

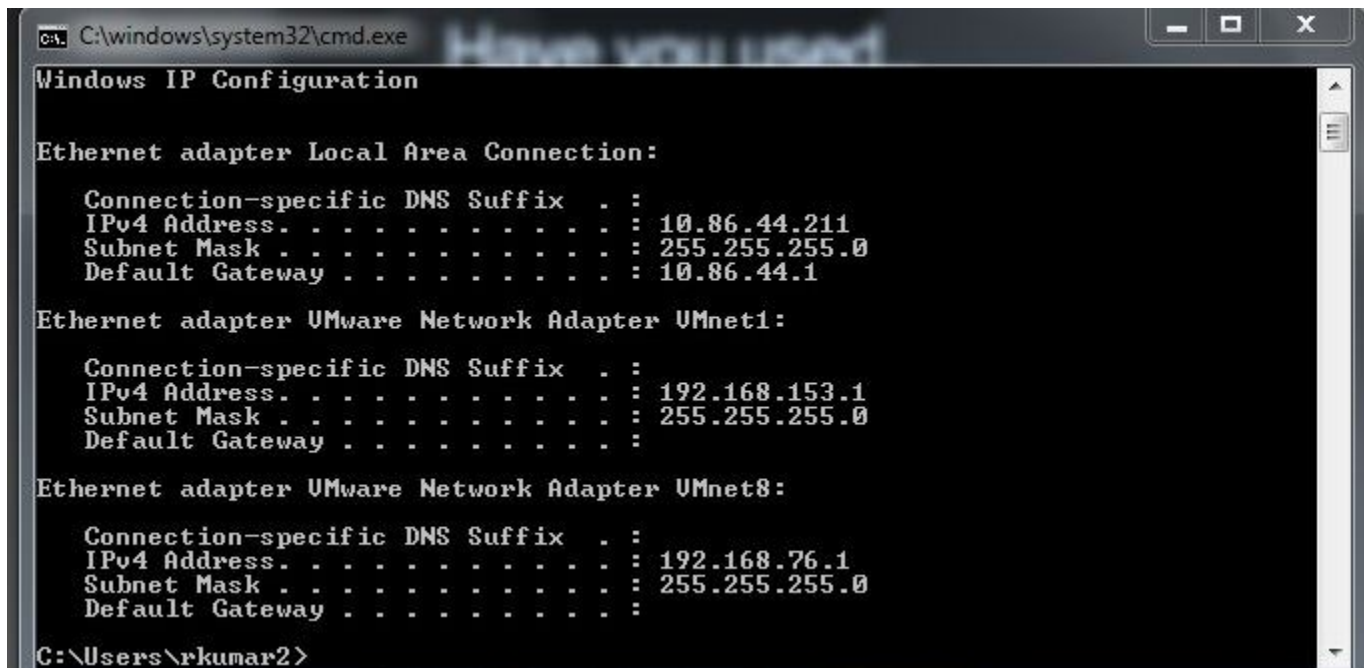
# CS447 Lab Assignment 4

## Cisco Router & Switch Configuration

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Date: 08/13/2015 Group# 11

Connect your router to the network as shown in the network topology drawing. Connect a rollover cable from the console port of the Cisco 1600 (or 2500) router to a 9-pin serial port on a computer. Download Putty or Teraterm communication software from Internet onto your computer and configure the terminal emulation software to 9600 bps, 8 data bits, no parity, and 1 stop bit. From the software program, verify that you can connect to the router console prompt and get into enable mode. Reset the router to its factory default state by executing “**erase startup-config**” and “**reload**” commands. If you are not able to log into the router, see step-by-step instructions for resetting the password at <http://www.calstatela.edu/faculty/egean/cs447/cisco1600-passwd-reset.htm>. Configure the Ethernet interface on the router with IP address specified in network topology drawing. Your router’s default gateway address and default route should be set to 10.86.44.1. Change the hostname of your router to RouterXY (where XY is your group number). Change the default router gateway of your computer’s virtual operating system from 10.86.44.1 to the IP address of the Ethernet interface of your Cisco 1600 (or 2500) router. From a command prompt on your computer, verify that you can ping the Cisco 1600 (or 2500) router’s Ethernet interface and have connectivity to the Internet.

