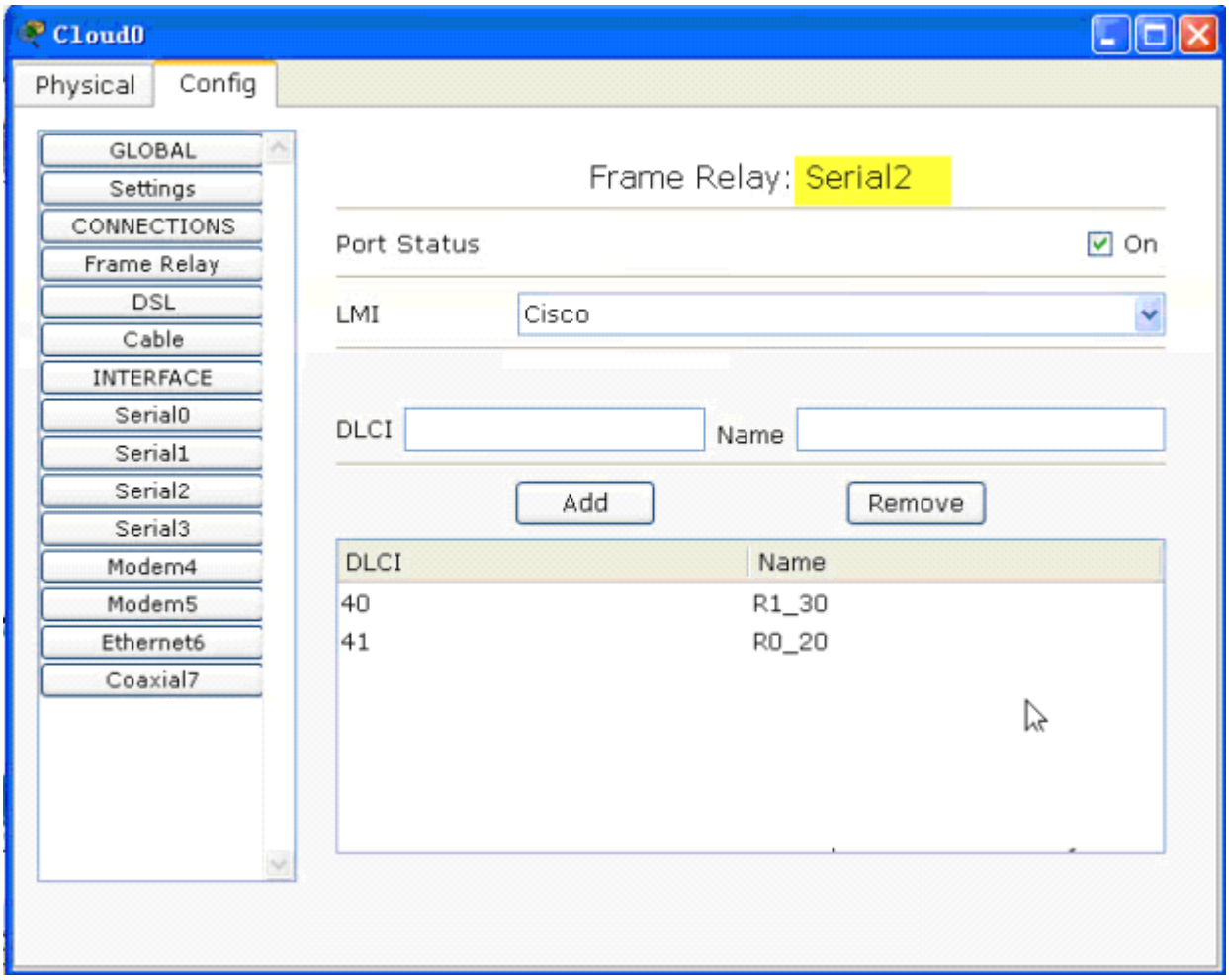
路由器配置完毕后，还需要配置 Cloud0。



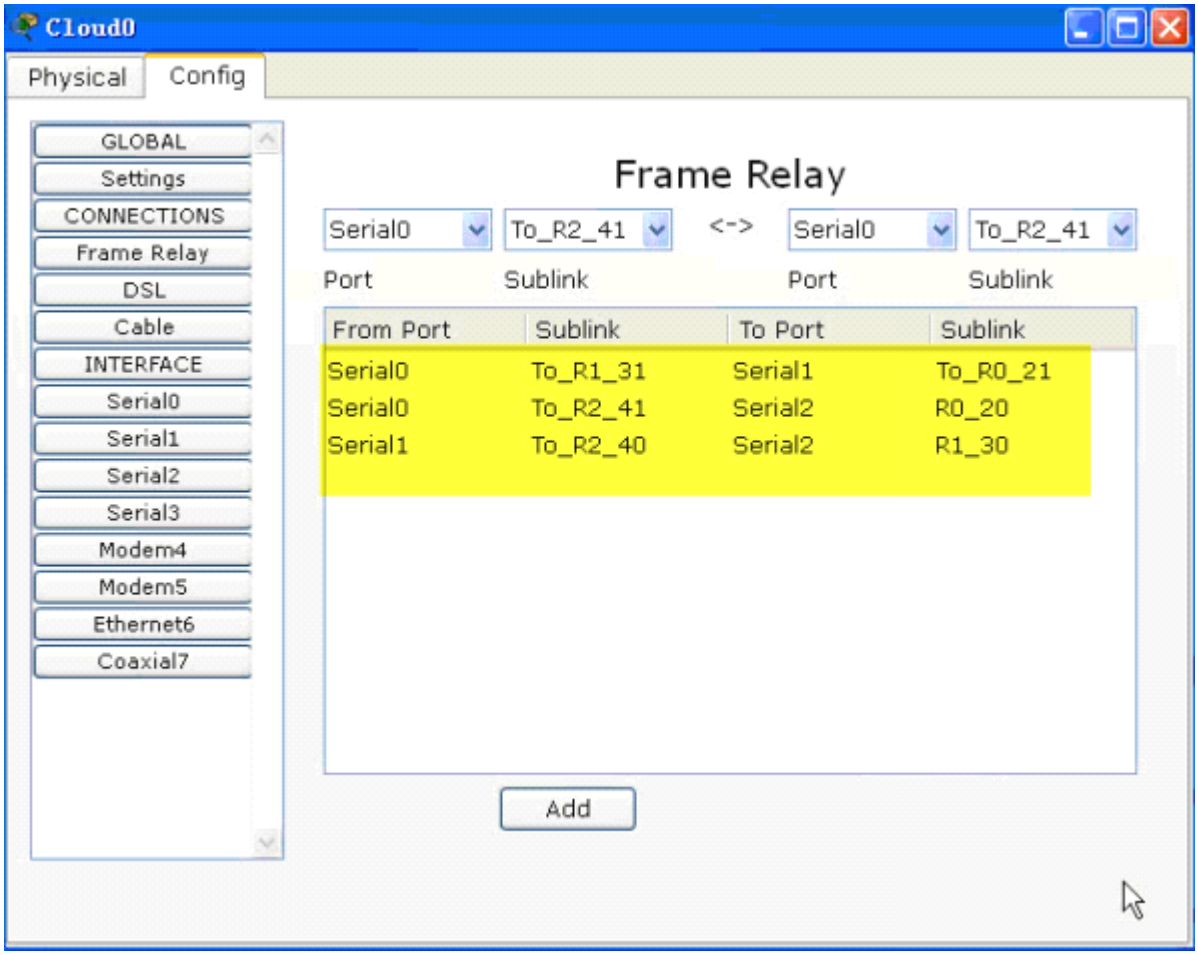
图六　根据路由器的相关配置，给 Cloud0 的 serial0 配置 DLCI 及 LMI 类型



