Department of Electrical and Computer Engineering

ENCS3320

Computer Networks

Project 2 Report

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Section: 1

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Part 1:

- DHCP (Dynamic Host Configuration Protocol) is a protocol that automatically assigns IP addresses to devices on a network. This eliminates the need for network administrators to manually configure IP addresses on each device.

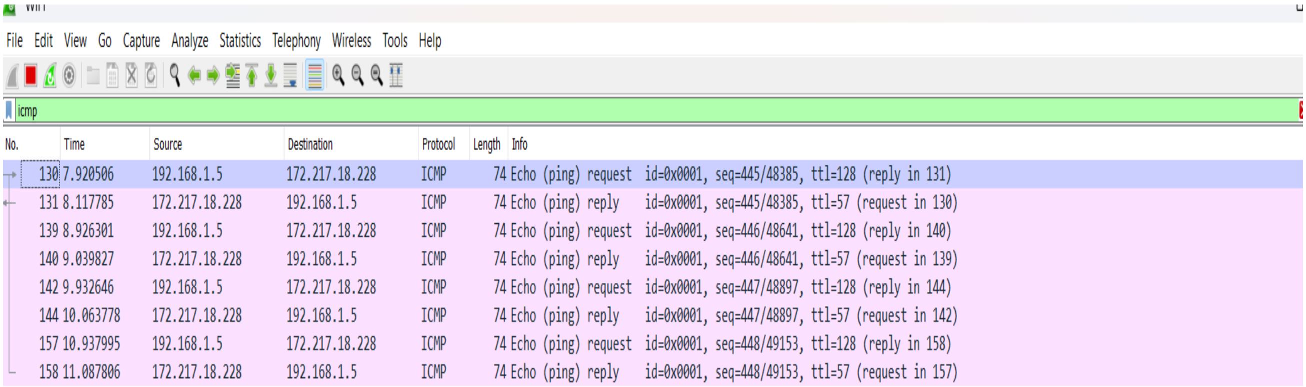
- DNS (Domain Name System) is a protocol that translates human-readable domain names into machine-readable IP addresses. This allows users to access websites and other online resources by typing in a domain name, such as "www.google.com" instead of an IP address.

- ICMP (Internet Control Message Protocol) is a protocol that is used to send error messages and status information between devices on an IP network. This allows devices to troubleshoot problems and ensure that they are able to communicate with each other.

Sniffing:

ICMP

First started with the ICMP protocol by writing on the commend widow: “ping www.google.com”



icmp

```
No.   Time       Source          Destination     Protocol Length Info
  130 7.920506   192.168.1.5     172.217.18.228  ICMP       74 Echo (ping) request  id=0x0001, seq=445/48385, ttl=128 (reply in 131)
  131 8.117785   172.217.18.228  192.168.1.5     ICMP       74 Echo (ping) reply    id=0x0001, seq=445/48385, ttl=57 (request in 130)
  139 8.926301   192.168.1.5     172.217.18.228  ICMP       74 Echo (ping) request  id=0x0001, seq=446/48641, ttl=128 (reply in 140)
  140 9.039827   172.217.18.228  192.168.1.5     ICMP       74 Echo (ping) reply    id=0x0001, seq=446/48641, ttl=57 (request in 139)
  142 9.932646   192.168.1.5     172.217.18.228  ICMP       74 Echo (ping) request  id=0x0001, seq=447/48897, ttl=128 (reply in 144)
  144 10.063778  172.217.18.228  192.168.1.5     ICMP       74 Echo (ping) reply    id=0x0001, seq=447/48897, ttl=57 (request in 142)
  157 10.937995  192.168.1.5     172.217.18.228  ICMP       74 Echo (ping) request  id=0x0001, seq=448/49153, ttl=128 (reply in 158)
  158 11.087806  172.217.18.228  192.168.1.5     ICMP       74 Echo (ping) reply    id=0x0001, seq=448/49153, ttl=57 (request in 157)
```

Figure 1:series of packets for ICMP

Packet fields:

- Time: 1307.920506

it can be parsed into two parts: the packet number (130) and the time in seconds since the start of the packet capture (7.920506).

- Destination IP Address: 192.168.1.5.

This is the IP address of the destination device where the packet is being sent.

- Source IP Address: 172.217.18.228.

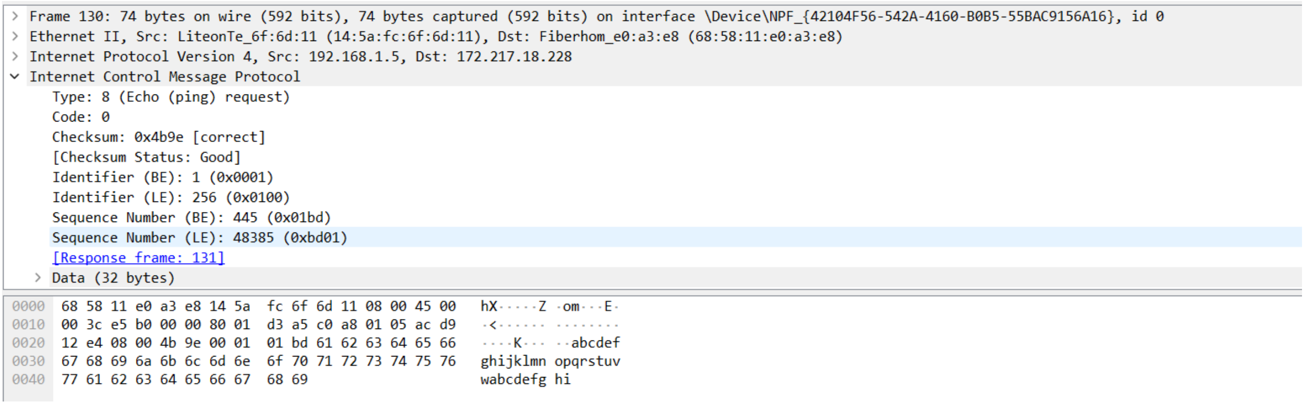
This is the IP address of the device that sent the packet.