1. Simulate a wide-area-network connection by connecting the WAN ports of two Cisco routers together via two V.35 serial cables (or one crossover serial cable). DCE side needs clock rate set. Configure the IP address of the WAN serial port (s0) with IP address specified in network topology drawing. Netmask should be 255.255.255.0. From a command prompt on your computer, verify that you can ping your own WAN interface (192.168.x.x) on your Cisco 1600 (or 2500) router. Verify that you can ping other endpoint (192.168.x.y on neighbor’s s0) of your WAN connection. Submit a screen capture of the output of a successful traceroute command from your computer’s command prompt to the other WAN endpoint (192.168.x.y) of your router’s WAN connection.



```
C:\windows\system32\cmd.exe
Windows IP Configuration

Ethernet adapter Local Area Connection:

    Connection-specific DNS Suffix  . : 
    IPv4 Address. . . . . : 10.86.44.211
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 10.86.44.1

Ethernet adapter VMware Network Adapter VMnet1:

    Connection-specific DNS Suffix  . : 
    IPv4 Address. . . . . : 192.168.153.1
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 

Ethernet adapter VMware Network Adapter VMnet8:

    Connection-specific DNS Suffix  . : 
    IPv4 Address. . . . . : 192.168.76.1
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 

C:\Users\rkumar2>
```

```
Router#sh int e0
Ethernet0 is up, line protocol is up
  Hardware is QUICC Ethernet, address is 0005.324a.2724 (bia 0005.324a.2724)
  Internet address is 10.86.44.210/24
  MTU 1500 bytes, BW 10000 Kbit, DLY 1000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:07, output 00:00:03, 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
    2031 packets input, 230196 bytes, 0 no buffer
    Received 1544 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 input packets with dribble condition detected
    837 packets output, 85301 bytes, 0 underruns
    0 output errors, 0 collisions, 1 interface resets
    0 babbles, 0 late collision, 0 deferred
    0 lost carrier, 0 no carrier
    0 output buffer failures, 0 output buffers swapped out
Router#
```

```
Router#sh int s0
Serial0 is up, line protocol is up
  Hardware is QUICC Serial
  Internet address is 192.168.60.1/24
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation HDLC, loopback not set
  Keepalive set (10 sec)
  Last input 00:00:06, output 00:00:04, 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: weighted fair
  Output queue: 0/1000/64/0 (size/max total/threshold/drops)
    Conversations 0/1/256 (active/max active/max total)
    Reserved Conversations 0/0 (allocated/max allocated)