图七　根据路由器的相关配置，给 Cloud0 的 serial1 配置 DLCI 及 LMI 类型



图八　根据路由器的相关配置，给 Cloud0 的 serial2 配置 DLCI 及 LMI 类型



图九　根据路由器的相关配置，配置 Cloud0 的 Frame Relay

三、配置各个计算机，并使用 ping 命令校验网络的连通性

```
pc0

PC>ipconfig

IP Address.....................: 172.16.1.2
Subnet Mask....................: 255.255.255.0
Default Gateway................: 172.16.1.1

PC>ping 192.168.1.1

Pinging 192.168.1.1 with 32 bytes of data:

Reply from 192.168.1.1: bytes=32 time=141ms TTL=254
Reply from 192.168.1.1: bytes=32 time=110ms TTL=254
Reply from 192.168.1.1: bytes=32 time=143ms TTL=254
Reply from 192.168.1.1: bytes=32 time=110ms TTL=254

Ping statistics for 192.168.1.1:
       Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
       Minimum = 110ms, Maximum = 143ms, Average = 126ms

PC>ping 192.168.2.2

Pinging 192.168.2.2 with 32 bytes of data:

Reply from 192.168.2.2: bytes=32 time=62ms TTL=255
Reply from 192.168.2.2: bytes=32 time=62ms TTL=255
Reply from 192.168.2.2: bytes=32 time=47ms TTL=255
Reply from 192.168.2.2: bytes=32 time=63ms TTL=255

Ping statistics for 192.168.2.2:
       Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
       Minimum = 47ms, Maximum = 63ms, Average = 58ms

PC>ping 192.168.3.1

Pinging 192.168.3.1 with 32 bytes of data:

Reply from 192.168.3.1: bytes=32 time=109ms TTL=254
Reply from 192.168.3.1: bytes=32 time=125ms TTL=254
Reply from 192.168.3.1: bytes=32 time=93ms TTL=254
Reply from 192.168.3.1: bytes=32 time=94ms TTL=254

Ping statistics for 192.168.3.1:
       Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
```

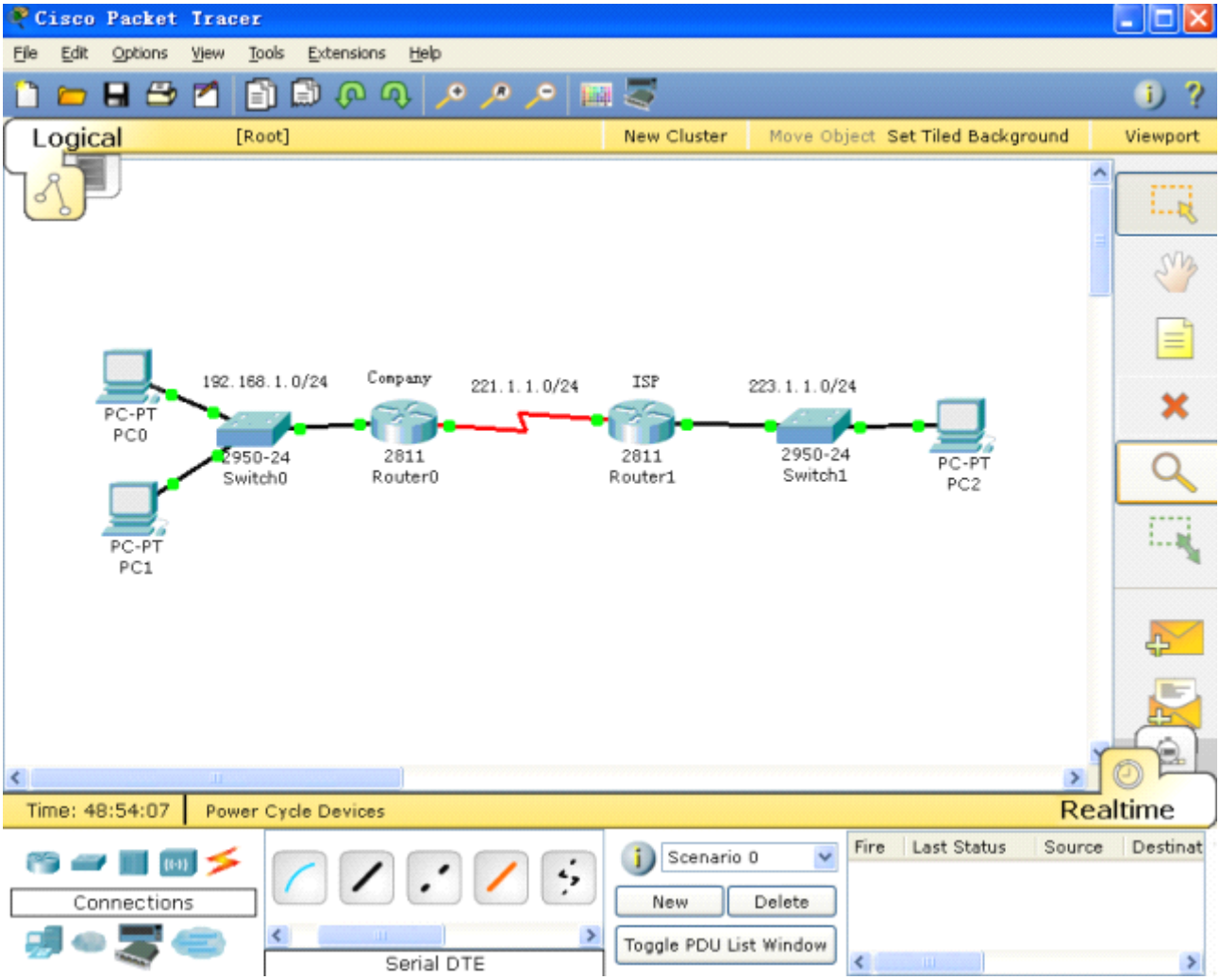
```
Approximate round trip times in milli-seconds:
       Minimum = 93ms, Maximum = 125ms, Average = 105ms


PC>ping 172.17.1.1

Pinging 172.17.1.1 with 32 bytes of data:

Reply from 172.17.1.1: bytes=32 time=110ms TTL=254
Reply from 172.17.1.1: bytes=32 time=112ms TTL=254
Reply from 172.17.1.1: bytes=32 time=123ms TTL=254
Reply from 172.17.1.1: bytes=32 time=110ms TTL=254

Ping statistics for 172.17.1.1:
       Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
       Minimum = 110ms, Maximum = 123ms, Average = 113ms

PC>ping 172.18.1.1

Pinging 172.18.1.1 with 32 bytes of data:

Reply from 172.18.1.1: bytes=32 time=140ms TTL=254
Reply from 172.18.1.1: bytes=32 time=109ms TTL=254
Reply from 172.18.1.1: bytes=32 time=110ms TTL=254
Reply from 172.18.1.1: bytes=32 time=125ms TTL=254

Ping statistics for 172.18.1.1:
       Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
       Minimum = 109ms, Maximum = 140ms, Average = 121ms
```

Packet Tracer 5.0 建构 CCNA 实验攻略(14)——PAT(基于端口的 NAT)

网络地址转换(NAT,Network Address Translation)被广泛应用于各种类型 Internet 接入方式和备种类型的网络中。原因很简单，NAT 不仅完美地解决了 lP 地址不足的问题，而且还能够有效地避免来自网络外部的攻击，隐藏并保护网络内部的计算机。NAT 的实现方式有三种，即静态转换 Static Nat、动态转换 Dynamic Nat 和 端口多路复用 OverLoad。

端口多路复用是指改变外出数据包的源端口并进行端口转换，即端口地址转换(PAT，Port AddressTranslation).采用端口多路复用方式。内部网络的所有主机均可共享一个合法外部 IP 地址实现对 Internet 的访问，从而可以最大限度地节约 IP 地址资源。同时，又可隐藏网络内部的所有主机，有效避免来自 internet 的攻击。因此，目前网络中应用最多的就是端口多路复用方式。

一、实验配置拓扑图



图一　私有网段 192.168.1.0/24 通过 Company 路由器的 PAT 技术接入互连网

二、路由器的基本配置

路由器 ISP 的配置

```
ISP#sh startup-config
Using 582 bytes
!
version 12.4
service password-encryption
!
hostname ISP
!
enable secret 5
$1$mERr$Q1EnFeXJ8Ibdhx2QffKaQ.
enable password 7 083249401018
!
ip ssh version 1
!
!
interface FastEthernet0/0
no ip address
duplex auto
speed auto
shutdown
!
interface FastEthernet0/1
ip address 223.1.1.1 255.255.255.0
duplex auto
speed auto
!
interface Serial0/3/0
ip address 221.1.1.1 255.255.255.0
clock rate 56000
!
interface Serial0/3/1
no ip address
shutdown
!
interface Vlan1
no ip address
shutdown
```

```
!
ip classless
!
no cdp run
!
line con 0
line vty 0 4
login
!
!
end
```

路由器 Company 的配置

```
Company#sh startup-config
Using 643 bytes
!
version 12.4
service password-encryption
!
hostname Company
!
!
enable password 7 083249401018
!
ip ssh version 1
!
!
interface FastEthernet0/0
no ip address
duplex auto
speed auto
shutdown
!
interface FastEthernet0/1
ip address 192.168.1.1 255.255.255.0
ip nat inside
duplex auto
speed auto
!
interface Serial0/3/0
ip address 221.1.1.2 255.255.255.0
ip nat outside
!
interface Vlan1
no ip address
shutdown
!
ip nat inside source list 1 interface
Serial0/3/0 overload
ip classless
ip route 0.0.0.0 0.0.0.0 221.1.1.1
!
!
access-list 1 permit 192.168.1.0 0.0.0.255

!
no cdp run
!
line con 0
line vty 0 4
login
!
!
end
```