- Checksum Status: Good.

which means that the packet's checksum has been verified and found to be valid.

- Identifier (BE): 1 (0x0001).

Means the identifier value in big-endian format.

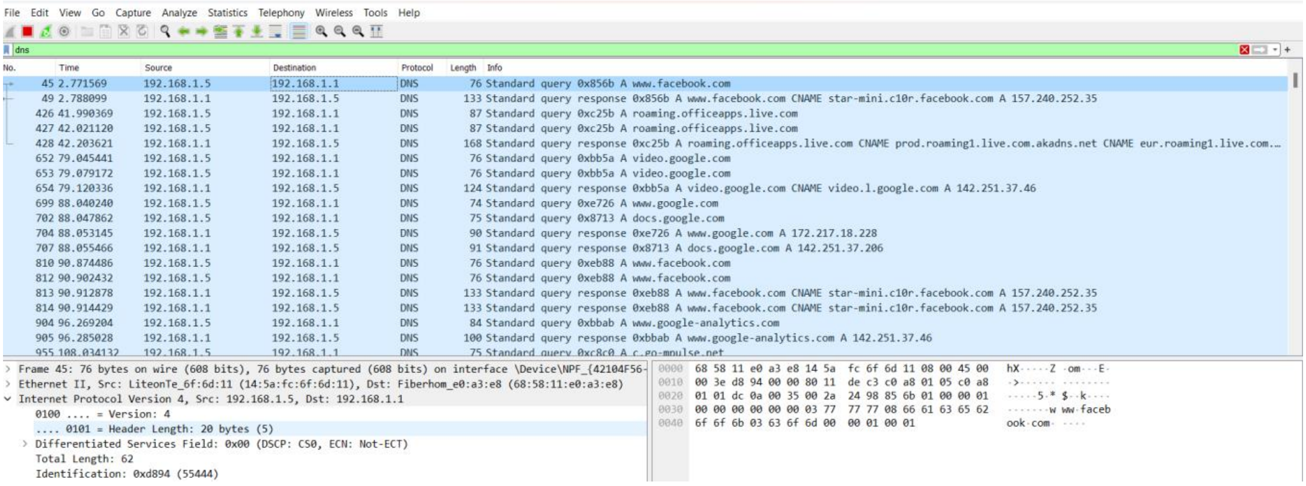


```
> Frame 130: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface \Device\NPF_{42104F56-542A-4160-B0B5-55BAC9156A16}, id 0
> Ethernet II, Src: LiteonTe_6f:6d:11 (14:5a:fc:6f:6d:11), Dst: Fiberhom_e0:a3:e8 (68:58:11:e0:a3:e8)
> Internet Protocol Version 4, Src: 192.168.1.5, Dst: 172.217.18.228
v Internet Control Message Protocol
    Type: 8 (Echo (ping) request)
    Code: 0
    Checksum: 0x4b9e [correct]
    [Checksum Status: Good]
    Identifier (BE): 1 (0x0001)
    Identifier (LE): 256 (0x0100)
    Sequence Number (BE): 445 (0x01bd)
    Sequence Number (LE): 48385 (0xbd01)
    [Response frame: 131]
  > Data (32 bytes)

0000  68 58 11 e0 a3 e8 14 5a  fc 6f 6d 11 08 00 45 00   hX·····Z ·om···E·
0010  00 3c e5 b0 00 00 80 01  d3 a5 c0 a8 01 05 ac d9   ·<······ ········
0020  12 e4 08 00 4b 9e 00 01  01 bd 61 62 63 64 65 66   ····K··· ··abcdef
0030  67 68 69 6a 6b 6c 6d 6e  6f 70 71 72 73 74 75 76   ghijklmn opqrstuv
0040  77 61 62 63 64 65 66 67  68 69                     wabcdefg hi
```

Figure 2:fields for one packet in ICMP.

DNS

First, cleared DNS by using:” ipconfig /?” then we open any website student want then write on the filter DNS.