    Available Bandwidth 1158 kilobits/sec
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    346 packets input, 21555 bytes, 0 no buffer
    Received 344 broadcasts, 0 runts, 0 giants, 0 throttles
    2 input errors, 0 CRC, 2 frame, 0 overrun, 0 ignored, 0 abort
    467 packets output, 27708 bytes, 0 underruns
    0 output errors, 0 collisions, 1 interface resets
    0 output buffer failures, 0 output buffers swapped out
    0 carrier transitions
  DCD=up DSR=up DTR=up RTS=up CTS=up
```

```
Router#
```

```
C:\Windows\system32\cmd.exe

C:\Users\csadmin>ping 10.86.44.210

Pinging 10.86.44.210 with 32 bytes of data:
Reply from 10.86.44.210: bytes=32 time=2ms TTL=255
Reply from 10.86.44.210: bytes=32 time=2ms TTL=255
Reply from 10.86.44.210: bytes=32 time=2ms TTL=255
Reply from 10.86.44.210: bytes=32 time=2ms TTL=255

Ping statistics for 10.86.44.210:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 2ms, Average = 2ms

C:\Users\csadmin>ping 10.86.44.220

Pinging 10.86.44.220 with 32 bytes of data:
Reply from 10.86.44.220: bytes=32 time=5ms TTL=255
Reply from 10.86.44.220: bytes=32 time=2ms TTL=255
Reply from 10.86.44.220: bytes=32 time=2ms TTL=255
Reply from 10.86.44.220: bytes=32 time=2ms TTL=255

Ping statistics for 10.86.44.220:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 5ms, Average = 2ms

C:\Users\csadmin>
```

```
C:\Windows\system32\cmd.exe

C:\Users\csadmin>ping 192.168.60.1

Pinging 192.168.60.1 with 32 bytes of data:
Reply from 192.168.60.1: bytes=32 time=2ms TTL=255
Reply from 192.168.60.1: bytes=32 time=2ms TTL=255
Reply from 192.168.60.1: bytes=32 time=2ms TTL=255
Reply from 192.168.60.1: bytes=32 time=2ms TTL=255

Ping statistics for 192.168.60.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 2ms, Average = 2ms

C:\Users\csadmin>ping 192.168.60.2

Pinging 192.168.60.2 with 32 bytes of data:
Reply from 192.168.60.2: bytes=32 time=59ms TTL=255
Reply from 192.168.60.2: bytes=32 time=59ms TTL=255
Reply from 192.168.60.2: bytes=32 time=59ms TTL=255
Reply from 192.168.60.2: bytes=32 time=59ms TTL=255

Ping statistics for 192.168.60.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 59ms, Maximum = 59ms, Average = 59ms

C:\Users\csadmin>_
```

```
C:\Windows\system32\cmd.exe

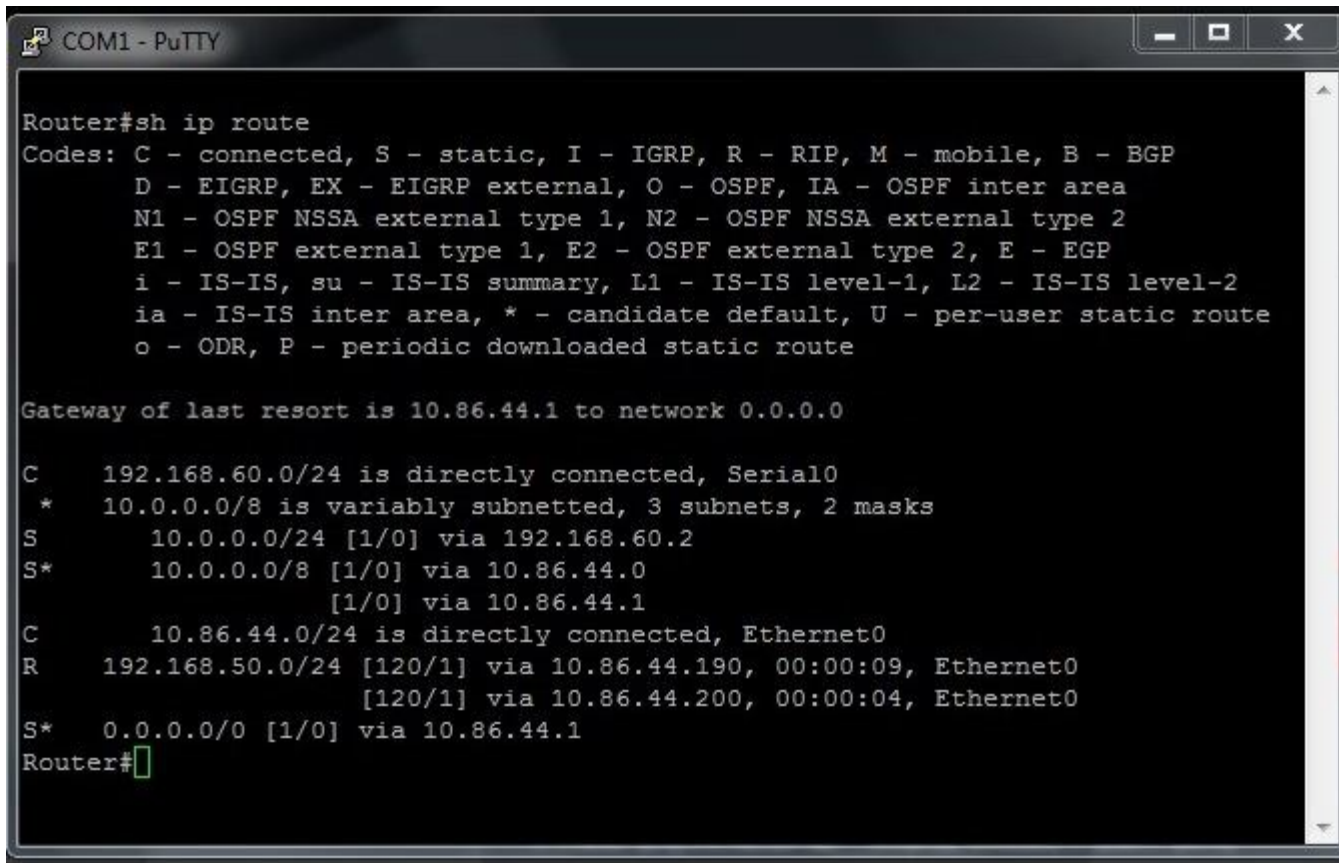
C:\Users\csadmin>tracert 192.168.60.1
Tracing route to 192.168.60.1 over a maximum of 30 hops
  1      2 ms      2 ms      2 ms  192.168.60.1
Trace complete.

C:\Users\csadmin>tracert 192.168.60.2
Tracing route to 192.168.60.2 over a maximum of 30 hops
  1      2 ms      2 ms      2 ms  10.86.44.210
  2     86 ms     86 ms     86 ms  192.168.60.2
Trace complete.

C:\Users\csadmin>_
```