在路由器 Company 上配置 PAT 的命令

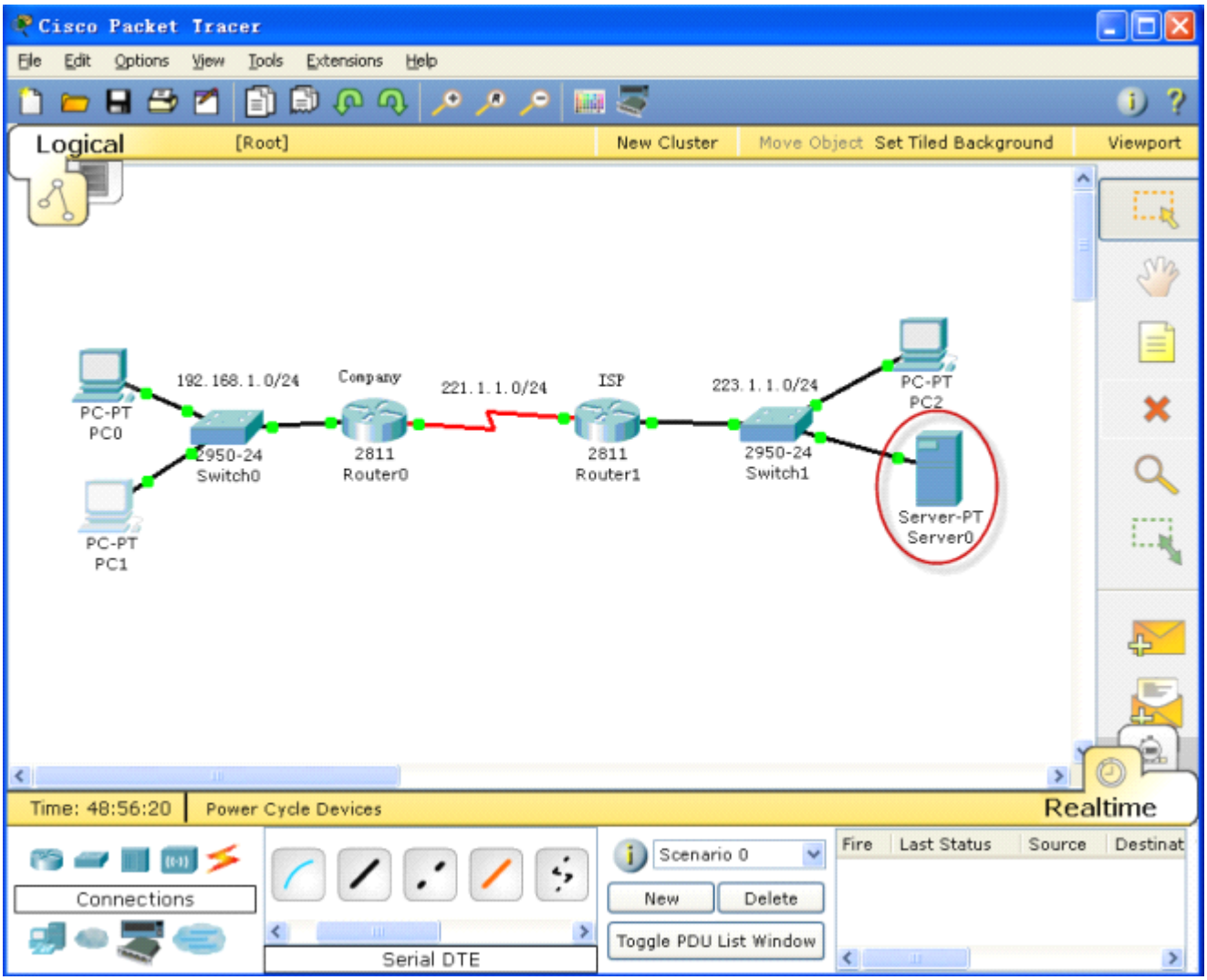
```
Company(config)#ip route 0.0.0.0 0.0.0.0 221.1.1.1     \\配置默认路由
Company(config)#access-list 1 permit 192.168.1.0 0.0.0.255     \\配置一个标准访问控制列表

Company(config)#ip nat inside source list 1 interface Serial0/3/0 overload  \\启用 PAT
```

私有 IP 地址的来源来自于 ACL 1，使用 serial0/3/0 上的公共 IP 地址进行转换，overload 表示使用端口号进行转换

```
Company(config)#int fa0/1
Company(config-if)#ip nat inside
Company(config-if)#int serial0/3/0
Company(config-if)#ip nat outside
```

三、校验、查看 PAT 的配置及运行状况

测试，又在实验拓扑图中添加了一台服务器。



图三

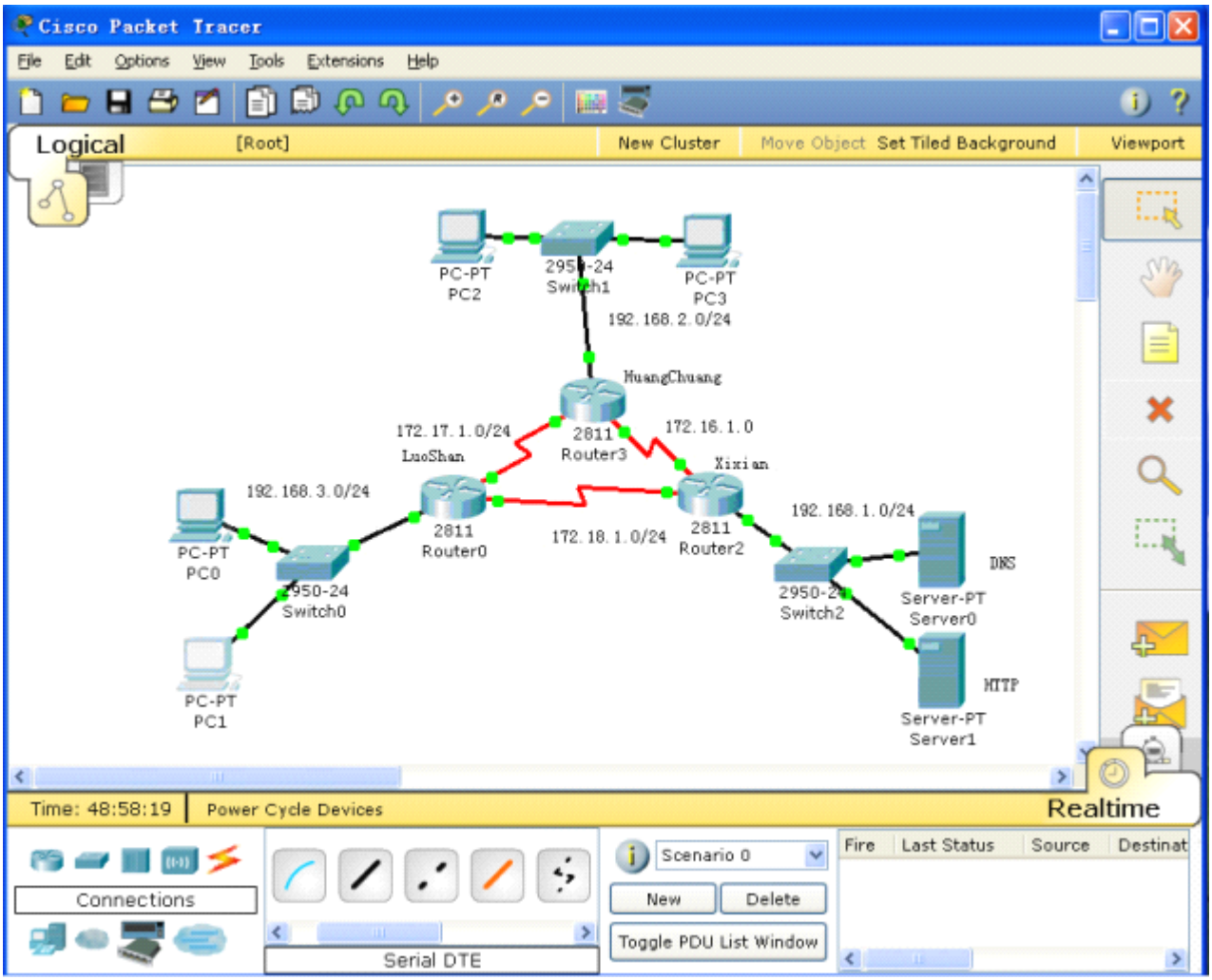
```
Company#sh ip nat translations
Pro Inside global     Inside local       Outside local      Outside global

icmp
221.1.1.2:23          192.168.1.3:23     223.1.1.2:23       223.1.1.2:23
icmp
221.1.1.2:24          192.168.1.3:24     223.1.1.2:24       223.1.1.2:24
icmp
221.1.1.2:25          192.168.1.3:25     223.1.1.2:25       223.1.1.2:25
icmp
221.1.1.2:26          192.168.1.3:26     223.1.1.2:26       223.1.1.2:26
icmp
221.1.1.2:27          192.168.1.3:27     223.1.1.2:27       223.1.1.2:27
icmp
221.1.1.2:28          192.168.1.3:28     223.1.1.2:28       223.1.1.2:28
tcp 221.1.1.2:1025        192.168.1.3:1025     223.1.1.3:80       223.1.1.3:80
tcp 221.1.1.2:1026        192.168.1.3:1026     223.1.1.3:80       223.1.1.3:80
tcp 221.1.1.2:1027        192.168.1.3:1027     223.1.1.3:80       223.1.1.3:80
tcp 221.1.1.2:1028        192.168.1.3:1028     223.1.1.3:80       223.1.1.3:80
tcp 221.1.1.2:1029        192.168.1.3:1029     223.1.1.3:80       223.1.1.3:80
```

```
Company#sh ip nat statistics
Total translations: 11 (0 static, 11 dynamic, 11 extended)
Outside Interfaces: Serial0/3/0
Inside Interfaces: FastEthernet0/1
Hits: 77 Misses: 11
Expired translations: 0
Dynamic mappings:

IP NAT debugging is on
Company#
NAT: s=192.168.1.2->221.1.1.2, d=223.1.1.1[12]
NAT*: s=223.1.1.1, d=221.1.1.2->192.168.1.2[12]
NAT: s=192.168.1.2->221.1.1.2, d=223.1.1.1[13]
NAT*: s=223.1.1.1, d=221.1.1.2->192.168.1.2[13]
NAT: s=192.168.1.2->221.1.1.2, d=223.1.1.1[14]
NAT*: s=223.1.1.1, d=221.1.1.2->192.168.1.2[14]
NAT: s=192.168.1.2->221.1.1.2, d=223.1.1.1[15]
NAT*: s=223.1.1.1, d=221.1.1.2->192.168.1.2[15]
Company#no debug ip nat
IP NAT debugging is off
Company#
```

