Journal

# Computer Networking

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# Index

# Practical 1: Finding IP Address

**What is an IP Address?**

An Internet Protocol address is a numerical label such as 192.0.2.1 that is connected to a computer network that uses the Internet Protocol for communication. An IP address serves two main functions: network interface identification and location addressing.

**Classes of IP Address, Range, Network Address, Host Address, Binary Notation, Subnet Mass with Example**

| Class | Range | IP Address | Network Address | Host Address | Binary Notation | Subnet ID |
|---|---|---|---|---|---|---|
| A | 0-127 | 110.10.10.3 | 110.0.0.0 | 0.10.10.3 | 01101110000010100000101000000011 | 255.0.0.0 |
| B | 128-191 | 170.10.10.1 | 170.10.0.0 | 0.0.10.0 | 10101010000010100000101000000001 | 255.255.0.0 |
| C | 192-223 | 192.10.15.2 | 192.10.15.0 | 0.0.0.2 | 11000000000010100000111100000010 | 255.255.255.0 |
| D | 224-239 | 227.21.6.173 | 227.21.6.0 | 0.0.0.173 | 11100011000101010000011010101101 | 255.255.255.0 |
| E | 240-255 | 241.111.10.28 | 241.111.10.0 | 0.0.0.28 | 11110001011011110000101 0.00011100 | 255.255.255.0 |

# Practical 2: Commands

**Command 1**

**ipconfig : gives ip address**

```
C:\Users\admin>ipconfig

Windows IP Configuration


Ethernet adapter Ethernet:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::59be:b273:4277:4de0%2
   IPv4 Address. . . . . . . . . . . : 172.17.40.58
   Subnet Mask . . . . . . . . . . . : 255.255.254.0
   Default Gateway . . . . . . . . . : fe80::ed2:b5ff:fe30:7b94%2
                                       172.17.41.254
```

**Command 2**

**Ping *ipAddress* : gives ping**

```
C:\Users\admin>ping 172.17.40.58

Pinging 172.17.40.58 with 32 bytes of data:
Reply from 172.17.40.58: bytes=32 time<1ms TTL=128
Reply from 172.17.40.58: bytes=32 time<1ms TTL=128
Reply from 172.17.40.58: bytes=32 time<1ms TTL=128
Reply from 172.17.40.58: bytes=32 time<1ms TTL=128

Ping statistics for 172.17.40.58:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

**Command 3**

**arp : arp utilities**

```
C:\Users\admin>arp

Displays and modifies the IP-to-Physical address translation tables used by
address resolution protocol (ARP).

ARP -s inet_addr eth_addr [if_addr]
ARP -d inet_addr [if_addr]
ARP -a [inet_addr] [-N if_addr] [-v]

  -a            Displays current ARP entries by interrogating the current
                protocol data.  If inet_addr is specified, the IP and Physical
                addresses for only the specified computer are displayed.  If
                more than one network interface uses ARP, entries for each ARP
                table are displayed.
  -g            Same as -a.
  -v            Displays current ARP entries in verbose mode.  All invalid
                entries and entries on the loop-back interface will be shown.
  inet_addr     Specifies an internet address.
  -N if_addr    Displays the ARP entries for the network interface specified
                by if_addr.
  -d            Deletes the host specified by inet_addr. inet_addr may be
                wildcarded with * to delete all hosts.
  -s            Adds the host and associates the Internet address inet_addr
                with the Physical address eth_addr.  The Physical address is
                given as 6 hexadecimal bytes separated by hyphens. The entry
                is permanent.
  eth_addr      Specifies a physical address.
  if_addr       If present, this specifies the Internet address of the
                interface whose address translation table should be modified.
                If not present, the first applicable interface will be used.
Example:
  > arp -s 157.55.85.212   00-aa-00-62-c6-09  .... Adds a static entry.
  > arp -a                                    .... Displays the arp table.
```

**Command 4**

**arp -a : display the ARP table for a particular IP address**

```
C:\Users\admin>arp -a

Interface: 172.17.40.58 --- 0x2
  Internet Address      Physical Address      Type
  172.17.40.22          d8-cb-8a-8d-15-8f     dynamic
  172.17.40.64          d4-3d-7e-13-1a-08     dynamic
  172.17.40.66          d4-3d-7e-12-bc-98     dynamic
  172.17.40.67          d4-3d-7e-12-ba-43     dynamic
  172.17.40.75          d4-3d-7e-12-ba-87     dynamic
  172.17.40.77          d4-3d-7e-a6-2f-5f     dynamic
  172.17.40.78          d4-3d-7e-13-17-14     dynamic
  172.17.40.79          d4-3d-7e-12-ba-a2     dynamic
  172.17.40.83          d4-3d-7e-12-ba-72     dynamic
  172.17.40.84          d4-3d-7e-12-ba-00     dynamic
  172.17.40.103         c0-18-03-b3-eb-1b     dynamic
  172.17.40.121         c8-5a-cf-0b-20-a7     dynamic
  172.17.40.122         c0-18-03-b3-99-0f     dynamic
  172.17.40.123         c8-5a-cf-0d-7f-cf     dynamic
  172.17.40.131         c8-5a-cf-0b-26-45     dynamic
  172.17.40.137         c8-5a-cf-0b-15-33     dynamic
  172.17.40.139         c8-5a-cf-0b-30-a5     dynamic
  172.17.40.140         c8-5a-cf-0b-01-ee     dynamic
  172.17.40.141         c8-5a-cf-0b-11-47     dynamic
  172.17.40.143         c8-5a-cf-0d-21-bc     dynamic
  172.17.40.144         c8-5a-cf-0b-18-28     dynamic
  172.17.40.160         24-52-6a-d8-74-ef     dynamic
  172.17.40.161         00-13-14-02-49-2a     dynamic
  172.17.40.174         c8-5a-cf-0b-32-1f     dynamic
  172.17.40.183         00-e0-99-00-13-d2     dynamic
  172.17.40.189         8c-89-a5-f6-7f-0b     dynamic
```

**Command 5**

**tracert *url* : tracing route of url**

```
Tracing route to youtube-ui.l.google.com [142.250.206.174]
over a maximum of 30 hops:

  1     1 ms     1 ms     1 ms  172.17.41.254
  2     1 ms     1 ms     1 ms  172.17.52.240
  3    <1 ms    <1 ms    <1 ms  172.30.250.250
  4     3 ms     4 ms     2 ms  182.73.90.241
  5    17 ms     *       11 ms  116.119.73.28
  6     *        3 ms     3 ms  72.14.212.48
  7     5 ms     5 ms     5 ms  108.170.248.177
  8     5 ms     4 ms     4 ms  108.170.248.186
  9    31 ms    91 ms    36 ms  172.253.69.59
 10    31 ms    29 ms    29 ms  74.125.243.97
 11    31 ms    29 ms    30 ms  142.251.76.203
 12    37 ms    44 ms    40 ms  del11s22-in-f14.1e100.net [142.250.206.174]

Trace complete.
```

**Command 6**

**tracert *ipAddress*: tracing route of ip address**

```
C:\Users\admin>tracert 172.17.40.58

Tracing route to DESKTOP-UHQI34I [172.17.40.58]
over a maximum of 30 hops:

  1    <1 ms    <1 ms    <1 ms  DESKTOP-UHQI34I [172.17.40.58]

Trace complete.
```

**Command 7**

**netstat : display network statistics**

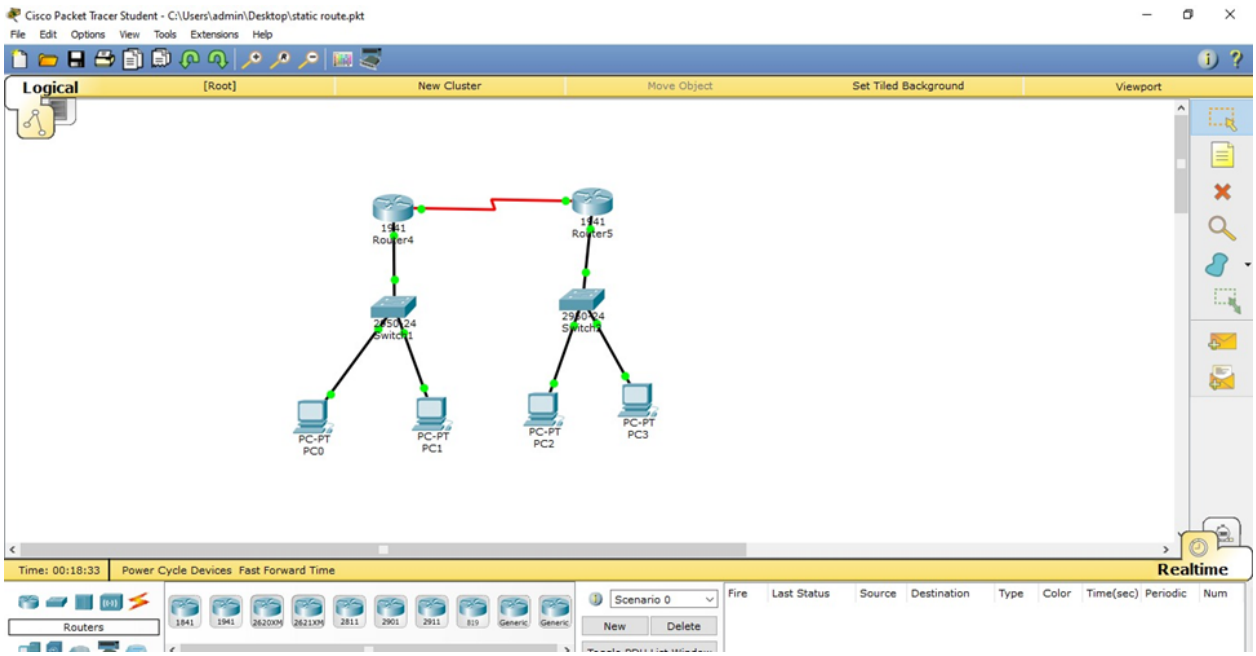
```
C:\Users\admin>netstat

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    172.17.40.58:49735     20.198.119.84:https    ESTABLISHED
  TCP    172.17.40.58:49879     del11s11-in-f14:https  ESTABLISHED
  TCP    172.17.40.58:49922     bom07s33-in-f10:https  ESTABLISHED
  TCP    172.17.40.58:49947     del12s11-in-f14:https  ESTABLISHED
  TCP    172.17.40.58:50321     a-0001:https           CLOSE_WAIT
  TCP    172.17.40.58:50323     204.79.197.222:https   CLOSE_WAIT
  TCP    172.17.40.58:50335     a23-54-83-250:https    CLOSE_WAIT
  TCP    172.17.40.58:50336     131.253.33.254:https   CLOSE_WAIT
  TCP    172.17.40.58:50337     13.107.238.48:https    CLOSE_WAIT
  TCP    172.17.40.58:50338     117.18.232.200:https   CLOSE_WAIT
  TCP    172.17.40.58:50339     117.18.237.29:http     CLOSE_WAIT
  TCP    172.17.40.58:50340     117.18.232.200:https   CLOSE_WAIT
  TCP    172.17.40.58:50341     13.107.253.254:https   CLOSE_WAIT
  TCP    172.17.40.58:50342     bom07s24-in-f10:https  ESTABLISHED
  TCP    172.17.40.58:50343     bom12s12-in-f14:https  ESTABLISHED
  TCP    172.17.40.58:50344     maa03s38-in-f3:https   ESTABLISHED
  TCP    172.17.40.58:50345     maa03s38-in-f3:https   ESTABLISHED
  TCP    172.17.40.58:50346     del03s09-in-f3:https   ESTABLISHED
  TCP    172.17.40.58:50347     del12s10-in-f14:https  ESTABLISHED
  TCP    172.17.40.58:50349     bom12s15-in-f3:https   TIME_WAIT
  TCP    172.17.40.58:50350     bom07s15-in-f10:https  ESTABLISHED
  TCP    172.17.40.58:50351     del11s16-in-f5:https   ESTABLISHED
  TCP    172.17.40.58:50356     hkg12s09-in-f14:https  ESTABLISHED
  TCP    172.17.40.58:50358     bom12s01-in-f3:https   TIME_WAIT
  TCP    172.17.40.58:50360     bom07s31-in-f4:https   ESTABLISHED
  TCP    172.17.40.58:50365     bom12s16-in-f3:https   TIME_WAIT
  TCP    172.17.40.58:50366     hkg12s09-in-f14:https  ESTABLISHED
  TCP    172.17.40.58:50367     e2a:https              ESTABLISHED
```

**Command 8**

**route Print : display entire routing table information**

```
C:\Users\admin>route Print
===========================================================================
Interface List
  2...a4 1f 72 7d 33 08 ......Realtek PCIe GbE Family Controller
  1...........................Software Loopback Interface 1
===========================================================================