2. Turn on RIP version 2 so that your router will learn how to reach other indirectly connected networks in the lab.
  - a. Submit a screenshot of your router's routing table. It should contain RIP routes advertised by five other networks (192.168.x.0) in the lab. Work with your fellow classmates if needed.

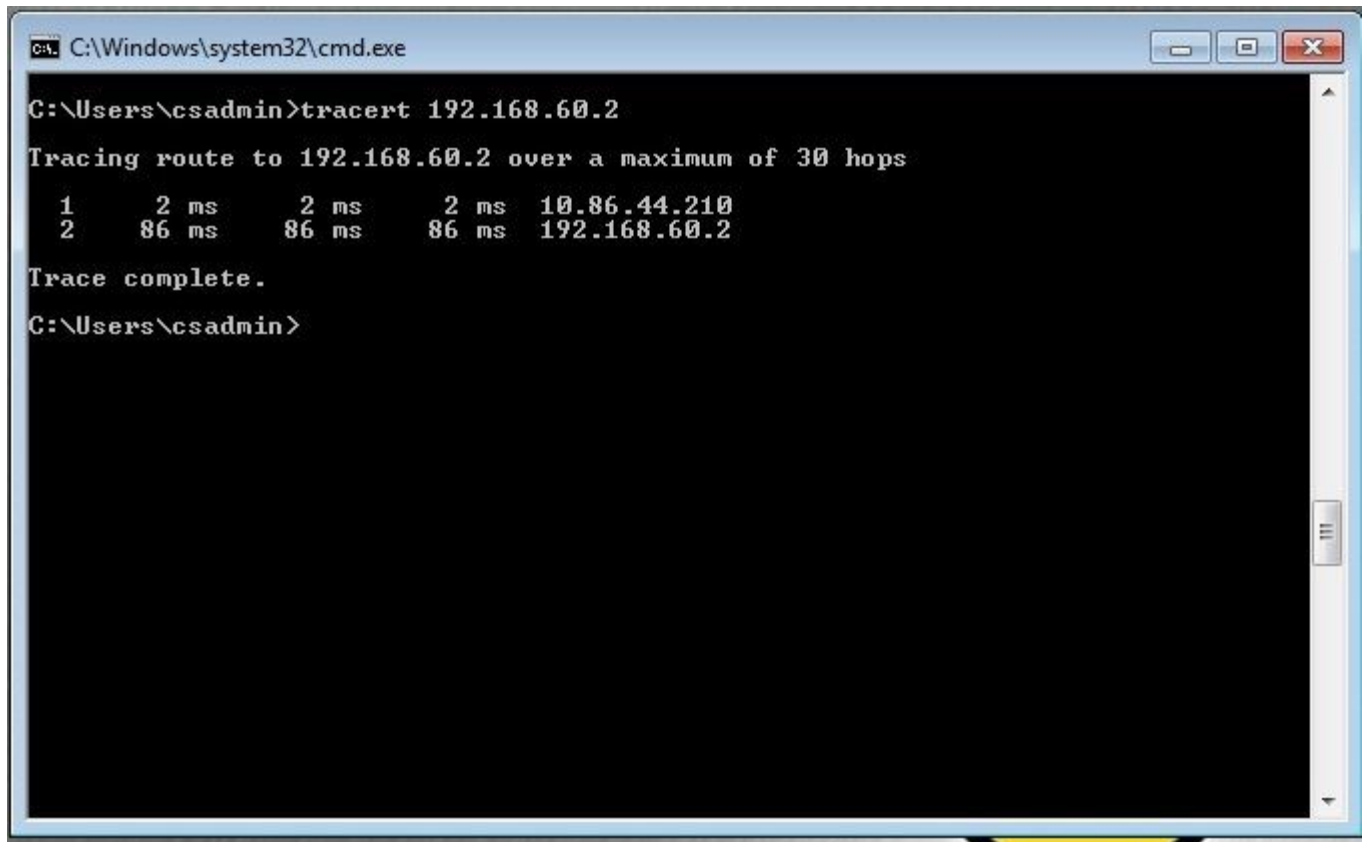


```
COM1 - PuTTY
Router#sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, su - IS-IS summary, 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 10.86.44.1 to network 0.0.0.0

C    192.168.60.0/24 is directly connected, Serial0
*    10.0.0.0/8 is variably subnetted, 3 subnets, 2 masks
S     10.0.0.0/24 [1/0] via 192.168.60.2
S*    10.0.0.0/8 [1/0] via 10.86.44.0
      [1/0] via 10.86.44.1
C     10.86.44.0/24 is directly connected, Ethernet0
R     192.168.50.0/24 [120/1] via 10.86.44.190, 00:00:09, Ethernet0
      [120/1] via 10.86.44.200, 00:00:04, Ethernet0
S*    0.0.0.0/0 [1/0] via 10.86.44.1
Router#
```

- b. From your computer's command prompt, do a traceroute to the serial WAN interface of another group's router whose network was learned by your router via RIP version 2. Submit a screenshot of the result of the traceroute.



```
C:\Windows\system32\cmd.exe

C:\Users\csadmin>tracert 192.168.60.2

Tracing route to 192.168.60.2 over a maximum of 30 hops
  0  0 ms  0 ms  0 ms  10.86.44.210
  1  86 ms  86 ms  86 ms  192.168.60.2

Trace complete.

C:\Users\csadmin>
```

The screenshot shows a Windows command prompt window titled "C:\Windows\system32\cmd.exe". The user has entered the command "tracert 192.168.60.2". The output shows a successful traceroute to 192.168.60.2 over a maximum of 30 hops. The route consists of two hops: the first hop is 10.86.44.210 with 0 ms latency, and the second hop is 192.168.60.2 with 86 ms latency. The trace is complete.

3. From your computer, capture and decode RIP version 2 packets advertised by your router.

a. What UDP port number is used by RIP advertisement packets?

Ans: **520**

b. Print out a screenshot from Ethereal or Wireshark packet analyzer that shows the decoded network routes being advertised by your router. You will need to expand and drill down into the packet decodes to see this information.

Ans:

The screenshot shows a Wireshark packet capture from a Local Area Connection. The filter is set to 'rip'. The packet list shows four packets, all of which are RIPv2 responses. The selected packet (No. 39) is expanded, showing the following details:

- Internet Protocol Version 4, Src: 10.86.44.200 (10.86.44.200), Dst: 224.0.0.9 (224.0.0.9)
- User Datagram Protocol, Src Port: 520 (520), Dst Port: 520 (520)
  - Source Port: 520 (520)
  - Destination Port: 520 (520)
  - Length: 52
  - Checksum: 0xe79a [validation disabled]
  - [Stream index: 0]
- Routing Information Protocol
  - Command: Response (2)
  - Version: RIPv2 (2)
  - IP Address: 10.0.0.0, Metric: 2
    - Address Family: IP (2)
    - Route Tag: 0
    - IP Address: 10.0.0.0 (10.0.0.0)
    - Netmask: 255.0.0.0 (255.0.0.0)
    - Next Hop: 0.0.0.0 (0.0.0.0)
    - Metric: 2
  - IP Address: 192.168.50.0, Metric: 1
    - Address Family: IP (2)
    - Route Tag: 0
    - IP Address: 192.168.50.0 (192.168.50.0)
    - Netmask: 255.255.255.0 (255.255.255.0)
    - Next Hop: 0.0.0.0 (0.0.0.0)
    - Metric: 1