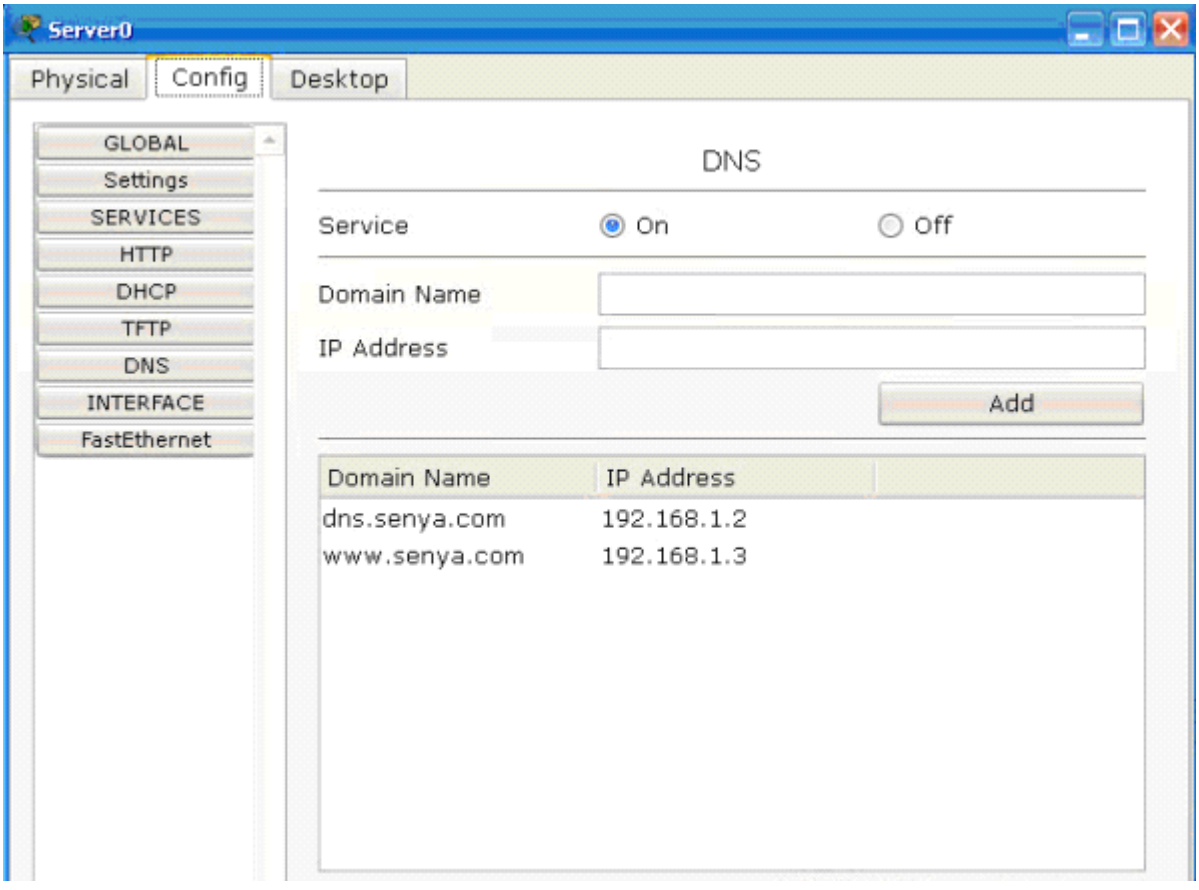
Packet Tracer 5.0 建构 CCNA 实验攻略(15)——ACL 简单的配置

ACL(Access Control List，访问控制列表)，简单说就是包过滤，根据数据包的报头中的 ip 地址、协议端口号等信息进行过滤。利用 ACL 可以实现安全控制。编号：1-99 or 1300-1999(standard IP)，100-199 or 2000-2699(Extended IP)。ACL 并不复杂，但在实际应用中的，要想恰当地应用 ACL，必需要制定合理的策略。