IPv4 Route Table
===========================================================================
Active Routes:
Network Destination        Netmask          Gateway       Interface  Metric
          0.0.0.0          0.0.0.0    172.17.41.254     172.17.40.58    281
        127.0.0.0        255.0.0.0         On-link         127.0.0.1    331
        127.0.0.1  255.255.255.255         On-link         127.0.0.1    331
  127.255.255.255  255.255.255.255         On-link         127.0.0.1    331
      172.17.40.0    255.255.254.0         On-link      172.17.40.58    281
     172.17.40.58  255.255.255.255         On-link      172.17.40.58    281
    172.17.41.255  255.255.255.255         On-link      172.17.40.58    281
        224.0.0.0        240.0.0.0         On-link         127.0.0.1    331
        224.0.0.0        240.0.0.0         On-link      172.17.40.58    281
  255.255.255.255  255.255.255.255         On-link         127.0.0.1    331
  255.255.255.255  255.255.255.255         On-link      172.17.40.58    281
===========================================================================
Persistent Routes:
  Network Address          Netmask  Gateway Address  Metric
          0.0.0.0          0.0.0.0    172.17.41.254  Default
===========================================================================

IPv6 Route Table
===========================================================================
Active Routes:
 If Metric Network Destination      Gateway
  2    281 ::/0                     fe80::ed2:b5ff:fe30:7b94
  1    331 ::1/128                  On-link
  2    281 fe80::/64                On-link
  2    281 fe80::59be:b273:4277:4de0/128
                                    On-link
  1    331 ff00::/8                 On-link
  2    281 ff00::/8                 On-link
===========================================================================
Persistent Routes:
  None
```

# Practical 3: Static Routing Configuration




**ROUTER1**

>enable

conf t

#host r1

#int serial0/1/0

#ip add 10.10.0.1 255.0.0.0

#no shut

#exit

#int g0/0

#ip route 172.10.10.0 255.255.255.0 10.10.0.2

#^Z

#show ip route

**ROUTER2**

>enable

conf t

#host r2

#int serial0/1/0

#ip add 10.10.0.2 255.0.0.0

#no shut

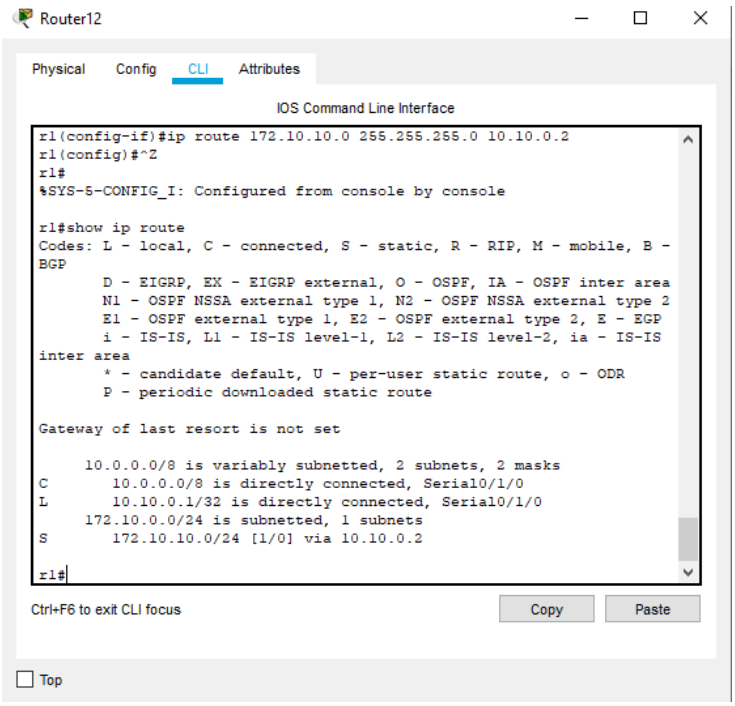
#exit

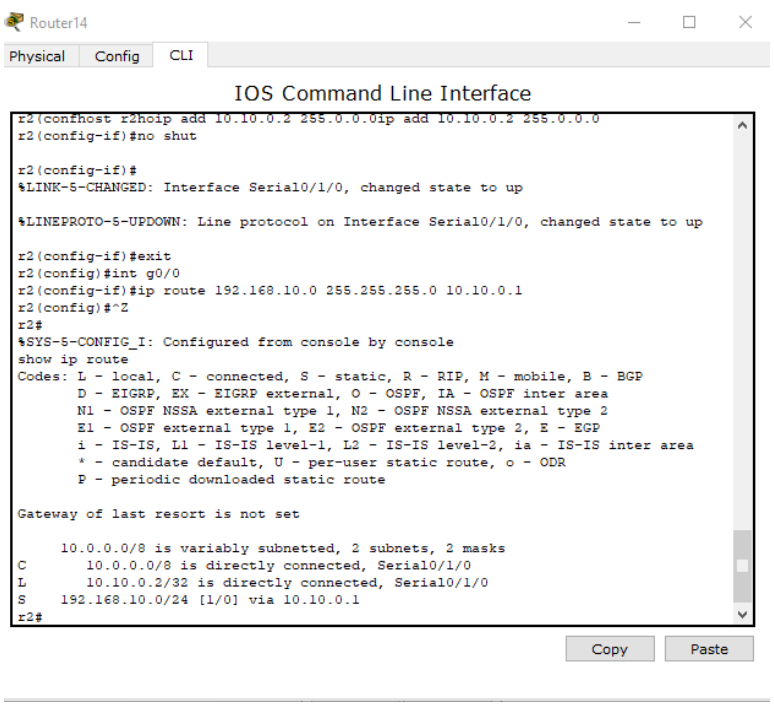
#int g0/0

#ip route 192.168.10.0 255.255.255.0 10.10.0.1

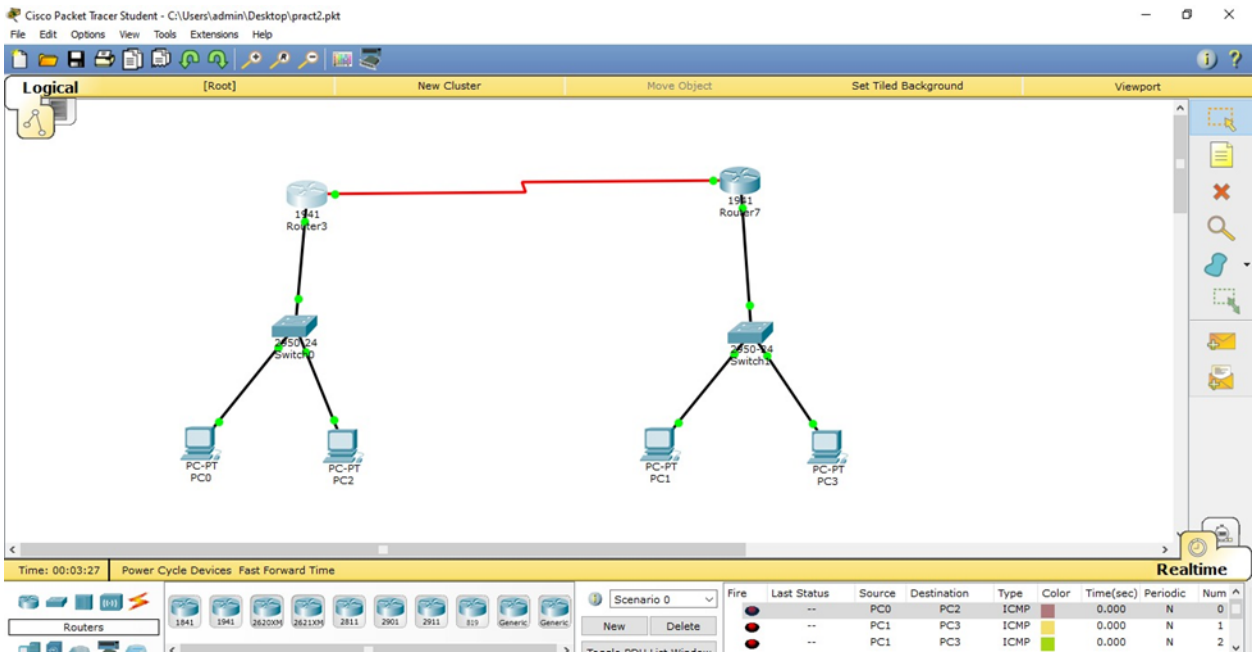
#^Z

#show ip route



# Practical 4: RIP Configuration




**ROUTER1**

>enable

conf t

#host r1

#int serial0/1/0

#ip add 10.10.0.1 255.0.0.0

#no shut

#exit

#int g0/0

#ip add 192.168.0.1 255.255.255.0

#no shut

#exit

#router rip

#network 10.10.0.0

#network 192.168.0.0

#^Z

**ROUTER2**

>enable

conf t

#host r2

#int serial0/1/0

#ip add 10.10.0.2 255.0.0.0

#no shut

#exit

#int g0/0

#ip add 172.116.0.1 255.255.255.0

#no shut

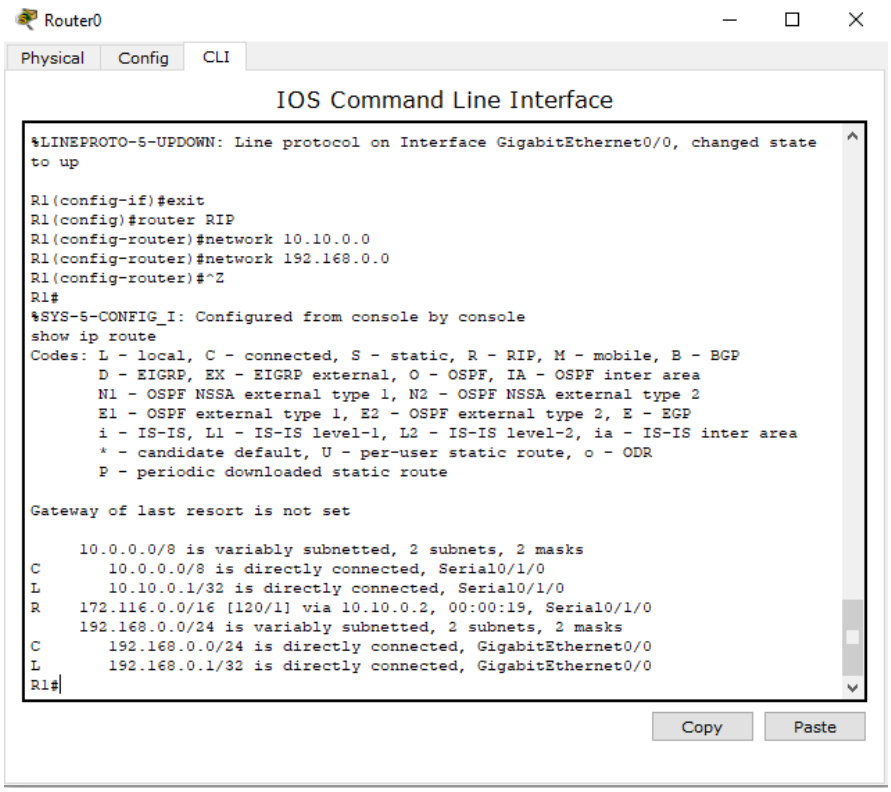
#exit

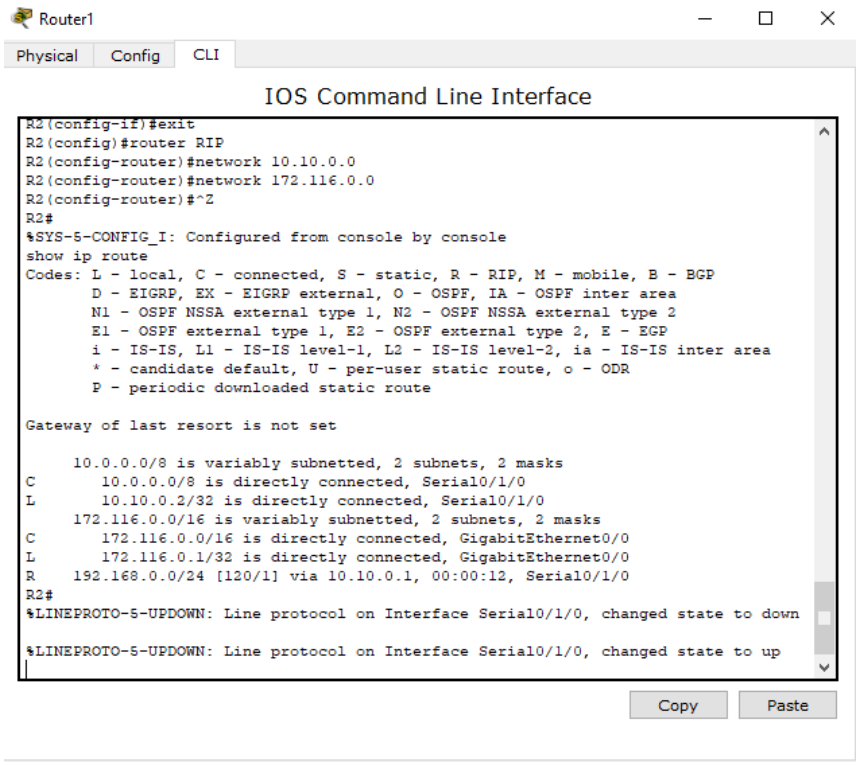
#router rip

#network 10.10.0.0

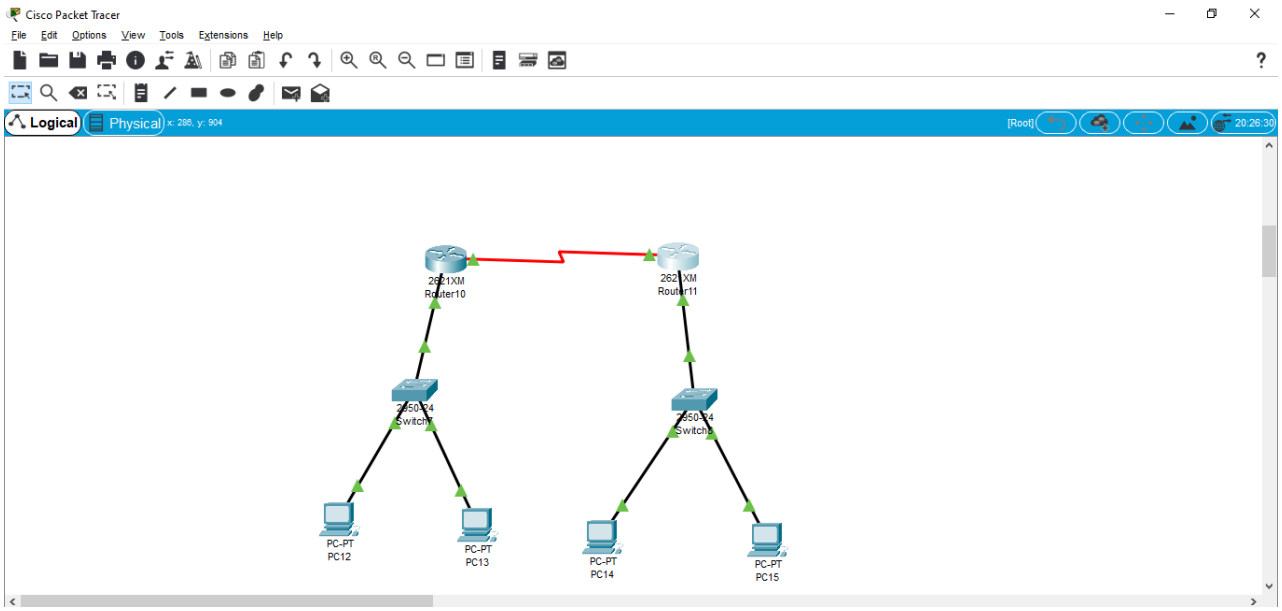
#network 172.116.0.0

#^Z


Router0
Physical
Config
CLI
IOS Command Line Interface
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
R1(config-if)#exit
R1(config)#router RIP
R1(config-router)#network 10.10.0.0
R1(config-router)#network 192.168.0.0
R1(config-router)#^Z
R1#
%SYS-5-CONFIG_I: Configured from console by console
show ip route
Codes: L - local, C - connected, S - static, 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
C 10.0.0.0/8 is directly connected, Serial0/1/0
L 10.10.0.1/32 is directly connected, Serial0/1/0
R 172.116.0.0/16 [120/1] via 10.10.0.2, 00:00:19, Serial0/1/0
192.168.0.0/24 is variably subnetted, 2 subnets, 2 masks
C 192.168.0.0/24 is directly connected, GigabitEthernet0/0
L 192.168.0.1/32 is directly connected, GigabitEthernet0/0
R1#
Copy
Paste


Router1
Physical
Config
CLI
IOS Command Line Interface
R2(config-if)#exit
R2(config)#router RIP
R2(config-router)#network 10.10.0.0
R2(config-router)#network 172.116.0.0
R2(config-router)#^Z
R2#
%SYS-5-CONFIG_I: Configured from console by console
show ip route
Codes: L - local, C - connected, S - static, 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
C 10.0.0.0/8 is directly connected, Serial0/1/0
L 10.10.0.2/32 is directly connected, Serial0/1/0
172.116.0.0/16 is variably subnetted, 2 subnets, 2 masks
C 172.116.0.0/16 is directly connected, GigabitEthernet0/0
L 172.116.0.1/32 is directly connected, GigabitEthernet0/0
R 192.168.0.0/24 [120/1] via 10.10.0.1, 00:00:12, Serial0/1/0
R2#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up
Copy
Paste

# Practical 5: OSPF Configuration




**ROUTER 1**

>enable

Router#conf t

#host R1

#int s0/0

#ip add 198.168.20.1 255.255.255.0

#clock rate 72000

#no shut

#exit

#int f0/0

#ip add 198.168.10.1 255.255.255.0

#no shut

#Router OSPF 1

#Network 198.168.20.0 0.0.0.255 area 0

#Network 198.168.10.0 0.0.0.255 area 0

#^Z

#show ip route

**ROUTER 2**

>enable

#conf t

#Host R2

#int s0/1/0

#ip add 198.168.20.2 255.255.255.0

#clock rate 72000

#no shut

#exit

#int f0/0

#ip add 198.168.30.1 255.255.255.0

#no shut

#Router OSPF 1

#Network 198.168.20.0 0.0.0.255 area 0

#Network 198.168.30.0 0.0.0.255 area 0

#^Z

#show ip route