The packet bytes pane shows the raw data of the selected packet, with the following hex and ASCII values:

```
0010 00 48 00 00 00 02 11 a0 be 0a 56 2c c8 e0 00 .H.....V,...
0020 00 09 02 08 02 08 00 34 e7 9a 02 02 00 00 00 02 .....4.....
0030 00 00 0a 00 00 00 ff 00 00 00 00 00 00 00 00 00 .....
0040 00 02 00 02 00 00 c0 a8 32 00 ff ff ff 00 00 00 ..2.....
0050 00 00 00 00 00 01 .....
```



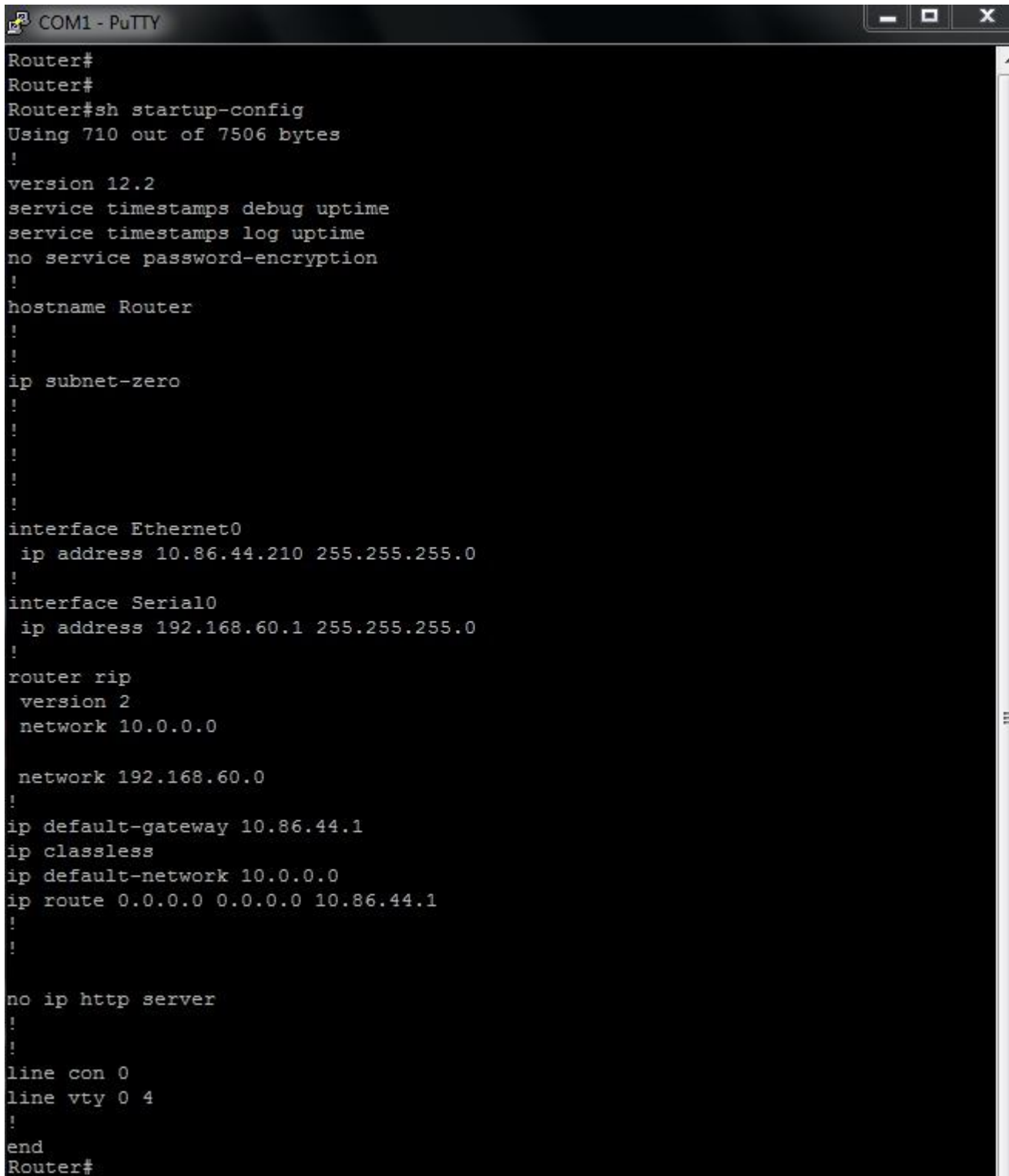
4. Save the router's current configuration from main memory to NVRAM.

a. What Cisco command did you use to accomplish this?

Ans: copy run start

b. Print out a copy of this configuration file.