File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
dns

```
No.   Time        Source        Destination   Protocol Length Info
   45 2.771569    192.168.1.5   192.168.1.1   DNS       76 Standard query 0x856b A www.facebook.com
   49 2.788099    192.168.1.1   192.168.1.5   DNS      133 Standard query response 0x856b A www.facebook.com CNAME star-mini.c10r.facebook.com A 157.240.252.35
  426 41.990369   192.168.1.5   192.168.1.1   DNS       87 Standard query 0xc25b A roaming.officeapps.live.com
  427 42.021120   192.168.1.5   192.168.1.1   DNS       87 Standard query 0xc25b A roaming.officeapps.live.com
  428 42.203621   192.168.1.1   192.168.1.5   DNS      168 Standard query response 0xc25b A roaming.officeapps.live.com CNAME prod.roaming1.live.com.akadns.net CNAME eur.roaming1.live.com.…
  652 79.045441   192.168.1.5   192.168.1.1   DNS       76 Standard query 0xbb5a A video.google.com
  653 79.079172   192.168.1.5   192.168.1.1   DNS       76 Standard query 0xbb5a A video.google.com
  654 79.120336   192.168.1.1   192.168.1.5   DNS      124 Standard query response 0xbb5a A video.google.com CNAME video.l.google.com A 142.251.37.46
  699 88.040240   192.168.1.5   192.168.1.1   DNS       74 Standard query 0xe726 A www.google.com
  702 88.047862   192.168.1.5   192.168.1.1   DNS       75 Standard query 0x8713 A docs.google.com
  704 88.053145   192.168.1.1   192.168.1.5   DNS       90 Standard query response 0xe726 A www.google.com A 172.217.18.228
  707 88.055466   192.168.1.1   192.168.1.5   DNS       91 Standard query response 0x8713 A docs.google.com A 142.251.37.206
  810 90.874486   192.168.1.5   192.168.1.1   DNS       76 Standard query 0xeb88 A www.facebook.com
  812 90.902432   192.168.1.5   192.168.1.1   DNS       76 Standard query 0xeb88 A www.facebook.com
  813 90.912878   192.168.1.1   192.168.1.5   DNS      133 Standard query response 0xeb88 A www.facebook.com CNAME star-mini.c10r.facebook.com A 157.240.252.35
  814 90.914429   192.168.1.1   192.168.1.5   DNS      133 Standard query response 0xeb88 A www.facebook.com CNAME star-mini.c10r.facebook.com A 157.240.252.35
  904 96.269204   192.168.1.5   192.168.1.1   DNS       84 Standard query 0xbbab A www.google-analytics.com
  905 96.285028   192.168.1.1   192.168.1.5   DNS      100 Standard query response 0xbbab A www.google-analytics.com A 142.251.37.46
  955 108.034132  192.168.1.5   192.168.1.1   DNS       75 Standard query 0xc8c0 A c.go-mpulse.net
```

```
> Frame 45: 76 bytes on wire (608 bits), 76 bytes captured (608 bits) on interface \Device\NPF_{42104F56-
> Ethernet II, Src: LiteonTe_6f:6d:11 (14:5a:fc:6f:6d:11), Dst: Fiberhom_e0:a3:e8 (68:58:11:e0:a3:e8)
v Internet Protocol Version 4, Src: 192.168.1.5, Dst: 192.168.1.1
    0100 .... = Version: 4
    .... 0101 = Header Length: 20 bytes (5)
  > Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
    Total Length: 62
    Identification: 0xd894 (55444)
```

```
0000  68 58 11 e0 a3 e8 14 5a  fc 6f 6d 11 08 00 45 00   hX·····Z ·om···E·
0010  00 3e d8 94 00 00 80 11  de c3 c0 a8 01 05 c0 a8   ·>······ ········
0020  01 01 dc 0a 00 35 00 2a  24 98 85 6b 01 00 00 01   ·····5·* $··k····
0030  00 00 00 00 00 00 03 77  77 77 08 66 61 63 65 62   ·······w ww·faceb
0040  6f 6f 6b 03 63 6f 6d 00  00 01 00 01               ook·com· ····
```

Figure 3:series of packets for DNS

Packet fields:

- Encapsulation type: Ethernet (1):

This indicates the type of network encapsulation used for this frame is Ethernet.

- Frame Number: 704:

This is the unique identifier for the current frame.

- Frame Length: 90 bytes (720 bits):

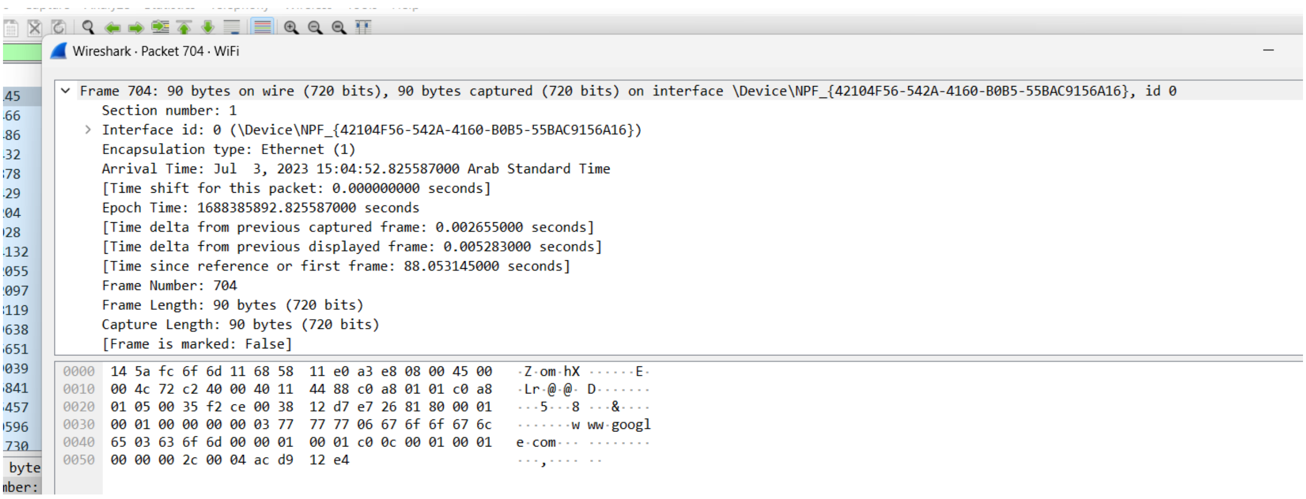
It represents the total length of the frame, including both the captured data and any additional overhead.

- Capture Length: 90 bytes (720 bits):

This indicates the length of the captured portion of the frame, excluding any additional overhead.

- [Frame is marked: False]:

This field denotes whether the frame is marked or flagged. In this case, it is marked as False, indicating that it is not flagged.