```
r1(config)#Router OSPF 1
r1(config-router)#Network 198.168.20.0 0.0.0.255 area 0
r1(config-router)#Network 198.168.10.0 0.0.0.255 area 0
r1(config-router)#^Z
r1#
%SYS-5-CONFIG_I: Configured from console by console

r1#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    198.168.10.0/24 is directly connected, FastEthernet0/0
C    198.168.20.0/24 is directly connected, Serial0/0
O    198.168.30.0/24 [110/65] via 198.168.20.2, 00:02:31, Serial0/0

r1#
```

Ctrl+F6 to exit CLI focus  Copy  Paste

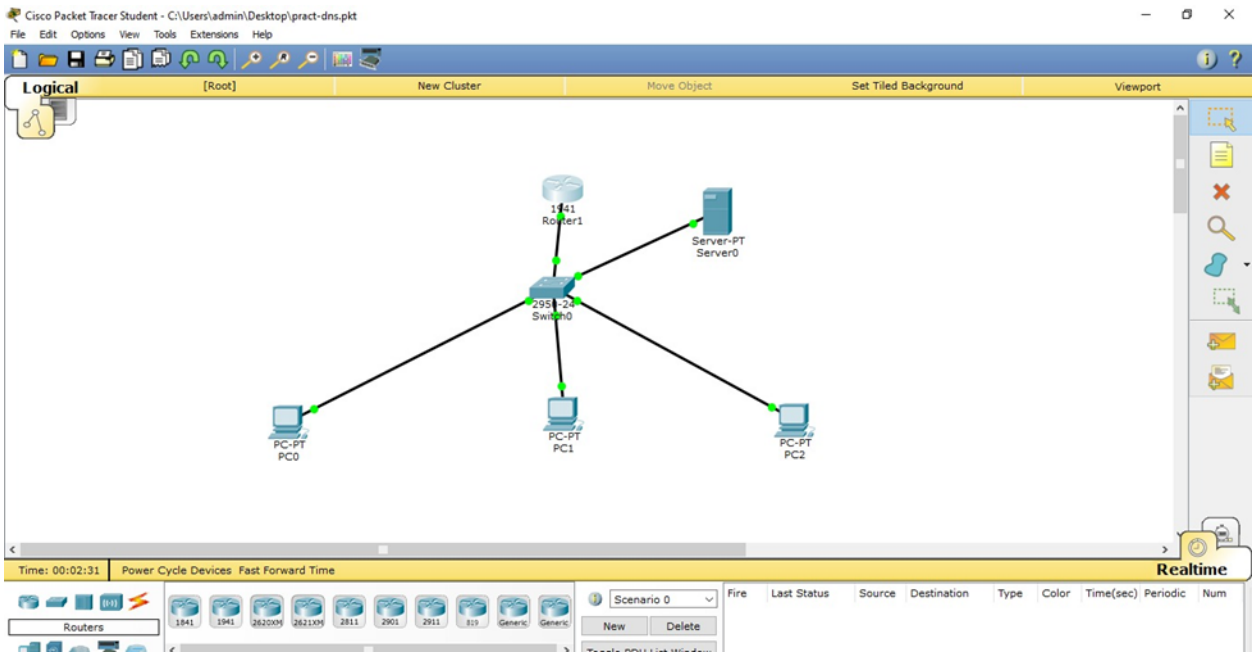
Physical  Config  CLI  Attributes

IOS Command Line Interface

```
r2(config-router)#Network 198.168.30.0 0.0.0.255 area 0
r2(config-router)#^Z
r2#
%SYS-5-CONFIG_I: Configured from console by console

00:15:10: %OSPF-5-ADJCHG: Process 1, Nbr 198.168.20.1 on Serial0/0
from LOADING to FULL, Loading Done

r2#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

O    198.168.10.0/24 [110/65] via 198.168.20.1, 00:00:04, Serial0/0
C    198.168.20.0/24 is directly connected, Serial0/0
C    198.168.30.0/24 is directly connected, FastEthernet0/0