Ans:

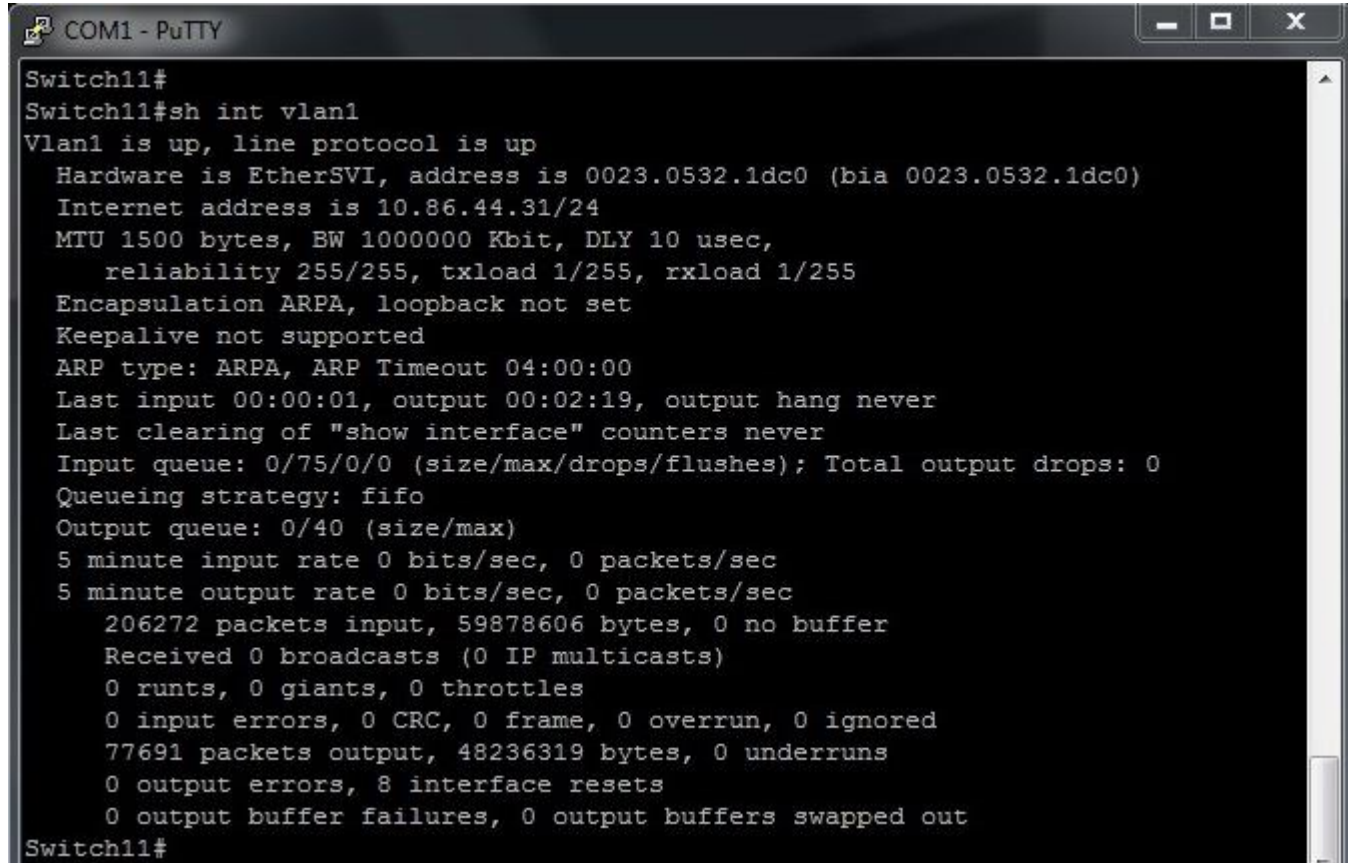


```
COM1 - PuTTY
Router#
Router#
Router#sh startup-config
Using 710 out of 7506 bytes
!
version 12.2
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname Router
!
!
ip subnet-zero
!
!
!
!
!
interface Ethernet0
 ip address 10.86.44.210 255.255.255.0
!
interface Serial0
 ip address 192.168.60.1 255.255.255.0
!
router rip
 version 2
 network 10.0.0.0

 network 192.168.60.0
!
ip default-gateway 10.86.44.1
ip classless
ip default-network 10.0.0.0
ip route 0.0.0.0 0.0.0.0 10.86.44.1
!
!
no ip http server
!
!
line con 0
line vty 0 4
!
end
Router#
```

5. Connect your console cable from your computer's serial port to the console port of your Ethernet switch and configure its hostname to SwitchXY ( where XY is your group number). Also configure the IP address of your switch to the value shown in the network topology drawing. Verify that you can ping the IP address of your switch from the command prompt of your computer.
- a. submit a screenshot of output of "show cdp neighbors" and "show mac address-table" from your switch. Circle the mac address that belongs to your computer.

Ans:



```
COM1 - PuTTY
Switch11#
Switch11#sh int vlan1
Vlan1 is up, line protocol is up
  Hardware is EtherSVI, address is 0023.0532.1dc0 (bia 0023.0532.1dc0)
  Internet address is 10.86.44.31/24
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive not supported
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:01, output 00:02:19, 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
    206272 packets input, 59878606 bytes, 0 no buffer
    Received 0 broadcasts (0 IP multicasts)
    0 runs, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    77691 packets output, 48236319 bytes, 0 underruns
    0 output errors, 8 interface resets
    0 output buffer failures, 0 output buffers swapped out
Switch11#
```

```
C:\windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\Users\rkumar2>ping 10.86.44.31

Pinging 10.86.44.31 with 32 bytes of data:
Reply from 10.86.44.31: bytes=32 time=2ms TTL=255
Reply from 10.86.44.31: bytes=32 time=3ms TTL=255
Reply from 10.86.44.31: bytes=32 time=2ms TTL=255
Reply from 10.86.44.31: bytes=32 time=1ms TTL=255

Ping statistics for 10.86.44.31:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 3ms, Average = 2ms

C:\Users\rkumar2>
```

```
COM1 - PuTTY
Switch11#show cdp neighbors
Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
                  S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone

Device ID         Local Intrfce   Holdtme    Capability Platform Port ID
Router            Fas 1/0/5       139        R           1601     Eth 0
Switch11#
Switch11#
Switch11#
```