Wireshark · Packet 704 · WiFi

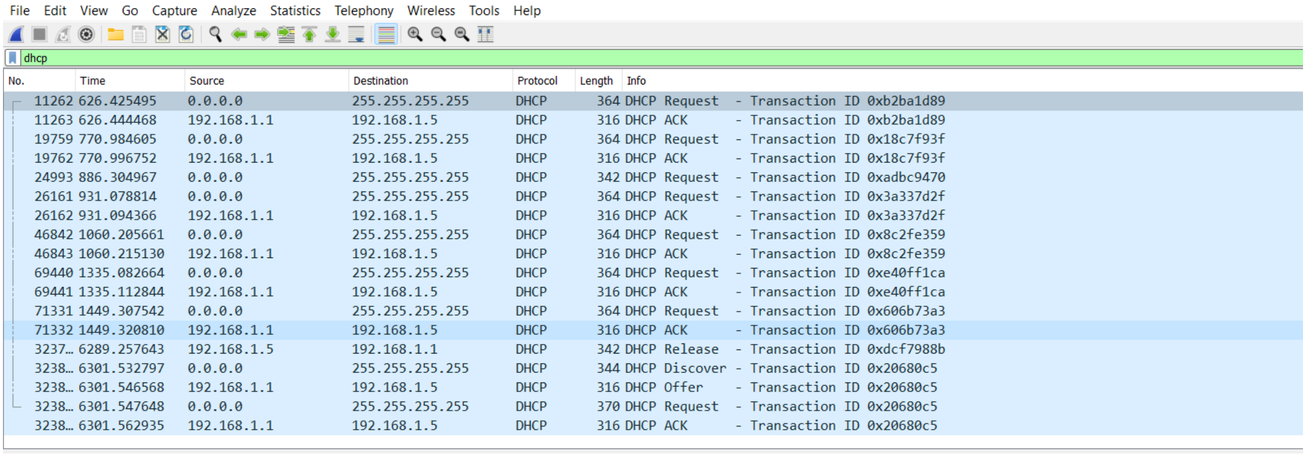
```
∨ Frame 704: 90 bytes on wire (720 bits), 90 bytes captured (720 bits) on interface \Device\NPF_{42104F56-542A-4160-B0B5-55BAC9156A16}, id 0
    Section number: 1
  > Interface id: 0 (\Device\NPF_{42104F56-542A-4160-B0B5-55BAC9156A16})
    Encapsulation type: Ethernet (1)
    Arrival Time: Jul  3, 2023 15:04:52.825587000 Arab Standard Time
    [Time shift for this packet: 0.000000000 seconds]
    Epoch Time: 1688385892.825587000 seconds
    [Time delta from previous captured frame: 0.002655000 seconds]
    [Time delta from previous displayed frame: 0.005283000 seconds]
    [Time since reference or first frame: 88.053145000 seconds]
    Frame Number: 704
    Frame Length: 90 bytes (720 bits)
    Capture Length: 90 bytes (720 bits)
    [Frame is marked: False]
```

```
0000  14 5a fc 6f 6d 11 68 58  11 e0 a3 e8 08 00 45 00   ·Z·om·hX ······E·
0010  00 4c 72 c2 40 00 40 11  44 88 c0 a8 01 01 c0 a8   ·Lr·@·@· D·······
0020  01 05 00 35 f2 ce 00 38  12 d7 e7 26 81 80 00 01   ···5···8 ···&····
0030  00 01 00 00 00 03 77     77 77 06 67 6f 6f 67 6c   ·······w ww·googl
0040  65 03 63 6f 6d 00 00 01  00 01 c0 0c 00 01 00 01   e·com··· ········
0050  00 00 00 2c 00 04 ac d9  12 e4                     ···,···· ··
```

Figure 4:fields for one packet in DNS.

DHCP

First, “ipconfig /clear” followed “ipconfig /release” have been written in the commend window



File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

```
dhcp
No.    Time         Source        Destination       Protocol  Length  Info
11262 626.425495   0.0.0.0       255.255.255.255   DHCP      364 DHCP Request  - Transaction ID 0xb2ba1d89
11263 626.444468   192.168.1.1   192.168.1.5       DHCP      316 DHCP ACK      - Transaction ID 0xb2ba1d89
19759 770.984605   0.0.0.0       255.255.255.255   DHCP      364 DHCP Request  - Transaction ID 0x18c7f93f
19762 770.996752   192.168.1.1   192.168.1.5       DHCP      316 DHCP ACK      - Transaction ID 0x18c7f93f
24993 886.304967   0.0.0.0       255.255.255.255   DHCP      342 DHCP Request  - Transaction ID 0xadbc9470
26161 931.078814   0.0.0.0       255.255.255.255   DHCP      364 DHCP Request  - Transaction ID 0x3a337d2f
26162 931.094366   192.168.1.1   192.168.1.5       DHCP      316 DHCP ACK      - Transaction ID 0x3a337d2f
46842 1060.205661  0.0.0.0       255.255.255.255   DHCP      364 DHCP Request  - Transaction ID 0x8c2fe359
46843 1060.215130  192.168.1.1   192.168.1.5       DHCP      316 DHCP ACK      - Transaction ID 0x8c2fe359
69440 1335.082664  0.0.0.0       255.255.255.255   DHCP      364 DHCP Request  - Transaction ID 0xe40ff1ca
69441 1335.112844  192.168.1.1   192.168.1.5       DHCP      316 DHCP ACK      - Transaction ID 0xe40ff1ca
71331 1449.307542  0.0.0.0       255.255.255.255   DHCP      364 DHCP Request  - Transaction ID 0x606b73a3
71332 1449.320810  192.168.1.1   192.168.1.5       DHCP      316 DHCP ACK      - Transaction ID 0x606b73a3
3237… 6289.257643  192.168.1.5   192.168.1.1       DHCP      342 DHCP Release  - Transaction ID 0xdcf7988b
3238… 6301.532797  0.0.0.0       255.255.255.255   DHCP      344 DHCP Discover - Transaction ID 0x20680c5
3238… 6301.546568  192.168.1.1   192.168.1.5       DHCP      316 DHCP Offer    - Transaction ID 0x20680c5
3238… 6301.547648  0.0.0.0       255.255.255.255   DHCP      370 DHCP Request  - Transaction ID 0x20680c5
3238… 6301.562935  192.168.1.1   192.168.1.5       DHCP      316 DHCP ACK      - Transaction ID 0x20680c5
```