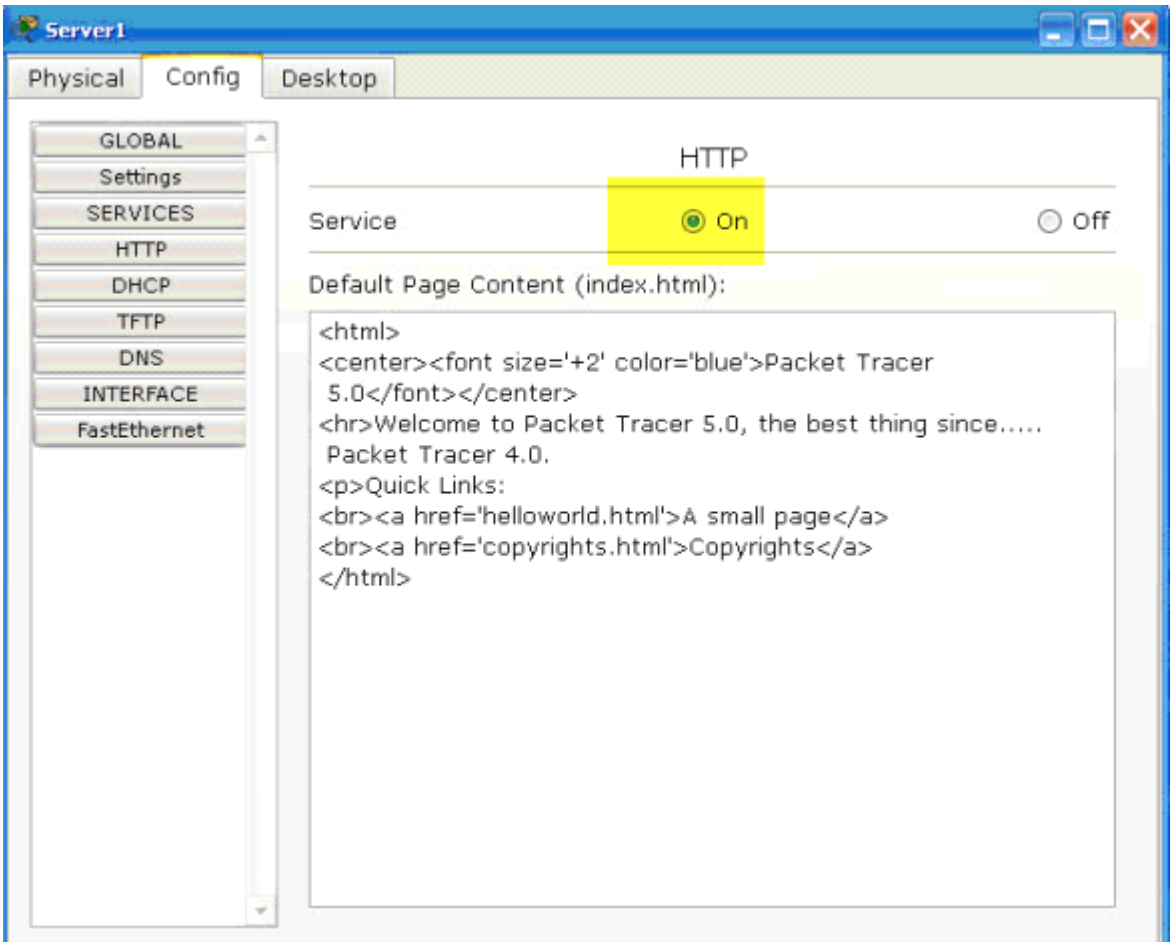
一、实验配置拓扑图



图一



图二　网络中的 DNS 服务器:192.168.1.2



图三　网络中的 WWW 服务器:192.168.1.3

二、三个路由器的基本配置

```
LuoShan#sh startup-config
Using 699 bytes
!
version 12.4
no service password-encryption
!
hostname LuoShan
!
!
enable password cisco
!
username senya password 0 cisco
!
ip ssh version 1
no ip domain-lookup
!
!
interface FastEthernet0/0
no ip address
duplex auto
speed auto
shutdown
!
interface FastEthernet0/1
ip address 192.168.3.1 255.255.255.0
duplex auto
speed auto
!
interface Serial0/3/0
ip address 172.17.1.1 255.255.255.0
clock rate 56000
!
interface Serial0/3/1
ip address 172.18.1.2 255.255.255.0
!
interface Vlan1
no ip address
shutdown
!
router eigrp 100
network 192.168.3.0
network 172.17.0.0
network 172.18.0.0
```

```
auto-summary
!
ip classless
!
!
line con 0
line vty 0 4
password cisco
login
!
!
end

HuangChuang#sh startup-config
Using 669 bytes
!
version 12.4
no service password-encryption
!
hostname HuangChuang
!
!
enable password cisco
!
ip ssh version 1
no ip domain-lookup
!
!
interface FastEthernet0/0
no ip address
duplex auto
speed auto
shutdown
!
interface FastEthernet0/1
ip address 192.168.2.1 255.255.255.0
duplex auto
speed auto
!
interface Serial0/3/0
ip address 172.17.1.2 255.255.255.0
!
interface Serial0/3/1
ip address 172.16.1.1 255.255.255.0
clock rate 56000
!
interface Vlan1
no ip address
shutdown
!
router eigrp 100
network 192.168.2.0
network 172.17.0.0
network 172.16.0.0
auto-summary
!
ip classless
!
line con 0
line vty 0 4
password cisco
login
!
!
end

xixian#sh startup-config
Using 679 bytes
!
version 12.4
service password-encryption
!
hostname xixian
!
!
enable password 7 0822455D0A16
!
ip ssh version 1
no ip domain-lookup
!
!
interface FastEthernet0/0
no ip address
duplex auto
speed auto
shutdown
!
interface FastEthernet0/1
ip address 192.168.1.1 255.255.255.0
duplex auto
speed auto
!
interface Serial0/3/0
ip address 172.18.1.1 255.255.255.0
```

```
clock rate 56000
!
interface Serial0/3/1
ip address 172.16.1.2 255.255.255.0
!
interface Vlan1
no ip address
shutdown
!
router eigrp 100
network 192.168.1.0
network 172.18.0.0
network 172.16.0.0
auto-summary
!
ip classless
!
line con 0
line vty 0 4
password 7 0822455D0A16
login
!
!
end
```

三、配置简单的 ACL

1、配置 ACL 限制远程登录到路由器的主机

```
HuangChuang#conf t
Enter configuration commands, one per line. End with CNTL/Z.
HuangChuang(config)#access-list 1 permit host 192.168.2.2  \\路由器 HuangChuang 只允许
192.168.2.2 远程登录(telnet)
HuangChuang(config)#line vty 0 4
HuangChuang(config-line)#access-class 1 in
HuangChuang(config-line)#
```

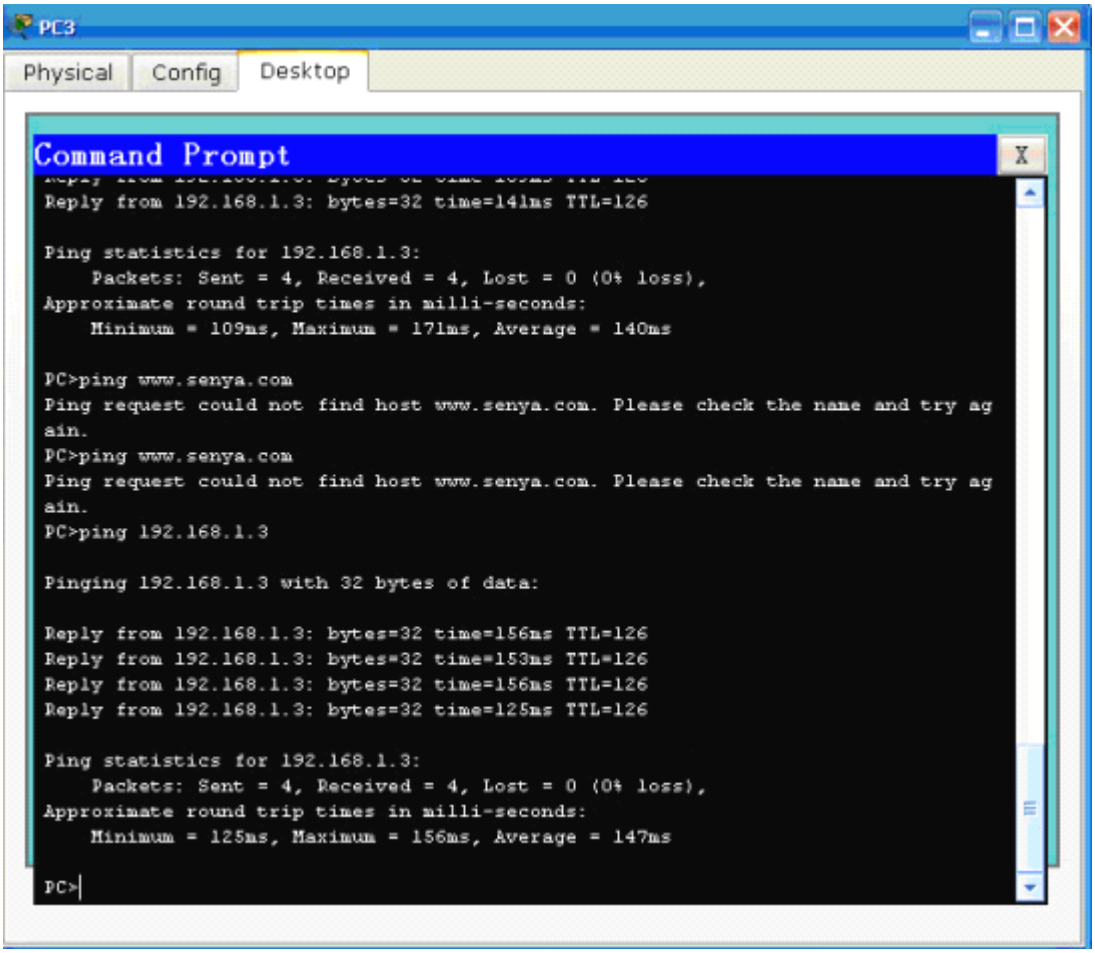
其它两个路由器配置相似。

2、配置 ACL 禁止 192.168.3.0/24 网段的 icmp 协议数据包通向与 192.168.1.0/24 网段

```
xixian(config)#access-list 101 deny icmp 192.168.3.0 0.0.0.255 192.168.1.0 0.0.0.255
xixian(config)#access-list 101 permit ip any any
xixian(config)#int fa0/1
xixian(config-if)#ip access-group 101 out
xixian(config-if)#
```

3、配置 ACL 禁止特点的协议端口通讯

```
HuangChuang#conf t
Enter configuration commands, one per line. End with CNTL/Z.
HuangChuang(config)#ip access-list extended ACL1     \\创建基于名称的扩展 ACL
HuangChuang(config-ext-nacl)#deny tcp host 192.168.2.2 192.168.1.0 0.0.0.255 eq 80
HuangChuang(config-ext-nacl)#deny udp host 192.168.2.3 192.168.1.0 0.0.0.255 eq 53
HuangChuang(config-ext-nacl)#permit ip any any
HuangChuang(config-ext-nacl)#exit
HuangChuang(config)#int fa0/1
HuangChuang(config-if)#ip access-group ACL1 in
HuangChuang(config-if)#
```