r2#
```

Ctrl+F6 to exit CLI focus  Copy  Paste

# Practical 6: DHCP & DNS Configuration




**ROUTER 1**

>enable

#conf t

#Host r1

#int f0/0

#ip add 192.168.1.1 255.255.255.0

#no shut

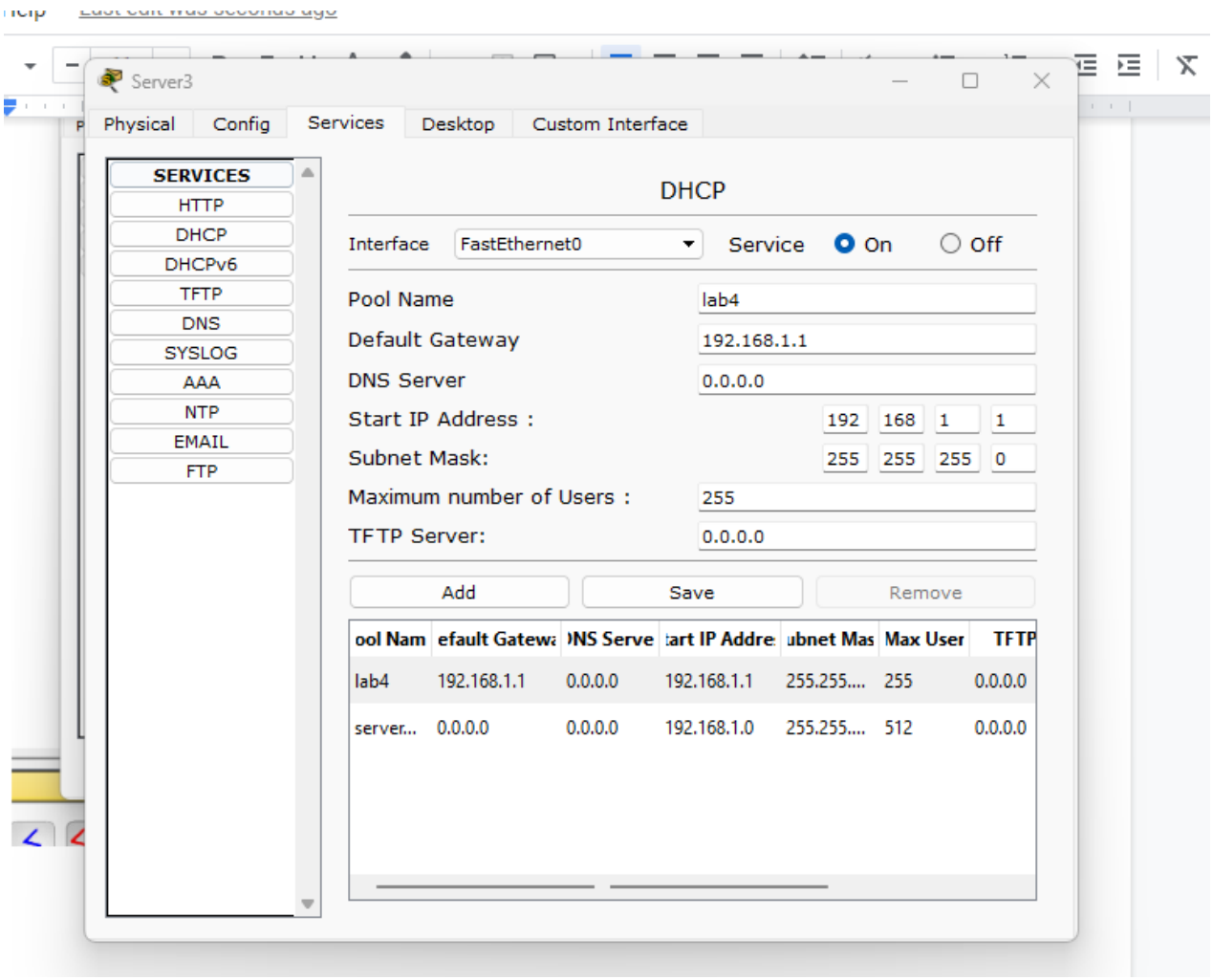
#ip dhcp pool Lab4

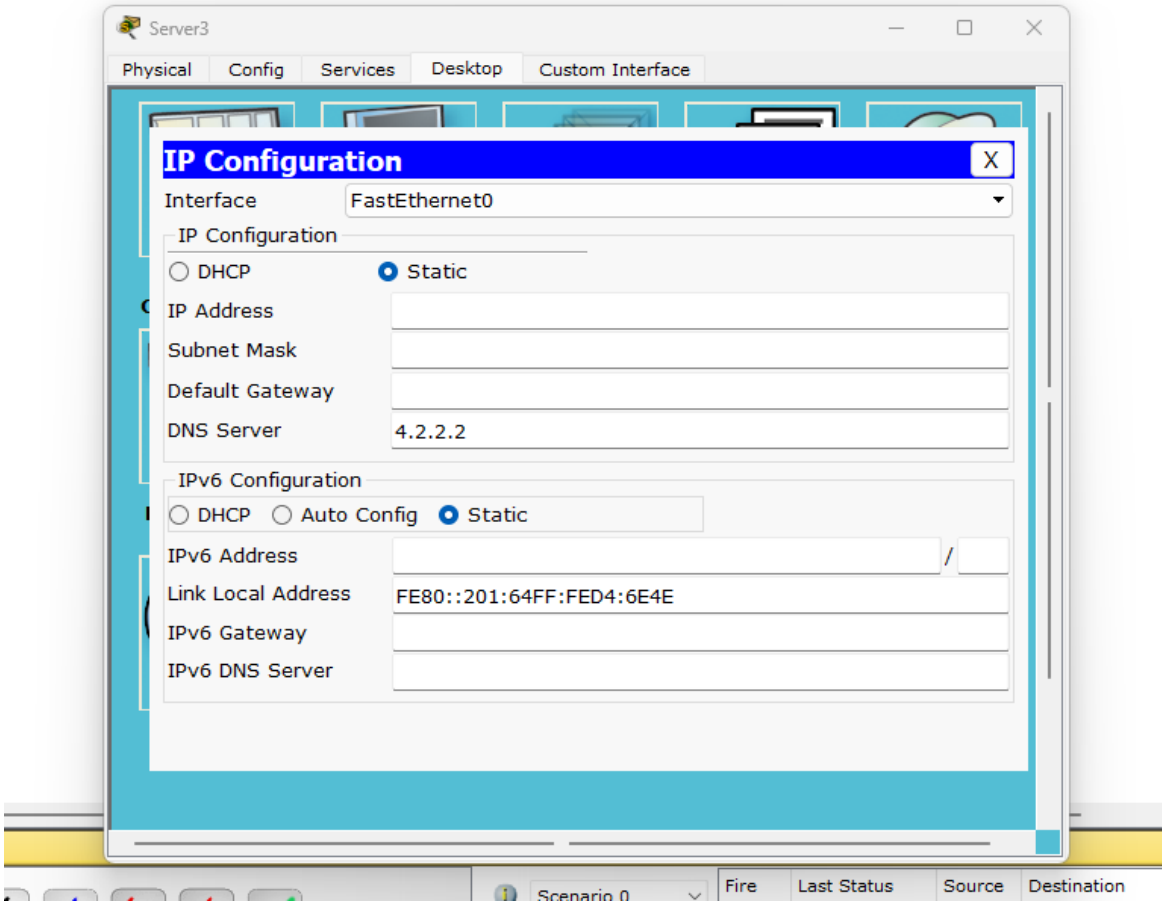
#network 192.168.1.0 255.255.255.0

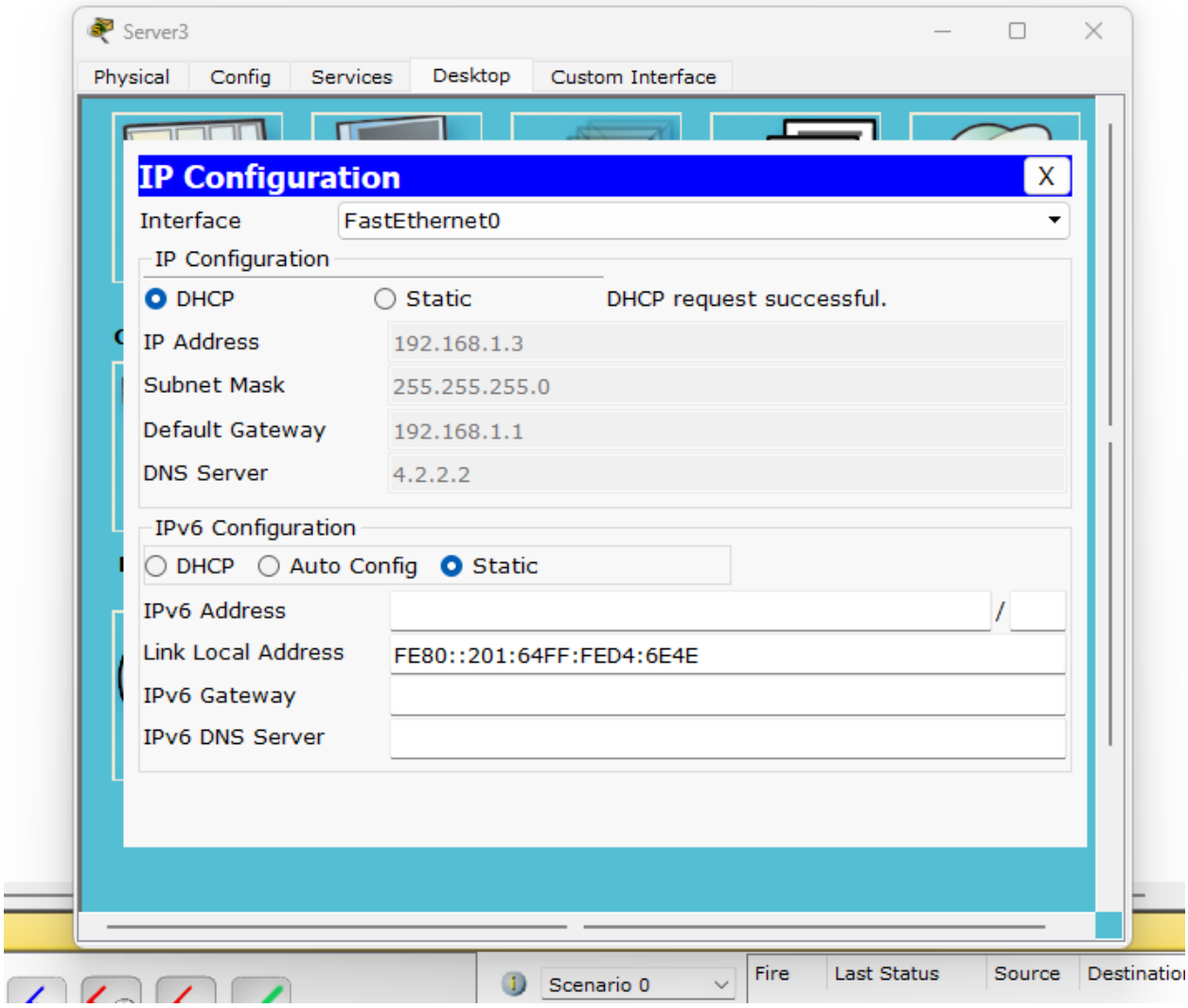
#default - router 192.168.1.1

#ctrl z

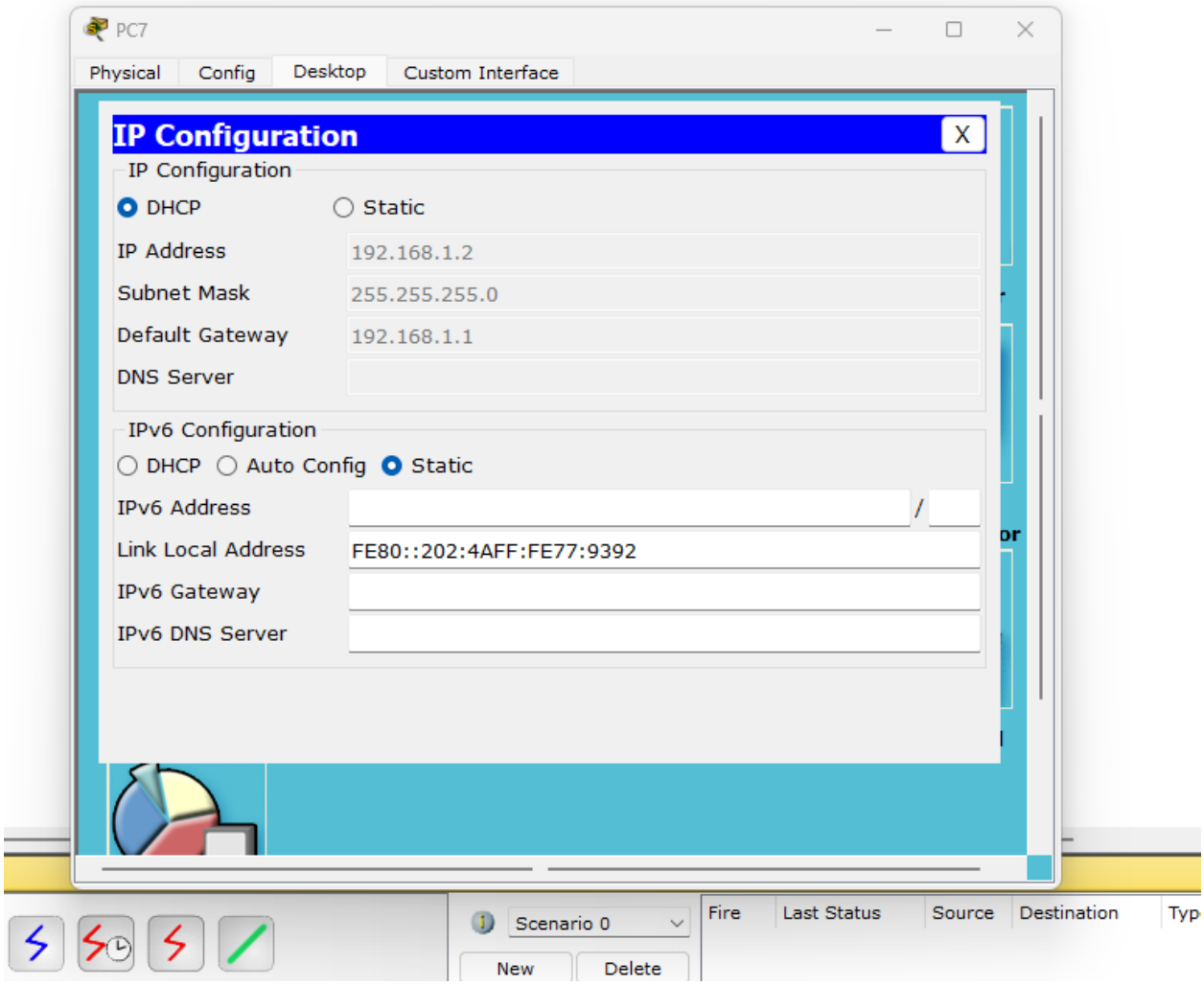
## Server

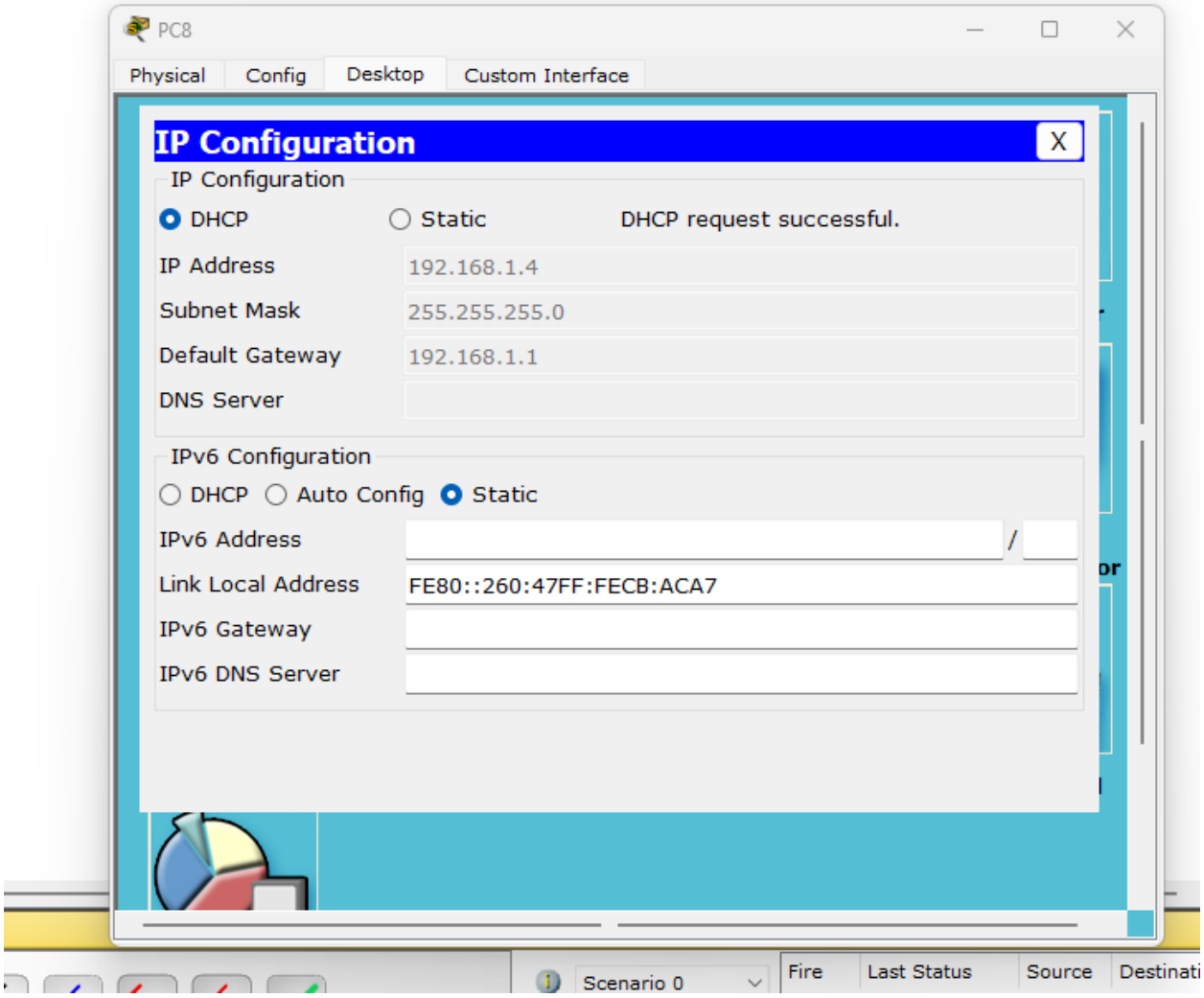

Server3
Physical
Config
Services
Desktop
Custom Interface
SERVICES
HTTP
DHCP
DHCPv6
TFTP
DNS
SYSLOG
AAA
NTP
EMAIL
FTP
DHCP
Interface
FastEthernet0
Service
On
Off
Pool Name
lab4
Default Gateway
192.168.1.1
DNS Server
0.0.0.0
Start IP Address :
192
168
1
1
Subnet Mask:
255
255
255
0
Maximum number of Users :
255
TFTP Server:
0.0.0.0
Add
Save
Remove
ool Nam
efault Gatewa
NS Serve
tart IP Addre
ubnet Mas
Max User
TFTP
lab4
192.168.1.1
0.0.0.0
192.168.1.1
255.255....
255
0.0.0.0
server...
0.0.0.0
0.0.0.0
192.168.1.0
255.255....
512
0.0.0.0

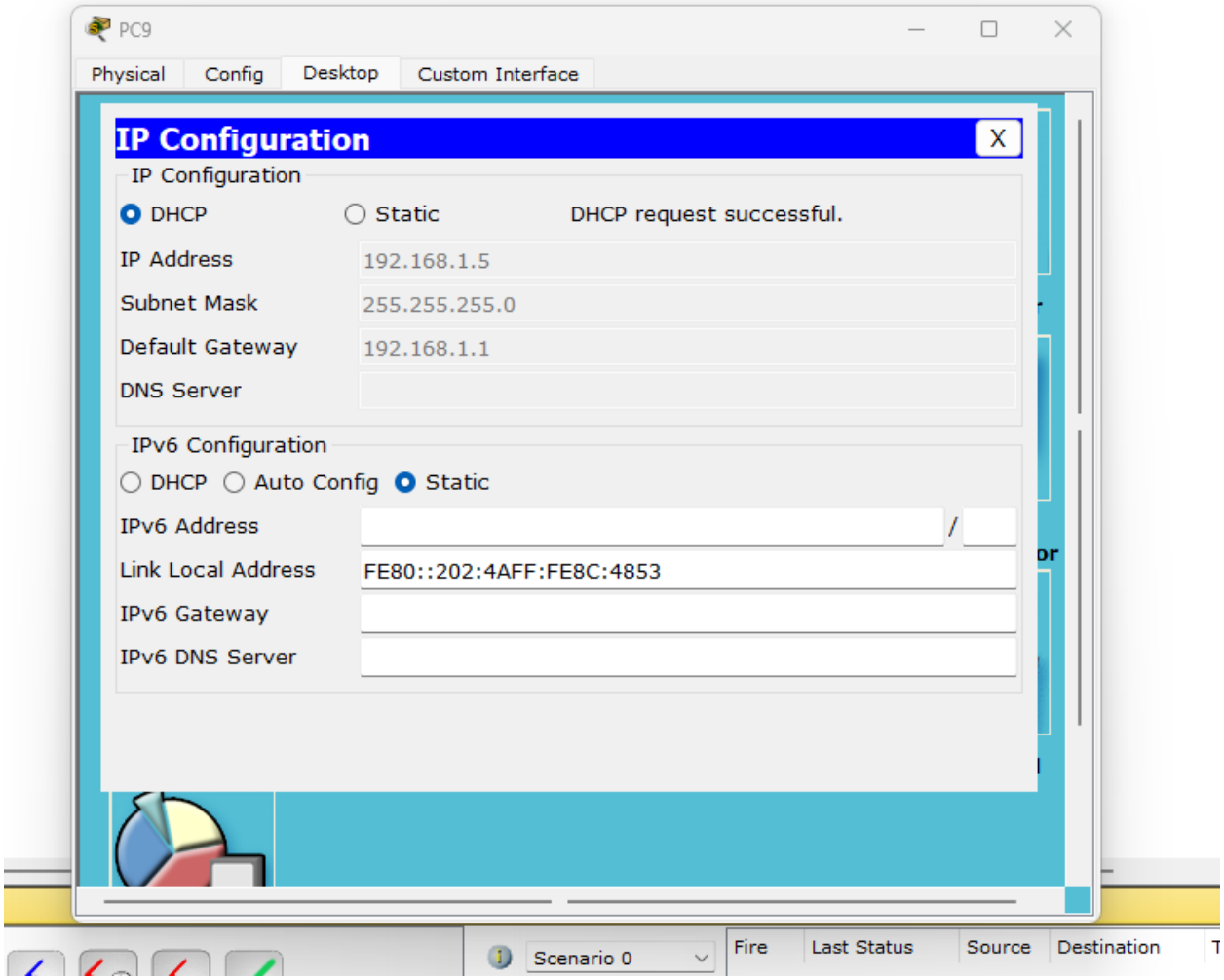

Server3
Physical
Config
Services
Desktop
Custom Interface
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IP Address
Subnet Mask
Default Gateway
DNS Server
4.2.2.2
IPv6 Configuration
DHCP
Auto Config
Static
IPv6 Address
Link Local Address
FE80::201:64FF:FED4:6E4E
IPv6 Gateway
IPv6 DNS Server
Fire
Last Status
Source
Destination

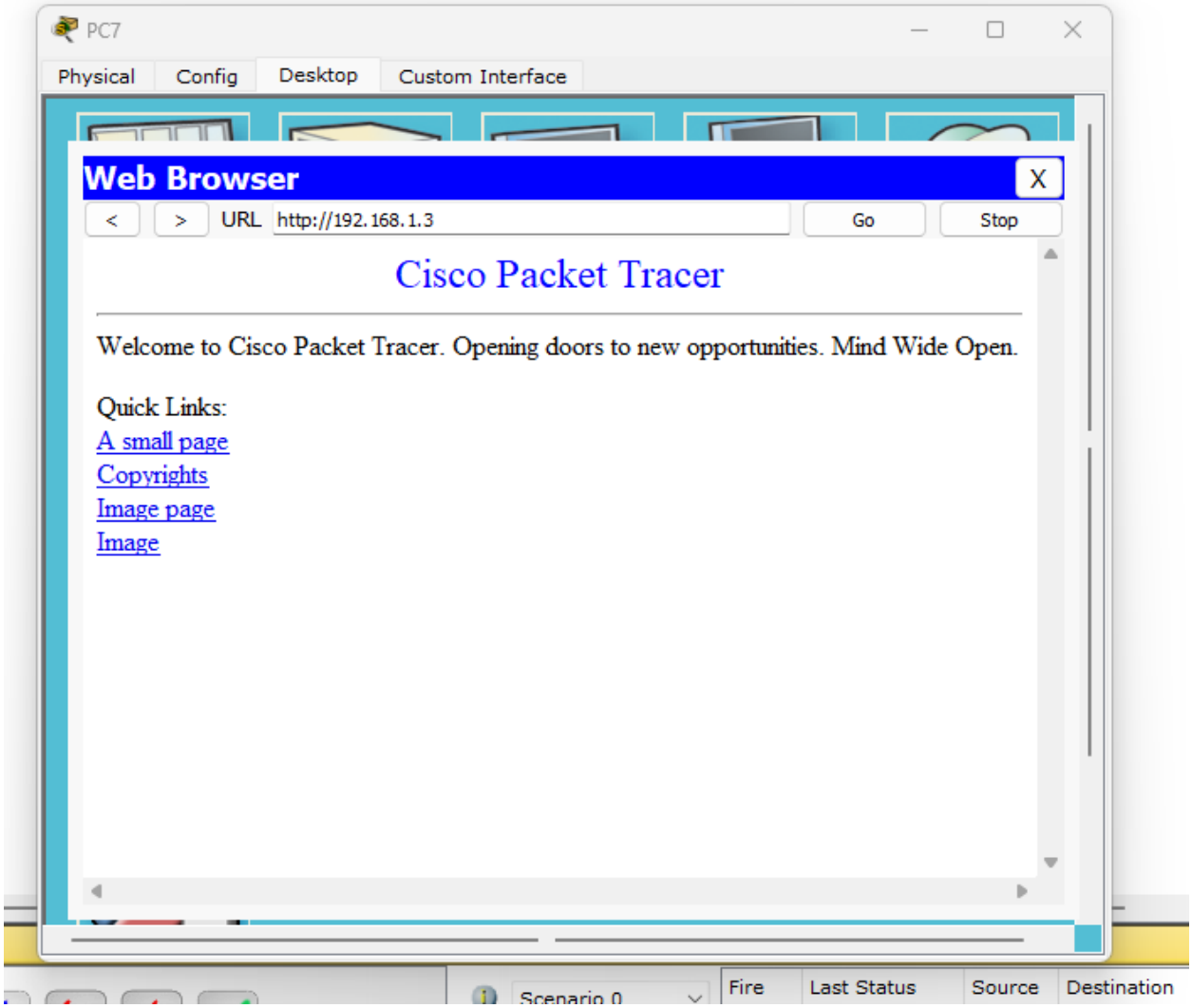

Server3
Physical
Config
Services
Desktop
Custom Interface
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
DHCP request successful.
IP Address
192.168.1.3
Subnet Mask
255.255.255.0
Default Gateway
192.168.1.1
DNS Server
4.2.2.2
IPv6 Configuration
DHCP
Auto Config
Static
IPv6 Address
Link Local Address
FE80::201:64FF:FED4:6E4E
IPv6 Gateway
IPv6 DNS Server
Scenario 0
Fire
Last Status
Source
Destinatio

## PC

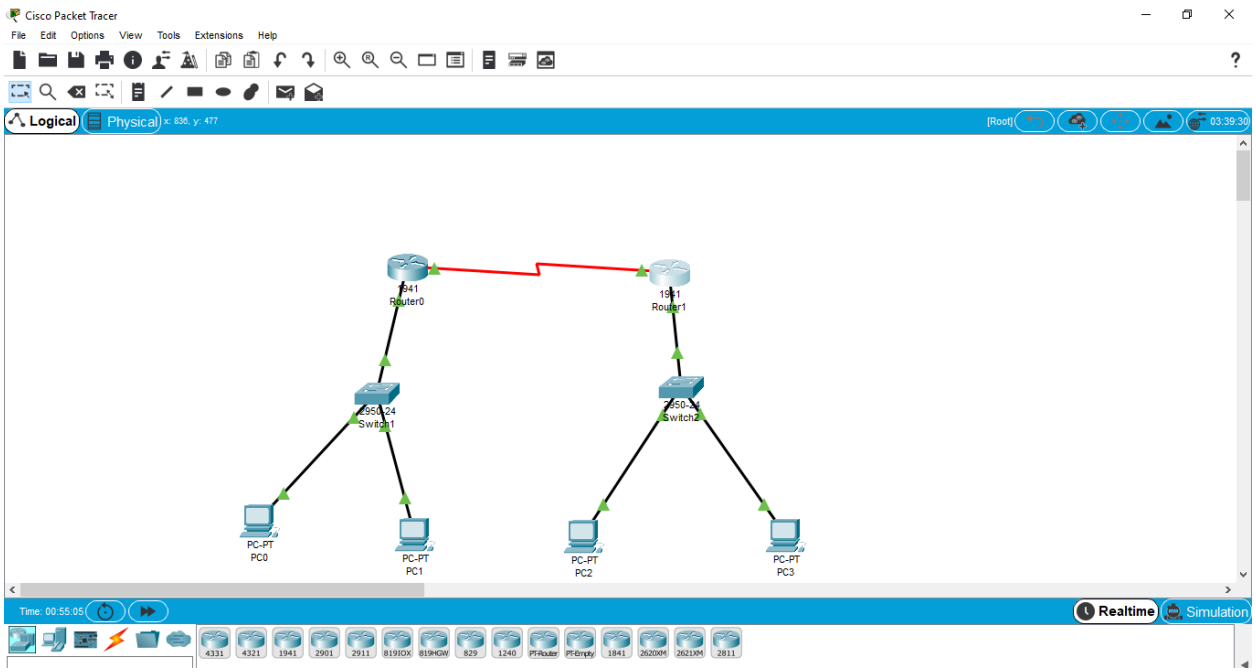

PC7
Physical
Config
Desktop
Custom Interface
IP Configuration
X
IP Configuration
DHCP
Static
IP Address
192.168.1.2
Subnet Mask
255.255.255.0
Default Gateway
192.168.1.1
DNS Server
IPv6 Configuration
DHCP
Auto Config
Static
IPv6 Address
Link Local Address
FE80::202:4AFF:FE77:9392
IPv6 Gateway
IPv6 DNS Server
Scenario 0
New
Delete
Fire
Last Status
Source
Destination


PC8
Physical
Config
Desktop
Custom Interface
IP Configuration
X
IP Configuration
DHCP
Static
DHCP request successful.
IP Address
192.168.1.4
Subnet Mask
255.255.255.0
Default Gateway
192.168.1.1
DNS Server
IPv6 Configuration
DHCP
Auto Config
Static
IPv6 Address
Link Local Address
FE80::260:47FF:FECB:ACA7
IPv6 Gateway
IPv6 DNS Server
Scenario 0
Fire
Last Status
Source
Destinati


PC9
Physical
Config
Desktop
Custom Interface
IP Configuration
X
IP Configuration
DHCP
Static
DHCP request successful.
IP Address
192.168.1.5
Subnet Mask
255.255.255.0
Default Gateway
192.168.1.1
DNS Server
IPv6 Configuration
DHCP
Auto Config
Static
IPv6 Address
Link Local Address
FE80::202:4AFF:FE8C:4853
IPv6 Gateway
IPv6 DNS Server
Scenario 0
Fire
Last Status
Source
Destination


PC7
Physical
Config
Desktop
Custom Interface
Web Browser
X
<
>
URL
http://192.168.1.3
Go
Stop
Cisco Packet Tracer
Welcome to Cisco Packet Tracer. Opening doors to new opportunities. Mind Wide Open.
Quick Links:
A small page
Copyrights
Image page
Image
Scenario 0
Fire
Last Status
Source
Destination

# Practical 7: Study of firewall implementation using ACL




**ROUTER 1**

>enable

#conf t

#host r1