Figure 5:series of packets for DHCP.

Packet fields:

- Frame Length: 364 bytes (2912 bits):

  This indicates the length of the frame in bytes and bits.

- Capture Length: 364 bytes (2912 bits):

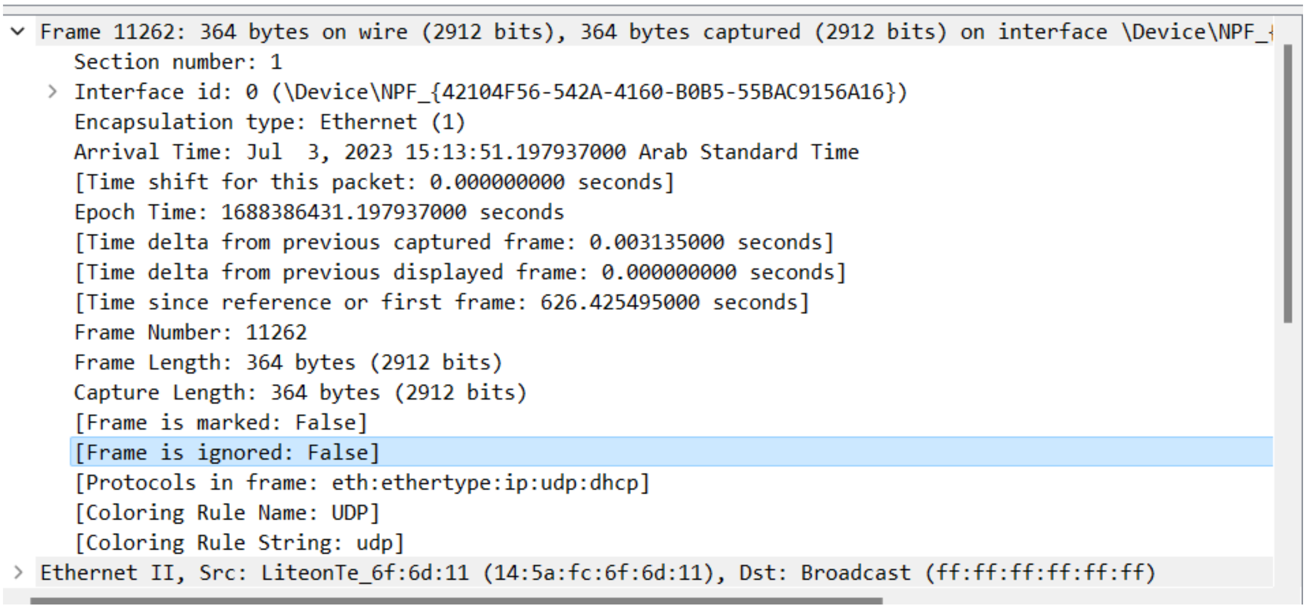
This specifies the length of the frame as captured.

- Protocols in frame:

eth:ethertype:ip:udp:dhcp: These are the protocols identified in the frame, indicating that it contains Ethernet, IP, UDP, and DHCP data.

- Interface id: 0 (\Device\NPF_{42104F56-542A-4160-BOB5-55BAC9156A16}):

This is the unique identifier for the network interface used for the capture.



```
v Frame 11262: 364 bytes on wire (2912 bits), 364 bytes captured (2912 bits) on interface \Device\NPF_{
     Section number: 1
   > Interface id: 0 (\Device\NPF_{42104F56-542A-4160-B0B5-55BAC9156A16})
     Encapsulation type: Ethernet (1)
     Arrival Time: Jul  3, 2023 15:13:51.197937000 Arab Standard Time
     [Time shift for this packet: 0.000000000 seconds]
     Epoch Time: 1688386431.197937000 seconds
     [Time delta from previous captured frame: 0.003135000 seconds]
     [Time delta from previous displayed frame: 0.000000000 seconds]
     [Time since reference or first frame: 626.425495000 seconds]
     Frame Number: 11262
     Frame Length: 364 bytes (2912 bits)
     Capture Length: 364 bytes (2912 bits)
     [Frame is marked: False]
     [Frame is ignored: False]
     [Protocols in frame: eth:ethertype:ip:udp:dhcp]
     [Coloring Rule Name: UDP]
     [Coloring Rule String: udp]
> Ethernet II, Src: LiteonTe_6f:6d:11 (14:5a:fc:6f:6d:11), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
```

Figure 6:fields for one packet in DHCP.

Part 2:

IP Addressing Scheme:

The IP addressing scheme is based on the student's university ID (ID: 120xyzw).

One of the student ID 1200905, So the IP 205.0.9.0/24 , as shown in figure above we need 5 subnets (networks). We also need 3 bits through the following equation 2^3=8, so 3 Bit.