C:\windows\system32\cmd.exe

Microsoft Windows [Version 6.1.7601]  
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\Users\rkumar2>ipconfig/all

Windows IP Configuration

Host Name . . . . . : et-p21-etc245  
Primary Dns Suffix . . . . . : ad.calstatela.edu  
Node Type . . . . . : Hybrid  
IP Routing Enabled. . . . . : No  
WINS Proxy Enabled. . . . . : No  
DNS Suffix Search List. . . . . : ad.calstatela.edu

Ethernet adapter Local Area Connection:

Connection-specific DNS Suffix . :  
Description . . . . . : Intel(R) 82579LM Gigabit Network Connection  
Physical Address. . . . . : E8-39-35-57-A4-93  
DHCP Enabled. . . . . : No  
Autoconfiguration Enabled . . . . : Yes  
IPv4 Address. . . . . : 10.86.44.211(Preferred)  
Subnet Mask . . . . . : 255.255.255.0  
Default Gateway . . . . . : 10.86.44.1  
DNS Servers . . . . . : 130.182.1.11  
NetBIOS over Tcpip. . . . . : Enabled

Ethernet adapter VMware Network Adapter VMnet1:

Connection-specific DNS Suffix . :  
Description . . . . . : VMware Virtual Ethernet Adapter for VMnet1  
Physical Address. . . . . : 00-50-56-C0-00-01  
DHCP Enabled. . . . . : No  
Autoconfiguration Enabled . . . . : Yes  
IPv4 Address. . . . . : 192.168.153.1(Preferred)  
Subnet Mask . . . . . : 255.255.255.0  
Default Gateway . . . . . :  
NetBIOS over Tcpip. . . . . : Enabled

Ethernet adapter VMware Network Adapter VMnet8:

Connection-specific DNS Suffix . :  
Description . . . . . : VMware Virtual Ethernet Adapter for VMnet8  
Physical Address. . . . . : 00-50-56-C0-00-08  
DHCP Enabled. . . . . : No  
Autoconfiguration Enabled . . . . : Yes  
IPv4 Address. . . . . : 192.168.76.1(Preferred)  
Subnet Mask . . . . . : 255.255.255.0  
Default Gateway . . . . . :  
NetBIOS over Tcpip. . . . . : Enabled

C:\Users\rkumar2>

```
Switch11#sh mac address-table
      Mac Address Table
```

```
-----
Vlan    Mac Address      Type    Ports
-----
All     0100.0ccc.cccc    STATIC  CPU
All     0100.0ccc.cccd    STATIC  CPU
All     0180.c200.0000    STATIC  CPU
All     0180.c200.0001    STATIC  CPU
All     0180.c200.0002    STATIC  CPU
All     0180.c200.0003    STATIC  CPU
All     0180.c200.0004    STATIC  CPU
All     0180.c200.0005    STATIC  CPU
All     0180.c200.0006    STATIC  CPU
All     0180.c200.0007    STATIC  CPU
All     0180.c200.0008    STATIC  CPU
All     0180.c200.0009    STATIC  CPU
All     0180.c200.000a    STATIC  CPU
All     0180.c200.000b    STATIC  CPU
All     0180.c200.000c    STATIC  CPU
All     0180.c200.000d    STATIC  CPU
All     0180.c200.000e    STATIC  CPU
All     0180.c200.000f    STATIC  CPU
All     0180.c200.0010    STATIC  CPU
All     ffff.ffff.ffff    STATIC  CPU
1       0005.324a.226e    DYNAMIC Fa1/0/4
1       0005.324a.26ec    DYNAMIC Fa1/0/4
1       0005.324a.2721    DYNAMIC Fa1/0/4
1       0005.324a.2724    DYNAMIC Fa1/0/5
1       0010.7be7.f27e    DYNAMIC Fa1/0/4
1       0023.0492.108b    DYNAMIC Fa1/0/4
1       0023.0492.1406    DYNAMIC Fa1/0/4
1       0023.04a2.1e86    DYNAMIC Fa1/0/4
1       0023.0531.d587    DYNAMIC Fa1/0/4
1       0023.0532.0406    DYNAMIC Fa1/0/4
1       0023.0532.0586    DYNAMIC Fa1/0/4
1       0023.0532.0606    DYNAMIC Fa1/0/4
1       6c62.6d50.518b    DYNAMIC Fa1/0/4
1       c464.13bd.71ac    DYNAMIC Fa1/0/4
1       e839.3557.a493    DYNAMIC Fa1/0/1
1       f40f.1bcf.3cbf    DYNAMIC Fa1/0/4
```

```
Total Mac Addresses for this criterion: 36
```

```
Switch11#
```

```
Switch11#
```

```
Switch11#
```