#int serial 0/1/0

#ip add 10.0.0.1 255.0.0.0

#no shut
#exit

#int g0/0

#ip add 11.0.0.1 255.0.0.0

#no shut

#exit

#ip route 12.0.0.0 255.0.0.0 10.0.0.2

#show ip route

**ROUTER 2**

>enable

#conf t

#host r2

#int serial 0/1/0

#ip add 10.0.0.2 255.0.0.0

#no shut

#exit

#int g0/0

#ip add 12.0.0.1 255.0.0.0

#no shut

#exit

#ip route 11.0.0.0 255.0.0.0 10.0.0.1

#show ip route

#access-list 1 deny 11.0.0.0 0.255.255.255

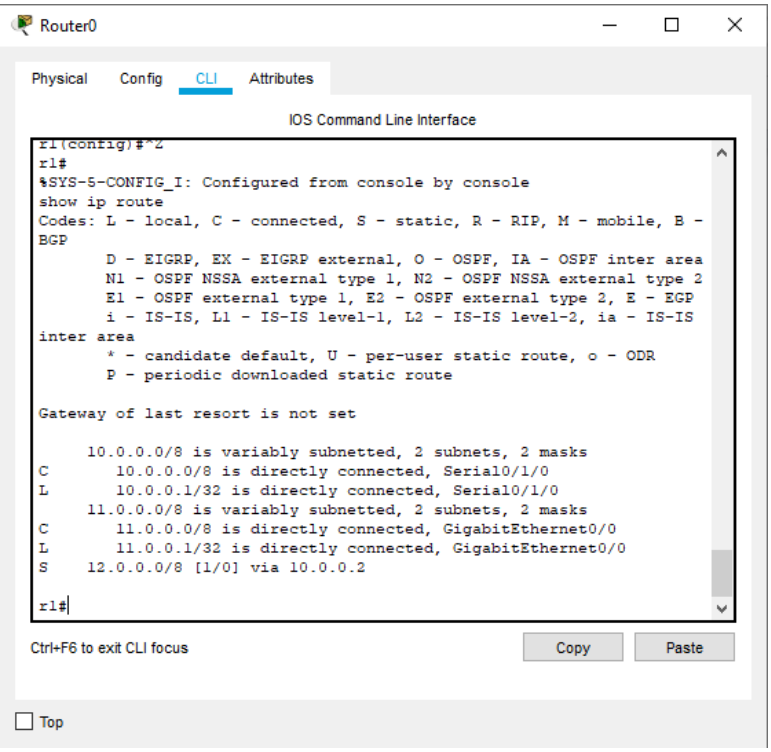
#access-list 1 permit any

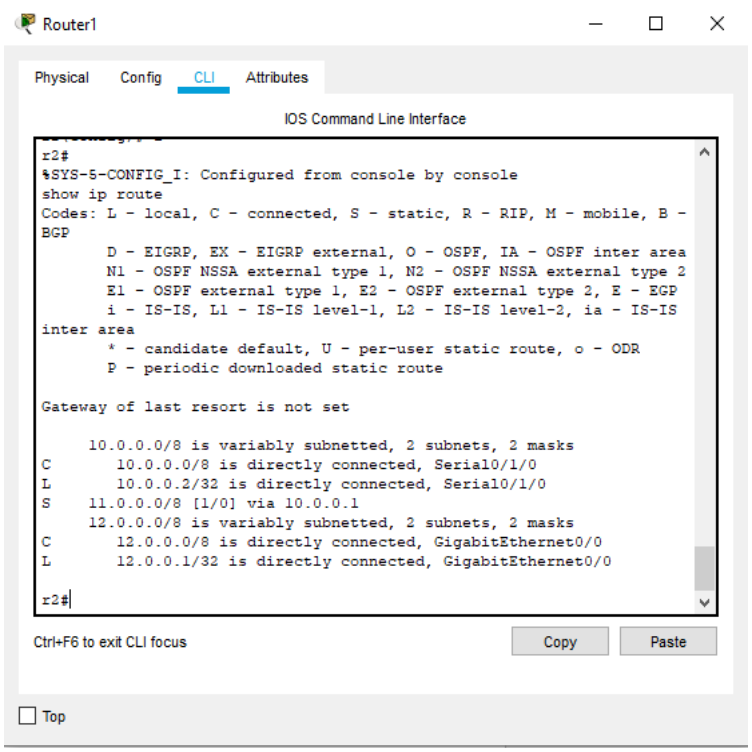
#int serial 0/1/0

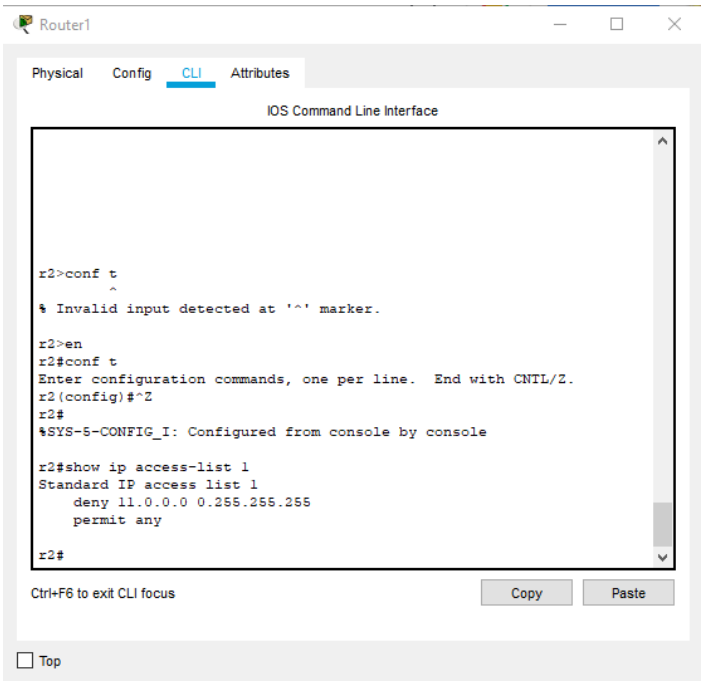
#ip access-group 1 in

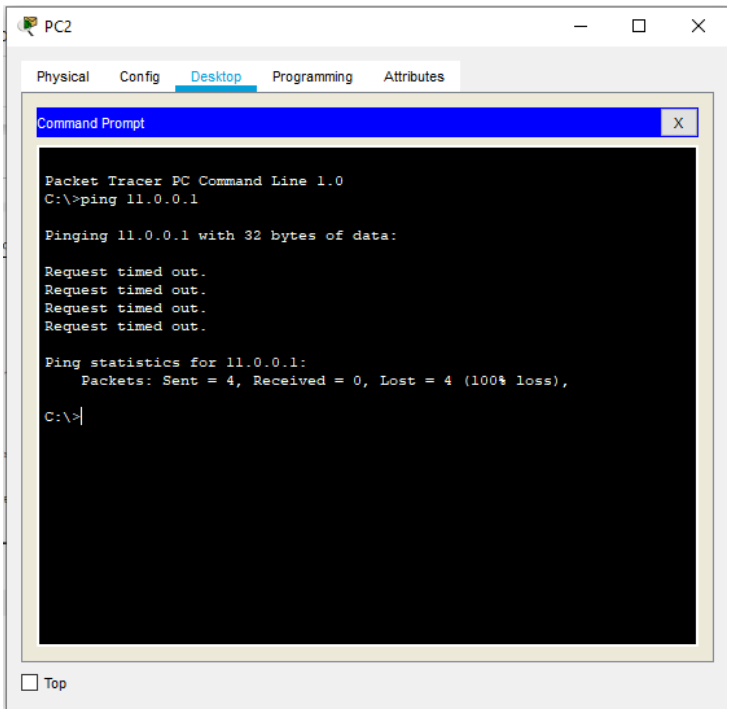
#show ip access-list 1

#exit


Router0
Physical
Config
CLI
Attributes
IOS Command Line Interface
r1(config)#^Z
r1#
%SYS-5-CONFIG_I: Configured from console by console
show ip route
Codes: L - local, C - connected, S - static, 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
C 10.0.0.0/8 is directly connected, Serial0/1/0
L 10.0.0.1/32 is directly connected, Serial0/1/0
11.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C 11.0.0.0/8 is directly connected, GigabitEthernet0/0
L 11.0.0.1/32 is directly connected, GigabitEthernet0/0
S 12.0.0.0/8 [1/0] via 10.0.0.2
r1#
Ctrl+F6 to exit CLI focus
Copy
Paste
Top


Router1
Physical
Config
CLI
Attributes
IOS Command Line Interface
r2#
%SYS-5-CONFIG_I: Configured from console by console
show ip route
Codes: L - local, C - connected, S - static, 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
C 10.0.0.0/8 is directly connected, Serial0/1/0
L 10.0.0.2/32 is directly connected, Serial0/1/0
S 11.0.0.0/8 [1/0] via 10.0.0.1
12.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C 12.0.0.0/8 is directly connected, GigabitEthernet0/0
L 12.0.0.1/32 is directly connected, GigabitEthernet0/0
r2#
Ctrl+F6 to exit CLI focus
Copy
Paste
Top


Router1
Physical
Config
CLI
Attributes
IOS Command Line Interface
r2>conf t
^
% Invalid input detected at '^' marker.
r2>en
r2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
r2(config)#^Z
r2#
%SYS-5-CONFIG_I: Configured from console by console
r2#show ip access-list 1
Standard IP access list 1
deny 11.0.0.0 0.255.255.255
permit any
r2#
Ctrl+F6 to exit CLI focus
Copy
Paste
Top


PC2
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
Packet Tracer PC Command Line 1.0
C:\>ping 11.0.0.1
Pinging 11.0.0.1 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Ping statistics for 11.0.0.1:
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>
Top

# Practical 8: Wireshark Analysis

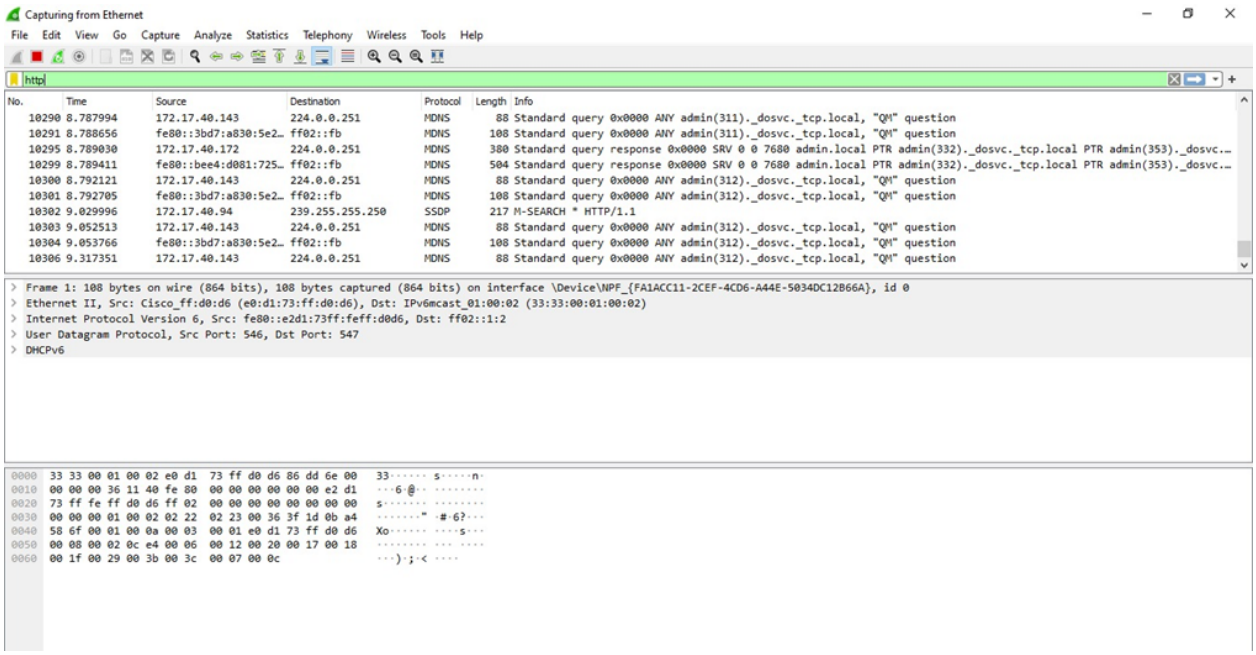
**What is Wireshark?**

Wireshark is a free and open-source packet analyzer. It is used for network troubleshooting, analysis, software and communications protocol development, and education.

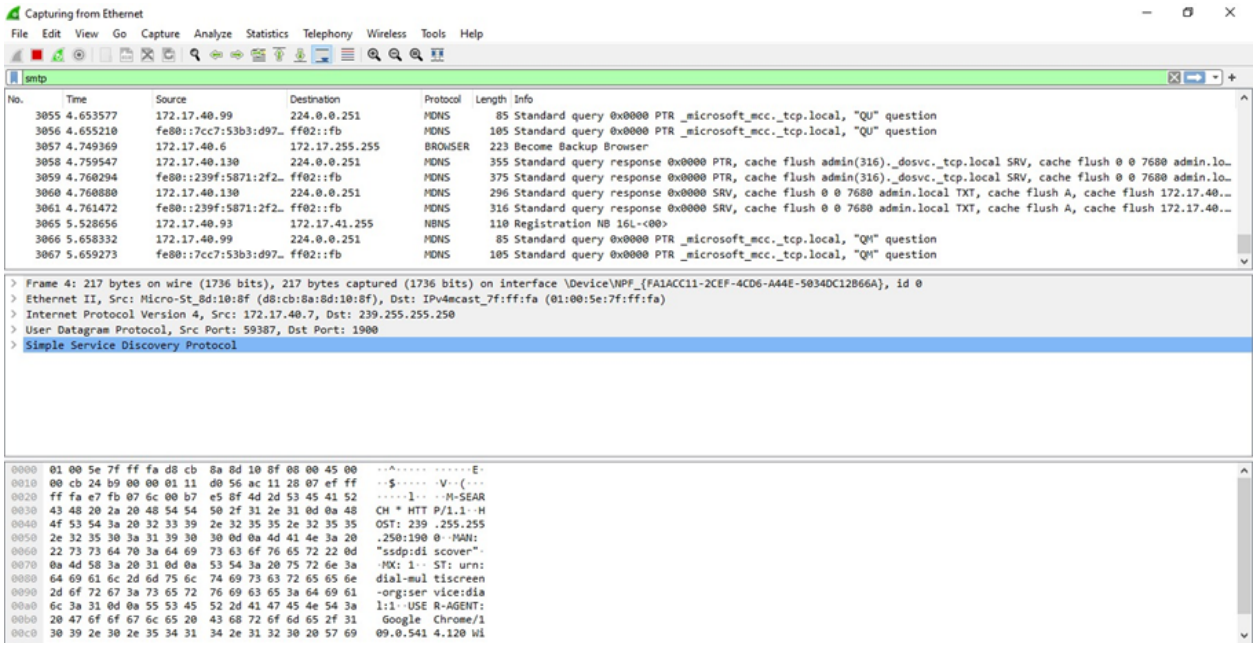
Wireshark lets the user put network interface controllers into promiscuous mode (if supported by the network interface controller), so they can see all the traffic visible on that interface including unicast traffic not sent to that network interface controller's MAC address. However, when capturing with a packet analyzer in promiscuous mode on a port on a network switch, not all traffic through the switch is necessarily sent to the port where the capture is done, so capturing in promiscuous mode is not necessarily sufficient to see all network traffic.

**Tracing of different protocols**

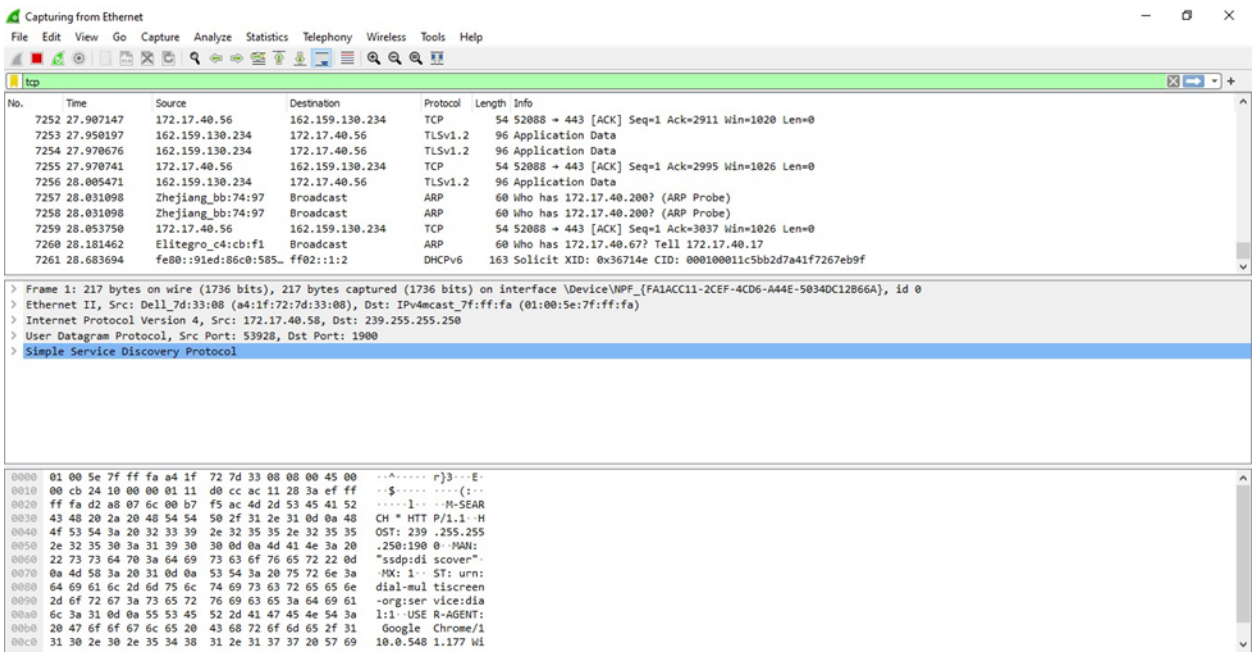