ID	Networks	In Binary	Range	Broadcast
1	205.0.9.0/27	205.0.9.00000000	205.0.9.1 205.0.9.30	205.0.9.31
2	205.0.9.32/27	205.0.9.00100000	205.0.9.33 205.0.9.62	205.0.9.63
3	205.0.9.64/27	205.0.9.01000000	205.0.9.65 205.0.9.94	205.0.9.95
4	205.0.9.96/27	205.0.9.01100000	205.0.9.97 205.0.9.126	205.0.9.127
5	205.0.9.128/27	205.0.9.10000000	205.0.9.129 205.0.9.190	205.0.9.191

Table 1: Subnetting

The Subnet Mask: 255.255.255.224

Router0 (FastEthernet0/0): 205.0.9.1

Router0 (Serial2/0): 205.0.9.33

Router1 (Serial2/0): 205.0.9.34

Router1 (Serial3/0): 205.0.9.65

Router2 (Serial2/0): 205.0.9.66

Router2 (Serial3/0): 205.0.9.97

Router3 (FastEthernet0/0): 205.0.9.129

Router3 (Serial2/0): 205.0.9.100

For PCs: DNS server 205.0.9.4 , Subnet Mast 255.255.255.224

	PC0	PC1	PC2	PC3	PC4
IP address	205.0.9.3	205.0.9.10	205.0.9.6	205.0.9.130	205.0.9.131
Default Gateway	205.0.9.1	205.0.9.1	205.0.9.1	205.0.9.129	205.0.9.129

Table 2: PCs info

This network have been designed and configuration of a network built using Cisco Packet Tracer. The network includes a total of four routers, two switches, and five PCs.

The network is designed as follows:

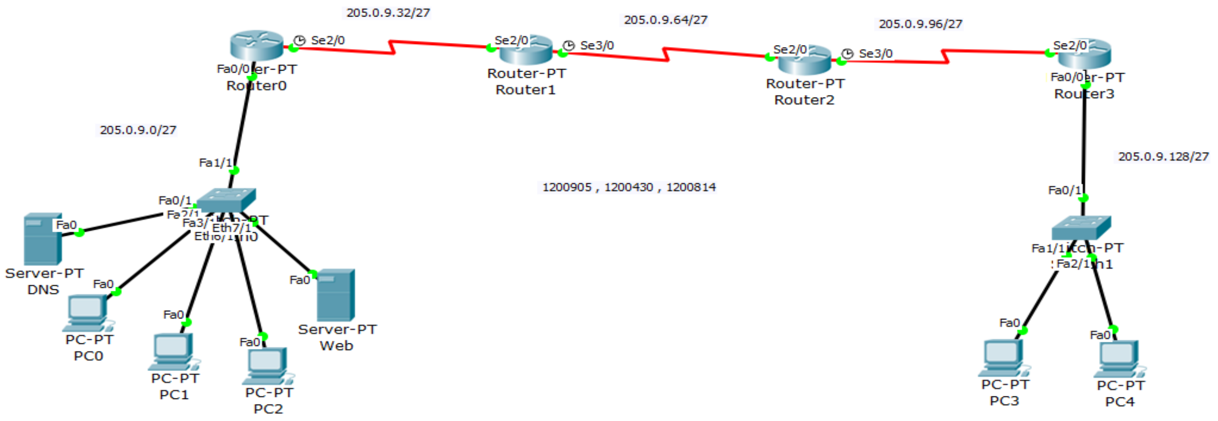


Figure 7:All Network

The network design includes OSPF routing, DHCP for one subnet, a web server, and a DNS server. It utilizes an IP addressing scheme based on a student's university ID with proper subnetting. The design also showcases the use of ping and tracert commands to demonstrate reachability and packet traversal.

Devices and Connections:

Routers:

Router0 is connected to Switch0 through FastEthernet0/0 interface.

Router0 is also connected to Router1 through Serial2/0 interface.

Router1 is connected to Router2 through Serial3/0 interface

Router2 is also connected to Router3 through Serial3/0 interface.

Router3 is connected to Switch1 through FastEthernet0/0 interface.

Switches:

Switch0 is connected to Router0 through FastEthernet0/0 interface

Switch0 is also connected to Webserver through a FastEthernet0/1 interface.

Switch0 is also connected to DNS Server through a FastEthernet interface.

Switch1 is connected to Router3 through FastEthernet0/0 interface

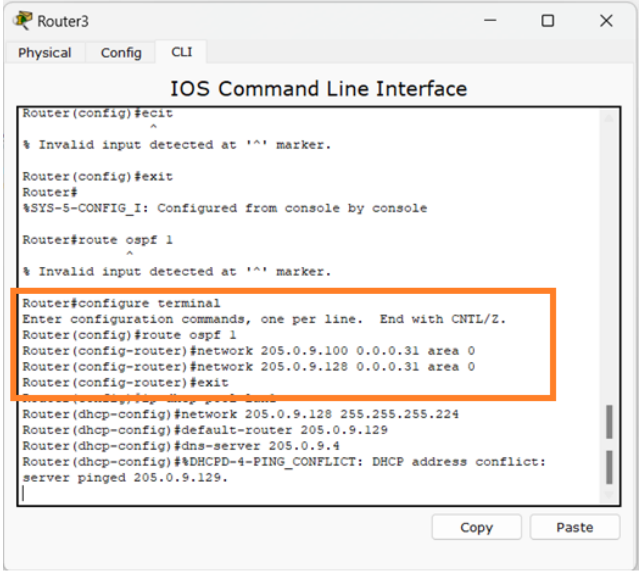
PCs:

PC0, PC1 and PC2 are connected to Switch0.