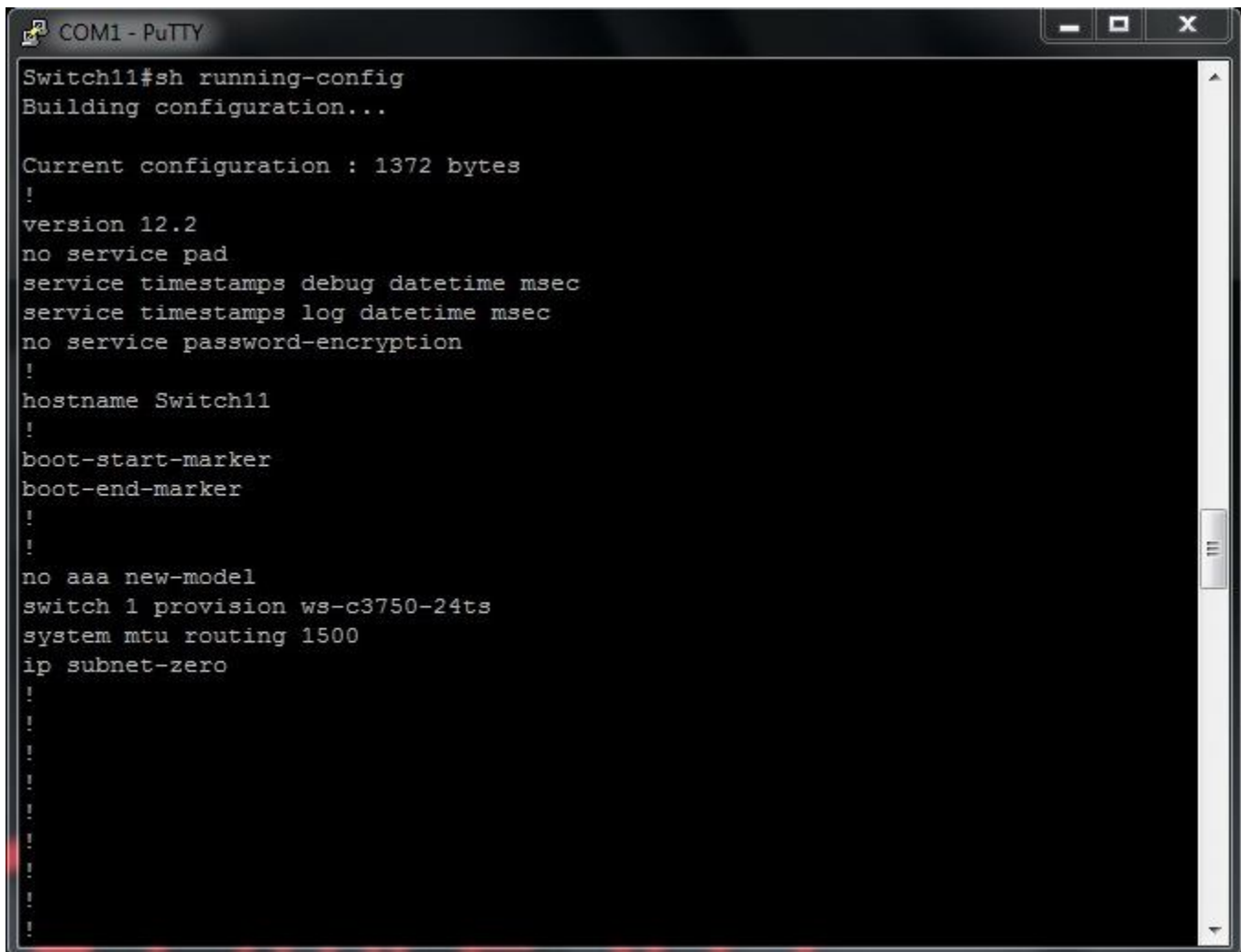
```
Switch11#
```

```
Switch11#
```



b. Submit a copy of the configuration file of your Ethernet switch.

Ans:



A screenshot of a PuTTY terminal window titled "COM1 - PuTTY". The terminal displays the output of the command "Switch11#sh running-config". The output shows the current configuration of the switch, which is 1372 bytes long. The configuration includes the following commands:

```
Switch11#sh running-config
Building configuration...

Current configuration : 1372 bytes
!
version 12.2
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname Switch11
!
boot-start-marker
boot-end-marker
!
!
no aaa new-model
switch 1 provision ws-c3750-24ts
system mtu routing 1500
ip subnet-zero
!
!
!
!
!
!
```

```
COM1 - PuTTY
spanning-tree mode pvst
spanning-tree extend system-id
!
vlan internal allocation policy ascending
!
!
!
interface FastEthernet1/0/1
!
interface FastEthernet1/0/2
!
interface FastEthernet1/0/3
!
interface FastEthernet1/0/4
!
interface FastEthernet1/0/5
!
interface FastEthernet1/0/6
!
interface FastEthernet1/0/7
!
interface FastEthernet1/0/8
!
interface FastEthernet1/0/9
!
interface FastEthernet1/0/10
!
interface FastEthernet1/0/11
!
interface FastEthernet1/0/12
```

```
COM1 - PuTTY
!
interface FastEthernet1/0/21
!
interface FastEthernet1/0/22
!
interface FastEthernet1/0/23
!
interface FastEthernet1/0/24
!
interface GigabitEthernet1/0/1
!
interface GigabitEthernet1/0/2
!
interface Vlan1
 ip address 10.86.44.31 255.255.255.0
!
 ip classless
 ip http server
 ip http secure-server
!
!
 control-plane
!
!
 line con 0
 line vty 5 15
!
end
Switch11#
```