## HTTP



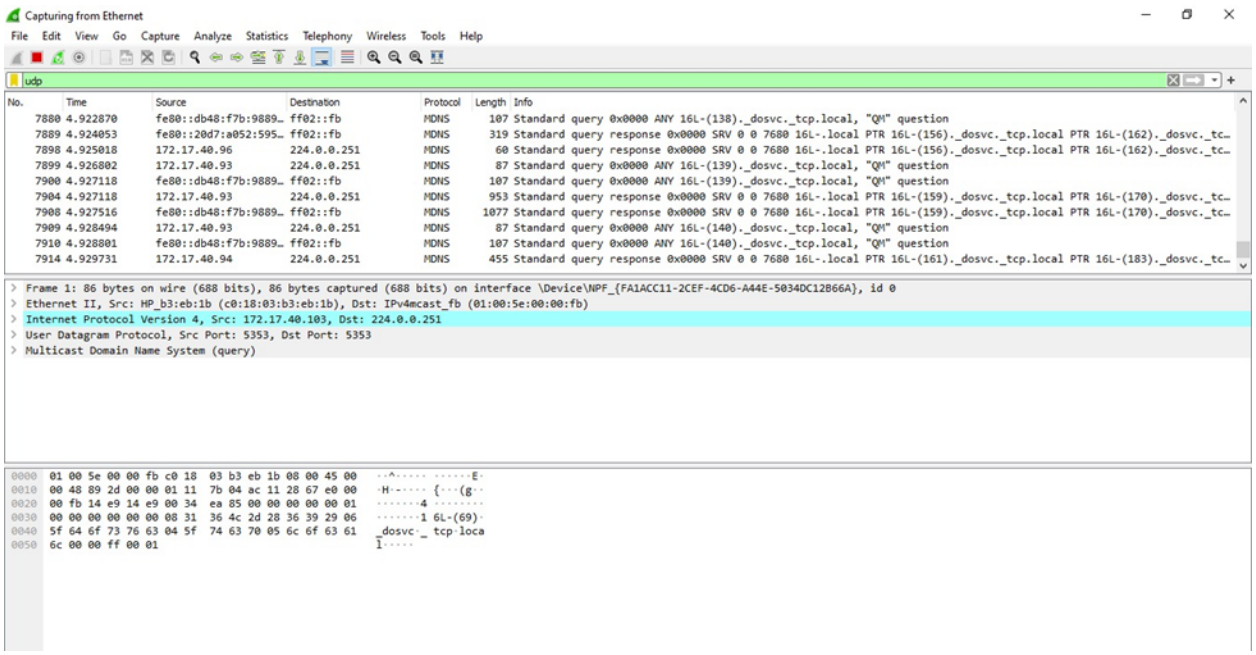
## SMTP


Capturing from Ethernet
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
smtp
No. Time Source Destination Protocol Length Info
3055 4.653577 172.17.40.99 224.0.0.251 MDNS 85 Standard query 0x0000 PTR _microsoft_mcc._tcp.local, "QU" question
3056 4.655210 fe80::7cc7:53b3:d97… ff02::fb MDNS 105 Standard query 0x0000 PTR _microsoft_mcc._tcp.local, "QU" question
3057 4.749369 172.17.40.6 172.17.255.255 BROWSER 223 Become Backup Browser
3058 4.759547 172.17.40.130 224.0.0.251 MDNS 355 Standard query response 0x0000 PTR, cache flush admin(316)._dosvc._tcp.local SRV, cache flush 0 0 7680 admin.lo…
3059 4.760294 fe80::239f:5871:2f2… ff02::fb MDNS 375 Standard query response 0x0000 PTR, cache flush admin(316)._dosvc._tcp.local SRV, cache flush 0 0 7680 admin.lo…
3060 4.760880 172.17.40.130 224.0.0.251 MDNS 296 Standard query response 0x0000 SRV, cache flush 0 0 7680 admin.local TXT, cache flush A, cache flush 172.17.40.…
3061 4.761472 fe80::239f:5871:2f2… ff02::fb MDNS 316 Standard query response 0x0000 SRV, cache flush 0 0 7680 admin.local TXT, cache flush A, cache flush 172.17.40.…
3065 5.528656 172.17.40.93 172.17.41.255 NBNS 110 Registration NB 16L-<00>
3066 5.658332 172.17.40.99 224.0.0.251 MDNS 85 Standard query 0x0000 PTR _microsoft_mcc._tcp.local, "QM" question
3067 5.659273 fe80::7cc7:53b3:d97… ff02::fb MDNS 105 Standard query 0x0000 PTR _microsoft_mcc._tcp.local, "QM" question
Frame 4: 217 bytes on wire (1736 bits), 217 bytes captured (1736 bits) on interface \Device\NPF_{FA1ACC11-2CEF-4CD6-A44E-5034DC12B66A}, id 0
Ethernet II, Src: Micro-St_8d:10:8f (d8:cb:8a:8d:10:8f), Dst: IPv4mcast_7f:ff:fa (01:00:5e:7f:ff:fa)
Internet Protocol Version 4, Src: 172.17.40.7, Dst: 239.255.255.250
User Datagram Protocol, Src Port: 59387, Dst Port: 1900
Simple Service Discovery Protocol
0000 01 00 5e 7f ff fa d8 cb 8a 8d 10 8f 08 00 45 00
0010 00 cb 24 b9 00 00 01 11 d0 56 ac 11 28 07 ef ff
0020 ff fa e7 fb 07 6c 00 b7 e5 8f 4d 2d 53 45 41 52
0030 43 48 20 2a 20 48 54 54 50 2f 31 2e 31 0d 0a 48
0040 4f 53 54 3a 20 32 33 39 2e 32 35 35 2e 32 35 35
0050 2e 32 35 30 3a 31 39 30 30 0d 0a 4d 41 4e 3a 20
0060 22 73 73 64 70 3a 64 69 73 63 6f 76 65 72 22 0d
0070 0a 4d 58 3a 20 31 0d 0a 53 54 3a 20 75 72 6e 3a
0080 64 69 61 6c 2d 6d 75 6c 74 69 73 63 72 65 65 6e
0090 2d 6f 72 67 3a 73 65 72 76 69 63 65 3a 64 69 61
00a0 6c 3a 31 0d 0a 55 53 45 52 2d 41 47 45 4e 54 3a
00b0 20 47 6f 6f 67 6c 65 20 43 68 72 6f 6d 65 2f 31
00c0 30 39 2e 30 2e 35 34 31 34 2e 31 32 30 20 57 69

## TCP


Capturing from Ethernet
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
tcp
No. Time Source Destination Protocol Length Info
7252 27.907147 172.17.40.56 162.159.130.234 TCP 54 52088 → 443 [ACK] Seq=1 Ack=2911 Win=1020 Len=0
7253 27.950197 162.159.130.234 172.17.40.56 TLSv1.2 96 Application Data
7254 27.970676 162.159.130.234 172.17.40.56 TLSv1.2 96 Application Data
7255 27.970741 172.17.40.56 162.159.130.234 TCP 54 52088 → 443 [ACK] Seq=1 Ack=2995 Win=1026 Len=0
7256 28.005471 162.159.130.234 172.17.40.56 TLSv1.2 96 Application Data
7257 28.031098 Zhejiang_bb:74:97 Broadcast ARP 60 Who has 172.17.40.200? (ARP Probe)
7258 28.031098 Zhejiang_bb:74:97 Broadcast ARP 60 Who has 172.17.40.200? (ARP Probe)
7259 28.053750 172.17.40.56 162.159.130.234 TCP 54 52088 → 443 [ACK] Seq=1 Ack=3037 Win=1026 Len=0
7260 28.181462 Elitegro_c4:cb:f1 Broadcast ARP 60 Who has 172.17.40.67? Tell 172.17.40.17