图四　验证 ACL

4。检验、查看 ACL

```
HuangChuang#sh access-list
Standard IP access list 1
        permit host 192.168.2.2 (4 match(es))
Extended IP access list ACL1
        deny udp host 192.168.2.3 192.168.1.0 0.0.0.255 eq domain
        deny tcp host 192.168.2.2 192.168.1.0 0.0.0.255 eq www
        permit ip any any
HuangChuang#show access-list
Standard IP access list 1
        permit host 192.168.2.2 (4 match(es))
Extended IP access list ACL1
        deny udp host 192.168.2.3 192.168.1.0 0.0.0.255 eq domain (15 match(es))
        deny tcp host 192.168.2.2 192.168.1.0 0.0.0.255 eq www (60 match(es))
        permit ip any any (34 match(es))
HuangChuang#show access-list ACL1
Extended IP access list ACL1
        deny udp host 192.168.2.3 192.168.1.0 0.0.0.255 eq domain (15 match(es))
        deny tcp host 192.168.2.2 192.168.1.0 0.0.0.255 eq www (60 match(es))
        permit ip any any (34 match(es))
HuangChuang#show access-list 1
```

```
Standard IP access list 1
       permit host 192.168.2.2 (4 match(es))
```

四、配置 ACL 的路由器配置内容

```
HuangChuang#sh startup-config
Using 914 bytes
!
version 12.4
no service password-encryption
!
hostname HuangChuang
!
!
enable password cisco
!
ip ssh version 1
no ip domain-lookup
!
!
interface FastEthernet0/0
no ip address
duplex auto
speed auto
shutdown
!
interface FastEthernet0/1
ip address 192.168.2.1 255.255.255.0
ip access-group ACL1 in
duplex auto
speed auto
!
interface Serial0/3/0
ip address 172.17.1.2 255.255.255.0
!
interface Serial0/3/1
ip address 172.16.1.1 255.255.255.0
clock rate 56000
!
interface Vlan1
no ip address
shutdown
!
router eigrp 100
network 192.168.2.0
network 172.17.0.0
network 172.16.0.0
auto-summary
!
ip classless
!
!
access-list 1 permit host 192.168.2.2
ip access-list extended ACL1
deny udp host 192.168.2.3 192.168.1.0
0.0.0.255 eq domain
deny tcp host 192.168.2.2 192.168.1.0
0.0.0.255 eq www
permit ip any any
!
line con 0
line vty 0 4
access-class 1 in
password cisco
login
!
!
end

LuoShan#sh startup-config
Using 756 bytes
!
version 12.4
no service password-encryption
!
hostname LuoShan
!
!
enable password cisco
!
!
username senya password 0 cisco
!
ip ssh version 1
no ip domain-lookup
!
!
interface FastEthernet0/0
no ip address
```

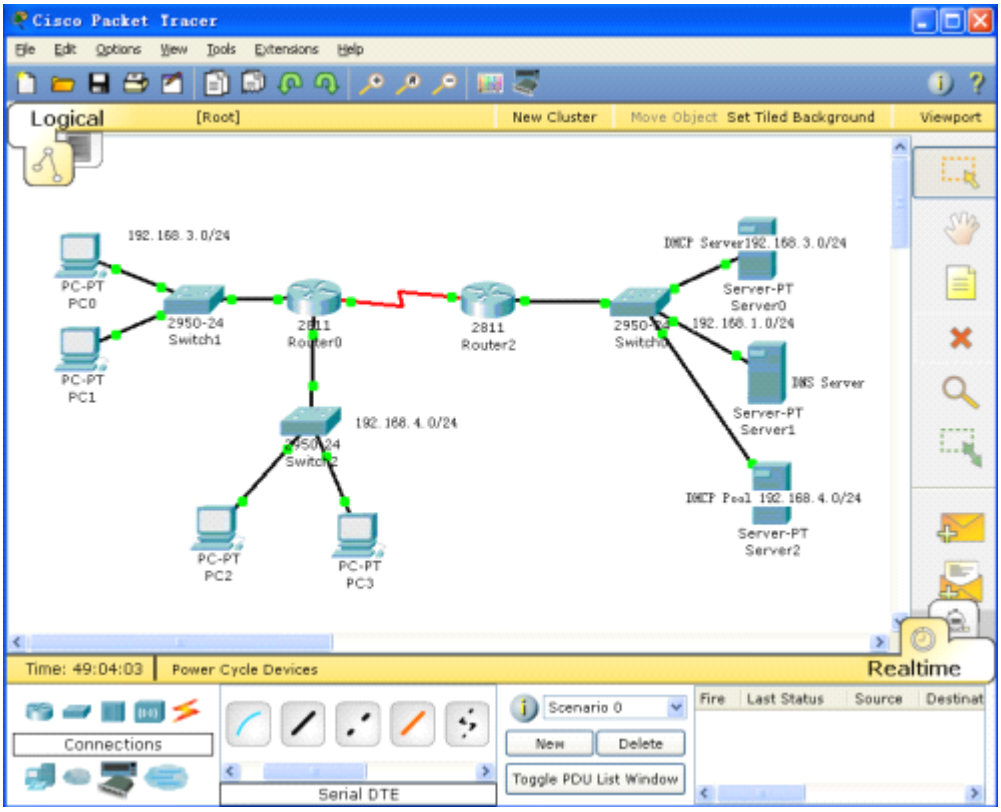
```
duplex auto
speed auto
shutdown
!
interface FastEthernet0/1
ip address 192.168.3.1 255.255.255.0
duplex auto
speed auto
!
interface Serial0/3/0
ip address 172.17.1.1 255.255.255.0
clock rate 56000
!
interface Serial0/3/1
ip address 172.18.1.2 255.255.255.0
!
interface Vlan1
no ip address
shutdown
!
router eigrp 100
network 192.168.3.0
network 172.17.0.0
network 172.18.0.0
auto-summary
!
ip classless
!
!
access-list 2 permit host 192.168.3.2
!
line con 0
line vty 0 4
access-class 2 in
password cisco
login
!
!
end

xixian#show startup-config
Using 808 bytes
!
version 12.4
service password-encryption
!
hostname xixian
!
!
enable password 7 0822455D0A16
!
!
ip ssh version 1
no ip domain-lookup
!
!
interface FastEthernet0/0
no ip address
duplex auto
speed auto
shutdown
!
interface FastEthernet0/1
ip address 192.168.1.1 255.255.255.0
ip access-group 101 out
duplex auto
speed auto
!
interface Serial0/3/0
ip address 172.18.1.1 255.255.255.0
clock rate 56000
!
interface Serial0/3/1
ip address 172.16.1.2 255.255.255.0
!
interface Vlan1
no ip address
shutdown
!
router eigrp 100
network 192.168.1.0
network 172.18.0.0
network 172.16.0.0
auto-summary
!
ip classless
!
!
access-list 101 deny icmp 192.168.3.0
0.0.0.255 192.168.1.0 0.0.0.255
access-list 101 permit ip any any
!
!
!
```

```
line con 0                                  !
line vty 0 4                                !
password 7 0822455D0A16                     end
login
```