7261 28.683694 fe80::91ed:86c0:585… ff02::1:2 DHCPv6 163 Solicit XID: 0x36714e CID: 000100011c5bb2d7a41f7267eb9f
Frame 1: 217 bytes on wire (1736 bits), 217 bytes captured (1736 bits) on interface \Device\NPF_{FA1ACC11-2CEF-4CD6-A44E-5034DC12B66A}, id 0
Ethernet II, Src: Dell_7d:33:08 (a4:1f:72:7d:33:08), Dst: IPv4mcast_7f:ff:fa (01:00:5e:7f:ff:fa)
Internet Protocol Version 4, Src: 172.17.40.58, Dst: 239.255.255.250
User Datagram Protocol, Src Port: 53928, Dst Port: 1900
Simple Service Discovery Protocol
0000 01 00 5e 7f ff fa a4 1f 72 7d 33 08 08 00 45 00
0010 00 cb 24 10 00 00 01 11 d0 cc ac 11 28 3a ef ff
0020 ff fa d2 a8 07 6c 00 b7 f5 ac 4d 2d 53 45 41 52
0030 43 48 20 2a 20 48 54 54 50 2f 31 2e 31 0d 0a 48
0040 4f 53 54 3a 20 32 33 39 2e 32 35 35 2e 32 35 35
0050 2e 32 35 30 3a 31 39 30 30 0d 0a 4d 41 4e 3a 20
0060 22 73 73 64 70 3a 64 69 73 63 6f 76 65 72 22 0d
0070 0a 4d 58 3a 20 31 0d 0a 53 54 3a 20 75 72 6e 3a
0080 64 69 61 6c 2d 6d 75 6c 74 69 73 63 72 65 65 6e
0090 2d 6f 72 67 3a 73 65 72 76 69 63 65 3a 64 69 61
00a0 6c 3a 31 0d 0a 55 53 45 52 2d 41 47 45 4e 54 3a
00b0 20 47 6f 6f 67 6c 65 20 43 68 72 6f 6d 65 2f 31
00c0 31 30 2e 30 2e 35 34 38 31 2e 31 37 37 20 57 69

## UDP


Capturing from Ethernet
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
udp
No. Time Source Destination Protocol Length Info
7880 4.922870 fe80::db48:f7b:9889… ff02::fb MDNS 107 Standard query 0x0000 ANY 16L-(138)._dosvc._tcp.local, "QM" question
7889 4.924053 fe80::20d7:a052:595… ff02::fb MDNS 319 Standard query response 0x0000 SRV 0 0 7680 16L-.local PTR 16L-(156)._dosvc._tcp.local PTR 16L-(162)._dosvc._tc…
7898 4.925018 172.17.40.96 224.0.0.251 MDNS 60 Standard query response 0x0000 SRV 0 0 7680 16L-.local PTR 16L-(156)._dosvc._tcp.local PTR 16L-(162)._dosvc._tc…
7899 4.926802 172.17.40.93 224.0.0.251 MDNS 87 Standard query 0x0000 ANY 16L-(139)._dosvc._tcp.local, "QM" question
7900 4.927118 fe80::db48:f7b:9889… ff02::fb MDNS 107 Standard query 0x0000 ANY 16L-(139)._dosvc._tcp.local, "QM" question
7904 4.927118 172.17.40.93 224.0.0.251 MDNS 953 Standard query response 0x0000 SRV 0 0 7680 16L-.local PTR 16L-(159)._dosvc._tcp.local PTR 16L-(170)._dosvc._tc…
7908 4.927516 fe80::db48:f7b:9889… ff02::fb MDNS 1077 Standard query response 0x0000 SRV 0 0 7680 16L-.local PTR 16L-(159)._dosvc._tcp.local PTR 16L-(170)._dosvc._tc…
7909 4.928494 172.17.40.93 224.0.0.251 MDNS 87 Standard query 0x0000 ANY 16L-(140)._dosvc._tcp.local, "QM" question
7910 4.928801 fe80::db48:f7b:9889… ff02::fb MDNS 107 Standard query 0x0000 ANY 16L-(140)._dosvc._tcp.local, "QM" question
7914 4.929731 172.17.40.94 224.0.0.251 MDNS 455 Standard query response 0x0000 SRV 0 0 7680 16L-.local PTR 16L-(161)._dosvc._tcp.local PTR 16L-(183)._dosvc._tc…
Frame 1: 86 bytes on wire (688 bits), 86 bytes captured (688 bits) on interface \Device\NPF_{FA1ACC11-2CEF-4CD6-A44E-5034DC12B66A}, id 0
Ethernet II, Src: HP_b3:eb:1b (c0:18:03:b3:eb:1b), Dst: IPv4mcast_fb (01:00:5e:00:00:fb)
Internet Protocol Version 4, Src: 172.17.40.103, Dst: 224.0.0.251
User Datagram Protocol, Src Port: 5353, Dst Port: 5353
Multicast Domain Name System (query)
0000 01 00 5e 00 00 fb c0 18 03 b3 eb 1b 08 00 45 00
0010 00 48 89 2d 00 00 01 11 7b 04 ac 11 28 67 e0 00
0020 00 fb 14 e9 14 e9 00 34 ea 85 00 00 00 00 00 01
0030 00 00 00 00 00 00 08 31 36 4c 2d 28 36 39 29 06
0040 5f 64 6f 73 76 63 04 5f 74 63 70 05 6c 6f 63 61
0050 6c 00 00 ff 00 01

# Practical 9: Socket Programming

## MY SERVER

```
import java.io.*;

import java.util.*;

import java.net.*;

 class MyServer {

  public static void main(String[] args) {

    try {

      Scanner sc = new Scanner(System.in);

      ServerSocket ss = new ServerSocket(6666);

      Socket s = ss.accept();// establishes connection

       DataInputStream dis = new DataInputStream(s.getInputStream());

      String str = (String) dis.readUTF();

      System.out.println("message= " + str);

      Thread t = new Thread();

      t.sleep(4000);

      DataOutputStream dout = new DataOutputStream(s.getOutputStream());

      System.out.println("Enter message");

      String s1 = new String();

      s1 = sc.nextLine();
```

```
      dout.writeUTF(s1);

      dout.flush();

      dout.close();

      ss.close();

    } catch (Exception e) {

      System.out.println(e);

    }

  }

}
```

```
D:\sawn>javac MyServer.java

D:\sawn>java MyServer
message= hi
Enter message
w

D:\sawn>javac MyServer.java
```

# MY CLIENT

```
import java.util.*;

import java.io.*;

import java.net.*;

class MyClient {

   public static void main(String[] args) {

      try {

         Scanner sc = new Scanner(System.in);

         Socket s = new Socket("localhost", 6666);

         DataOutputStream dout = new DataOutputStream(s.getOutputStream());

         System.out.println("Enter massage");

         String s1 = new String();

         s1 = sc.nextLine();

         dout.writeUTF(s1);

         Thread t = new Thread();

         t.sleep(5000);

         dout.flush();



         DataInputStream dis = new DataInputStream(s.getInputStream());
```

```
        String str = (String) dis.readUTF();
        System.out.println("message= " + str);
        dout.close();
        s.close();
    } catch (Exception e) {
        System.out.println(e);
    }
  }
}
```

```
PS D:\sawn> javac MyClient.java
PS D:\sawn> java MyClient
Enter massage
hi
message= w
PS D:\sawn>
```