Packet Tracer 5.0 建构 CCNA 实验攻略(16)——DHCP 中继配置

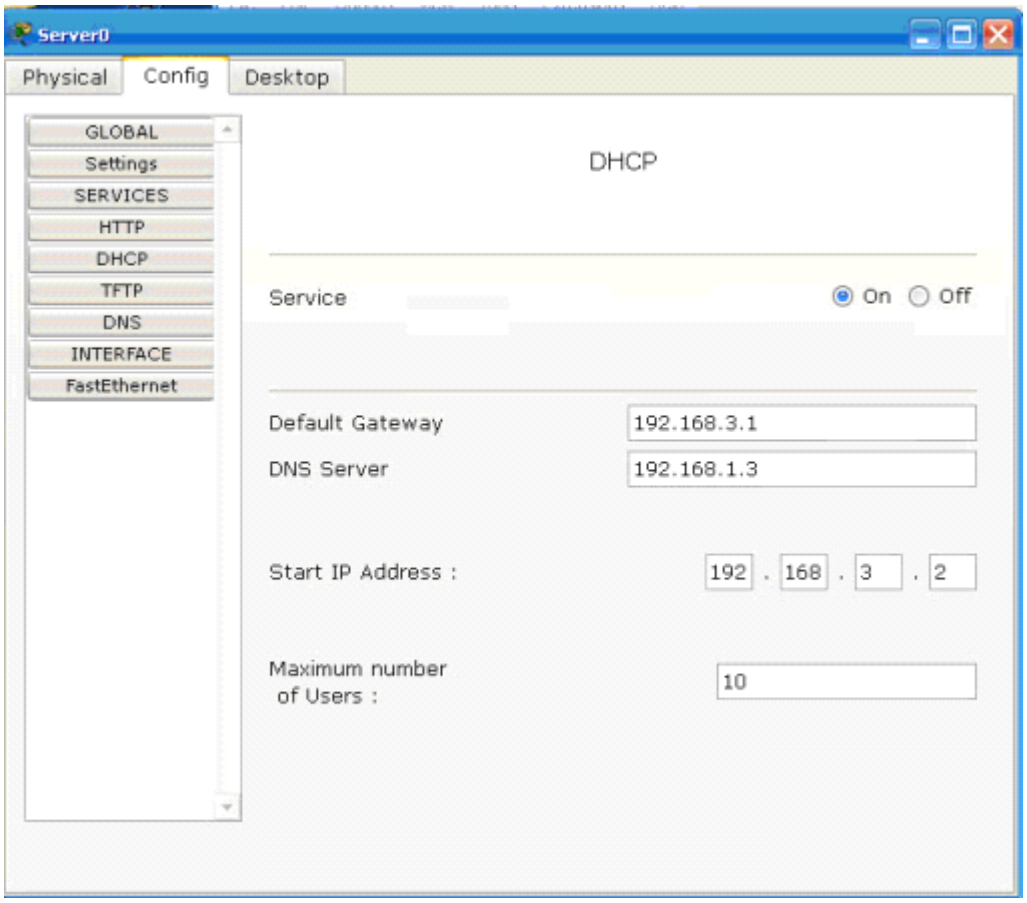
所谓 DHCP 中继，即是跨网段为主机分配 IP 地址等配置，DHCP Server 与 DHCP Client 处于不同的网段，这时就需要 DHCP Relay。

一、实验配置拓扑图

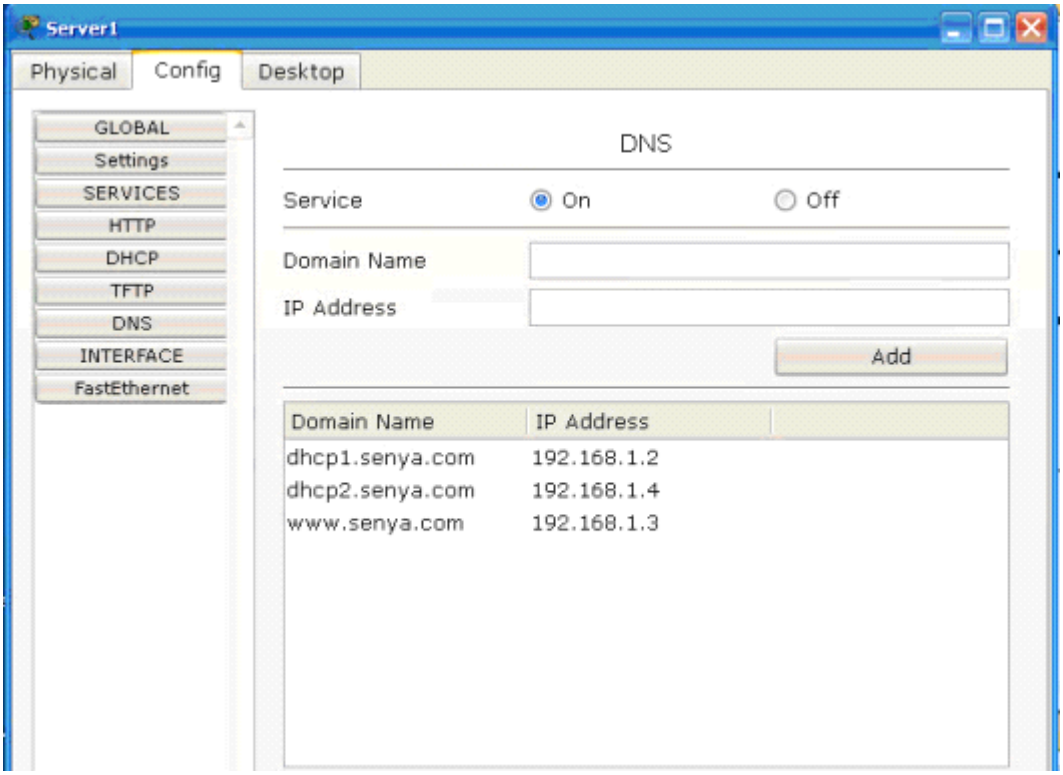


图一

实验环境说明：由于模拟的服务器只能提供一个地址池，因此我使用两个 DHCP 服务器，分别创建 DHCP 地址池：192.168.3.0/24:192.168.1.2 及 192.168.4.0/24:192.168.1.4。配置了一个 DNS 服务器 192.168.1.3。



图二　DHCP 服务器地址池配置



图三　DNS 服务器

二、实验配置

1、Router2 的配置

```
Router2#sh startup-config
Using 580 bytes
!
```

```
version 12.4
service password-encryption
!
hostname Router2
!
enable password 7 0822455D0A16
!
ip ssh version 1
!
interface FastEthernet0/0
no ip address
duplex auto
speed auto
shutdown
!
interface FastEthernet0/1
ip address 192.168.1.1 255.255.255.0
duplex auto
speed auto
!
interface Serial0/3/0
ip address 192.168.2.1 255.255.255.0
clock rate 56000
!
interface Vlan1
no ip address
shutdown
!
router eigrp 10 \\启用 EIGRP 路由协议
network 192.168.1.0
network 192.168.2.0
auto-summary
!
ip classless
!
line con 0
line vty 0 4
password 7 0822455D0A16
login!
end
```

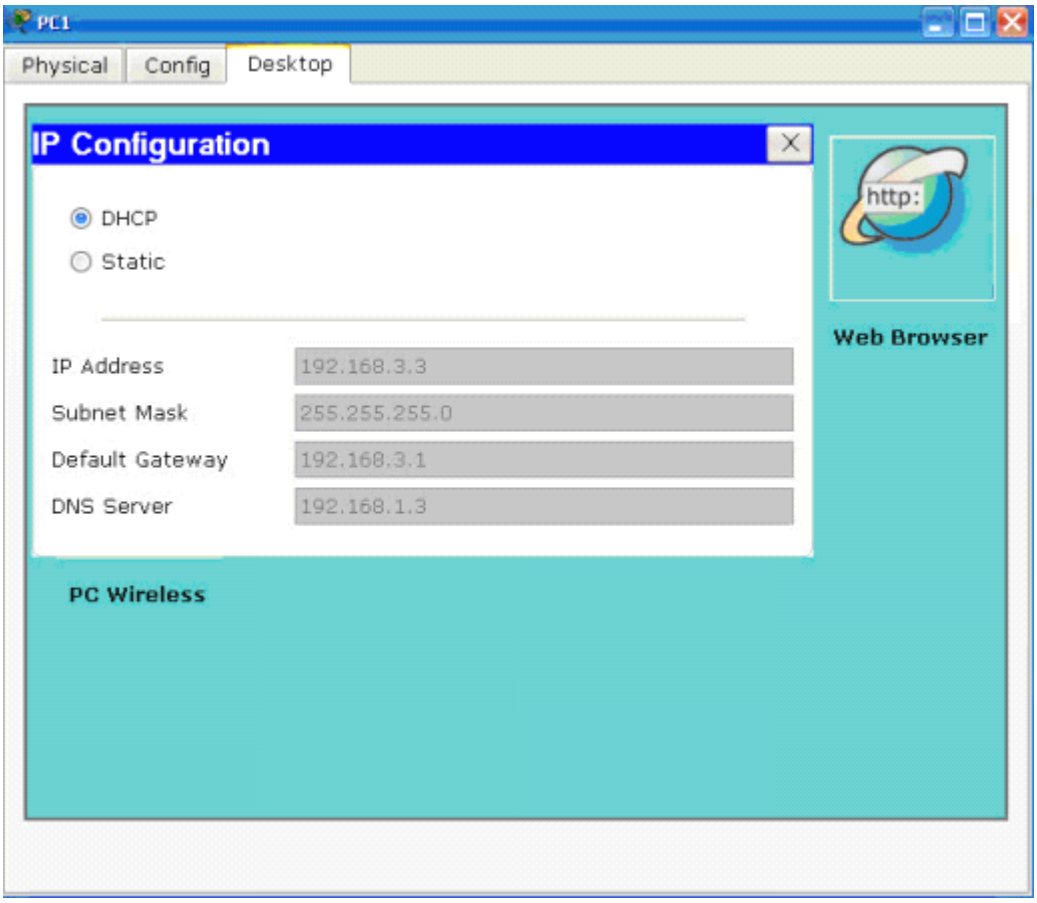
2、Router0 的配置

```
Router0#sh startup-conf
Using 625 bytes
!
version 12.4
service password-encryption
!
hostname Router0
!
```

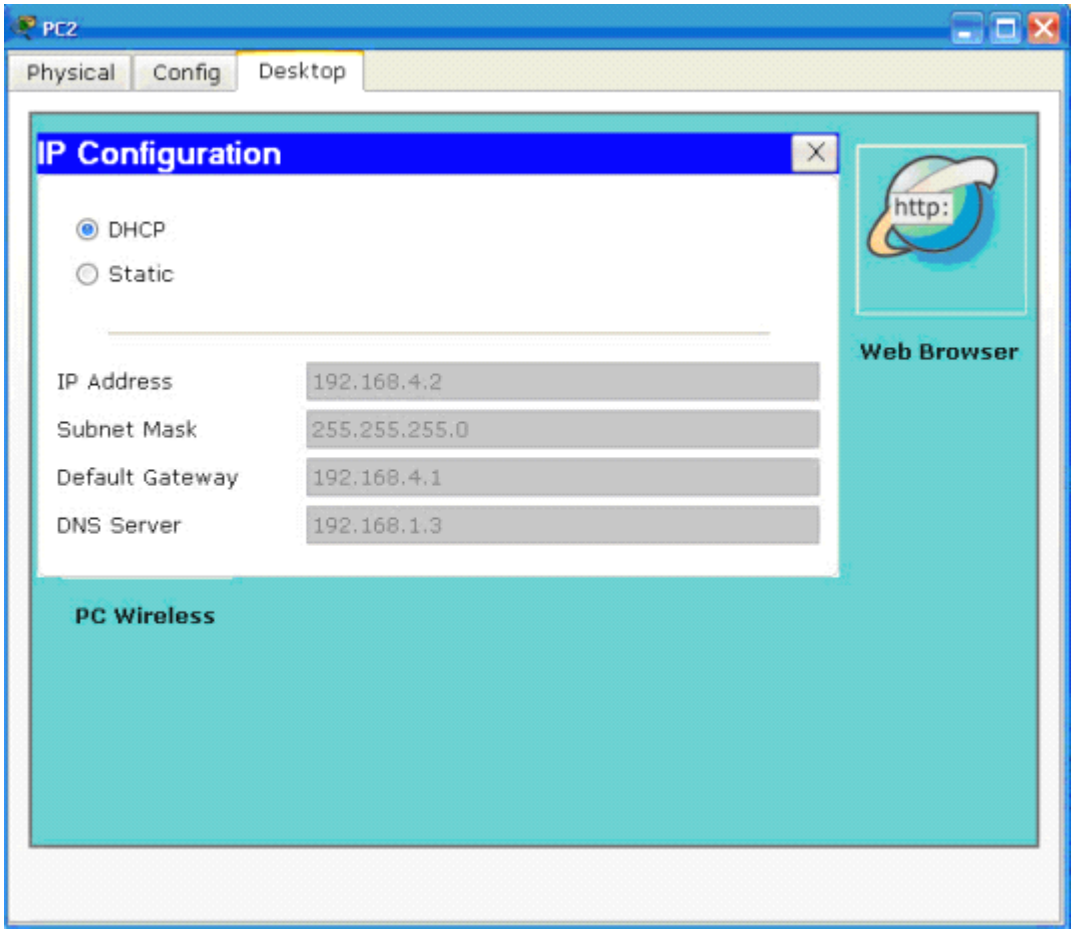
```
ip ssh version 1
!
interface FastEthernet0/0
ip address 192.168.4.1 255.255.255.0
ip helper-address 192.168.1.4 \\配置 DHCP 中继代理，DHCP 服务器是 192.168.1.4
duplex auto
speed auto
!
interface FastEthernet0/1
ip address 192.168.3.1 255.255.255.0
ip helper-address 192.168.1.2                    \\配置 DHCP 中继代理，DHCP
服务器是 192.168.1.2
duplex auto
speed auto
!
interface Serial0/3/0
ip address 192.168.2.2 255.255.255.0
!
interface Vlan1
no ip address
shutdown
!
router eigrp 10                                                    \\
启用 EIGRP 路由协议
network 192.168.3.0
network 192.168.2.0
network 192.168.4.0
auto-summary
!
ip classless
!
line con 0
line vty 0 4
password 7 0822455D0A16
login
!
end
```

3、配置 DHCP Client

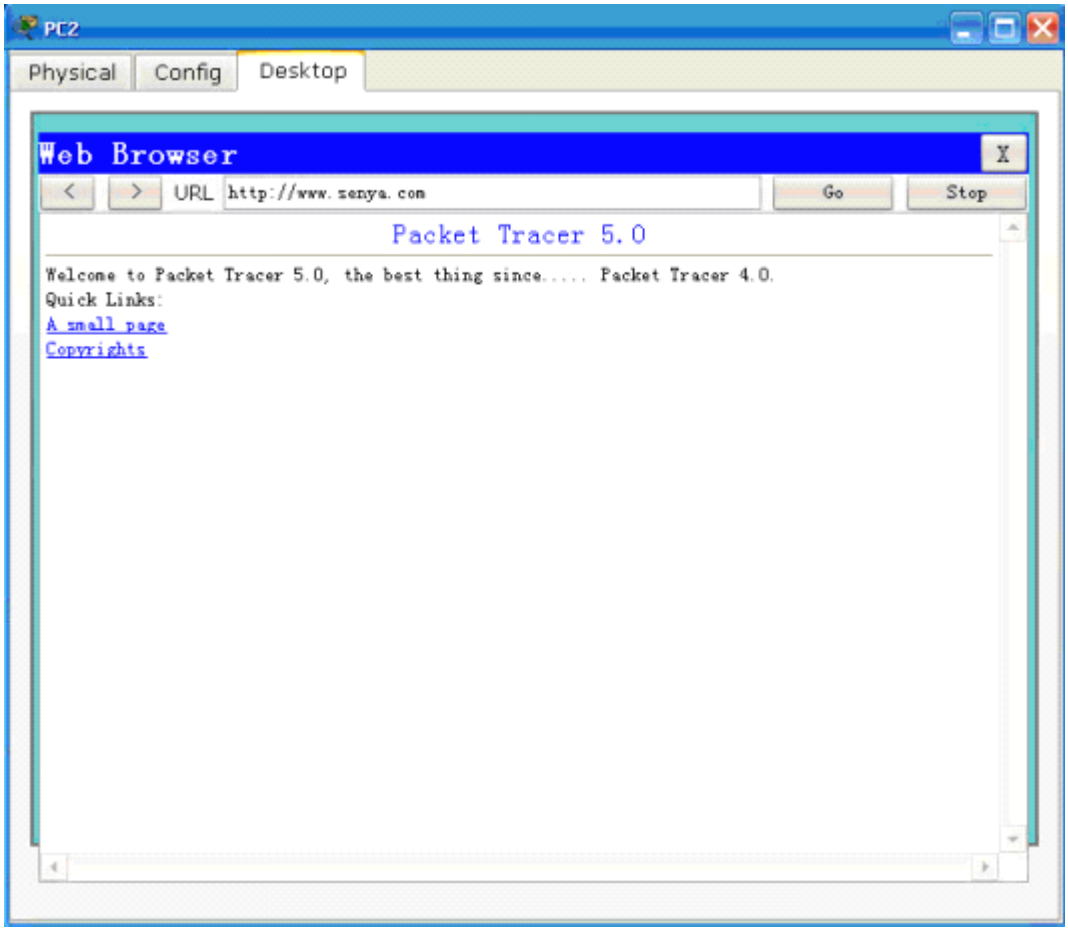
让客户 PC 动态获取 IP 地址。


PC1
Physical
Config
Desktop
IP Configuration
DHCP
Static
IP Address
192.168.3.3
Subnet Mask
255.255.255.0
Default Gateway
192.168.3.1
DNS Server
192.168.1.3
PC Wireless
http:
Web Browser

图四


PC2
Physical
Config
Desktop
IP Configuration
DHCP
Static
IP Address
192.168.4.2
Subnet Mask
255.255.255.0
Default Gateway
192.168.4.1
DNS Server
192.168.1.3
PC Wireless
http:
Web Browser

图五



图六　测试一下

DHCP 中继代理配置其实很简单。ip helper-address 这个命令就搞定了。