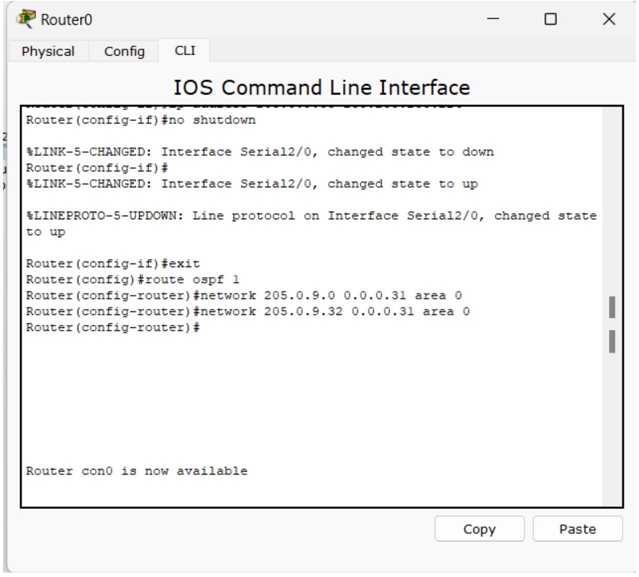
PC3 and PC4 are connected to Switch1.

OSPF protocol:

OSPF routering for router 0 and router 3 :



```
Router(config)#ecit
                ^
% Invalid input detected at '^' marker.

Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#route ospf 1
             ^
% Invalid input detected at '^' marker.

Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#route ospf 1
Router(config-router)#network 205.0.9.100 0.0.0.31 area 0
Router(config-router)#network 205.0.9.128 0.0.0.31 area 0
Router(config-router)#exit
Router(dhcp-config)#network 205.0.9.128 255.255.255.224
Router(dhcp-config)#default-router 205.0.9.129
Router(dhcp-config)#dns-server 205.0.9.4
Router(dhcp-config)#%DHCPD-4-PING_CONFLICT: DHCP address conflict:
server pinged 205.0.9.129.
```

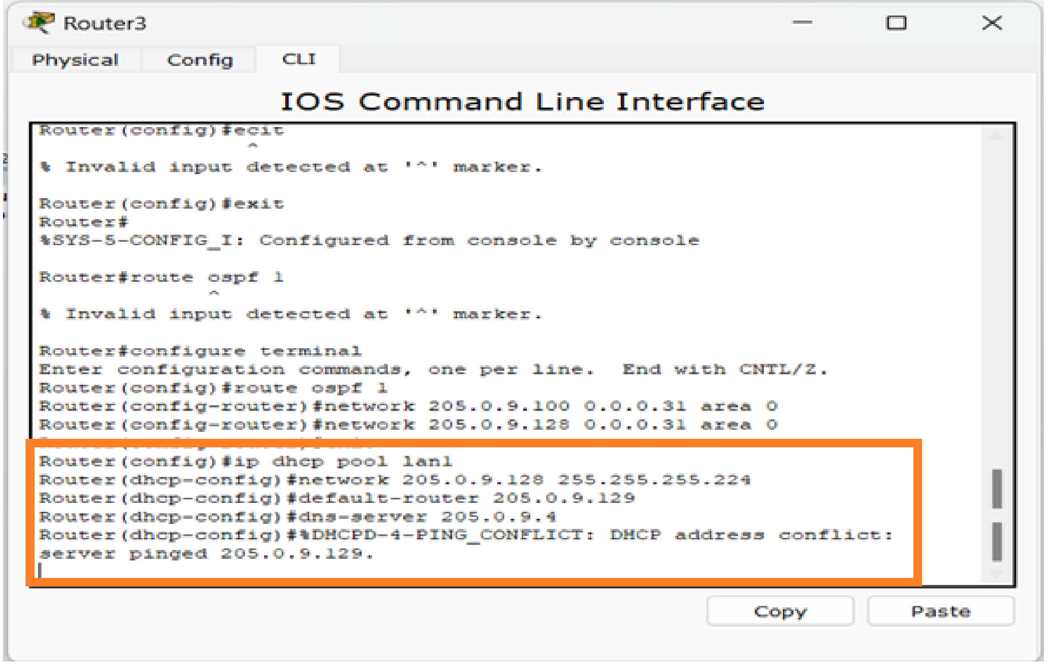


```
Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial2/0, changed state to down
Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state
to up

Router(config-if)#exit
Router(config)#route ospf 1
Router(config-router)#network 205.0.9.0 0.0.0.31 area 0
Router(config-router)#network 205.0.9.32 0.0.0.31 area 0
Router(config-router)#








Router con0 is now available
```

Figure 8: OSPF

DHCP protocol:

DHCP for router 3:



Router3

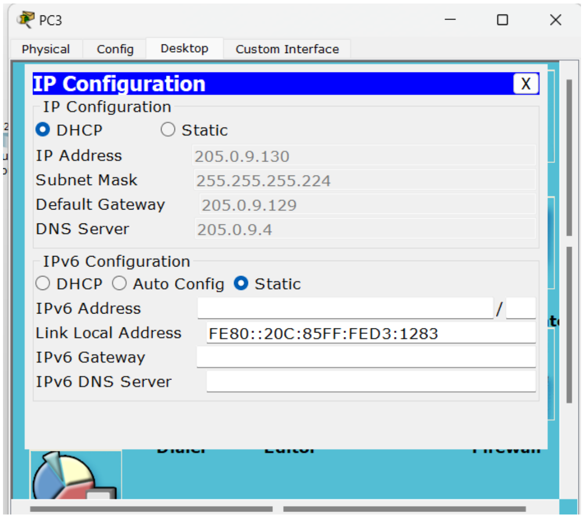
```
Router(config)#ecit
                 ^
% Invalid input detected at '^' marker.

Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#route ospf 1
              ^
% Invalid input detected at '^' marker.

Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#route ospf 1
Router(config-router)#network 205.0.9.100 0.0.0.31 area 0
Router(config-router)#network 205.0.9.128 0.0.0.31 area 0
Router(config)#ip dhcp pool lan1
Router(dhcp-config)#network 205.0.9.128 255.255.255.224
Router(dhcp-config)#default-router 205.0.9.129
Router(dhcp-config)#dns-server 205.0.9.4
Router(dhcp-config)#%DHCPD-4-PING_CONFLICT: DHCP address conflict:
server pinged 205.0.9.129.
```

Figure 9: DHCP

IP addresses for some PCs:

IP address for PCs by DHCP:

Using DHCP to give PC3 and PC4 the IP's address automatically.



PC3

IP Configuration

● DHCP ○ Static

IP Address 205.0.9.130

Subnet Mask 255.255.255.224

Default Gateway 205.0.9.129

DNS Server 205.0.9.4

IPv6 Configuration

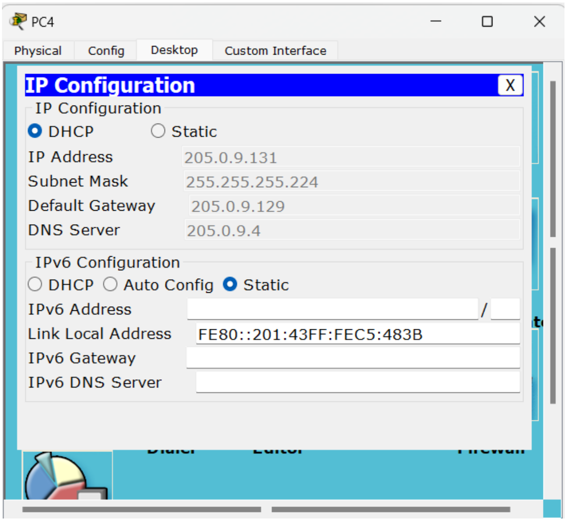
○ DHCP ○ Auto Config ● Static

IPv6 Address /

Link Local Address FE80::20C:85FF:FED3:1283

IPv6 Gateway

IPv6 DNS Server



PC4

IP Configuration

● DHCP ○ Static

IP Address 205.0.9.131

Subnet Mask 255.255.255.224

Default Gateway 205.0.9.129

DNS Server 205.0.9.4

IPv6 Configuration

○ DHCP ○ Auto Config ● Static

IPv6 Address /

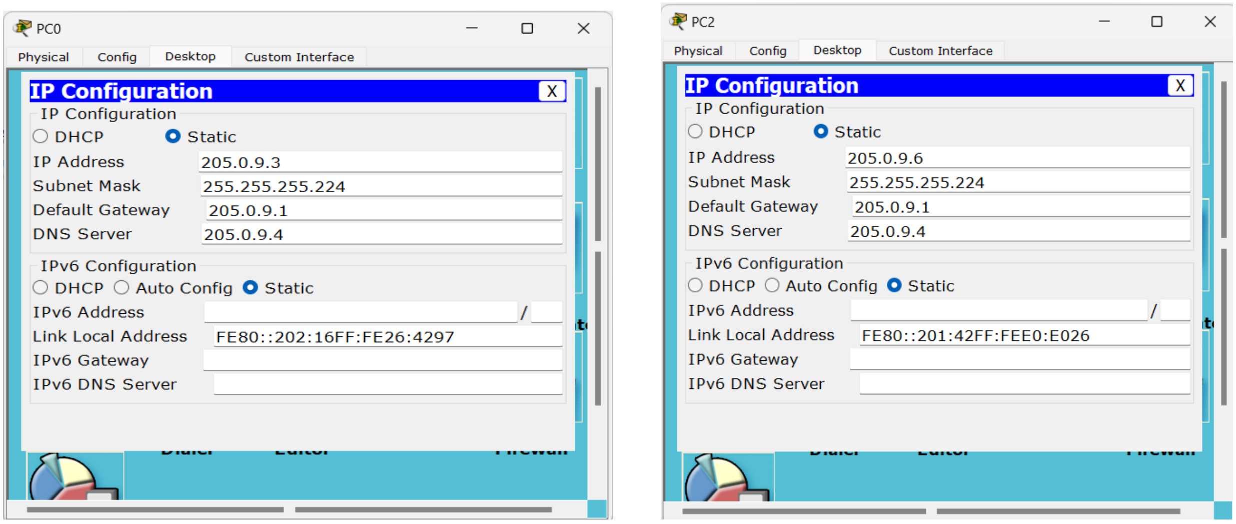
Link Local Address FE80::201:43FF:FEC5:483B

IPv6 Gateway

IPv6 DNS Server

Figure 10: IP address with DHCP

IP for PC0 and PC2 without DHCP:



IP Configuration

IP Configuration
○ DHCP ● Static
IP Address 205.0.9.3
Subnet Mask 255.255.255.224
Default Gateway 205.0.9.1
DNS Server 205.0.9.4

IPv6 Configuration
○ DHCP ○ Auto Config ● Static
IPv6 Address /
Link Local Address FE80::202:16FF:FE26:4297
IPv6 Gateway
IPv6 DNS Server

IP Configuration

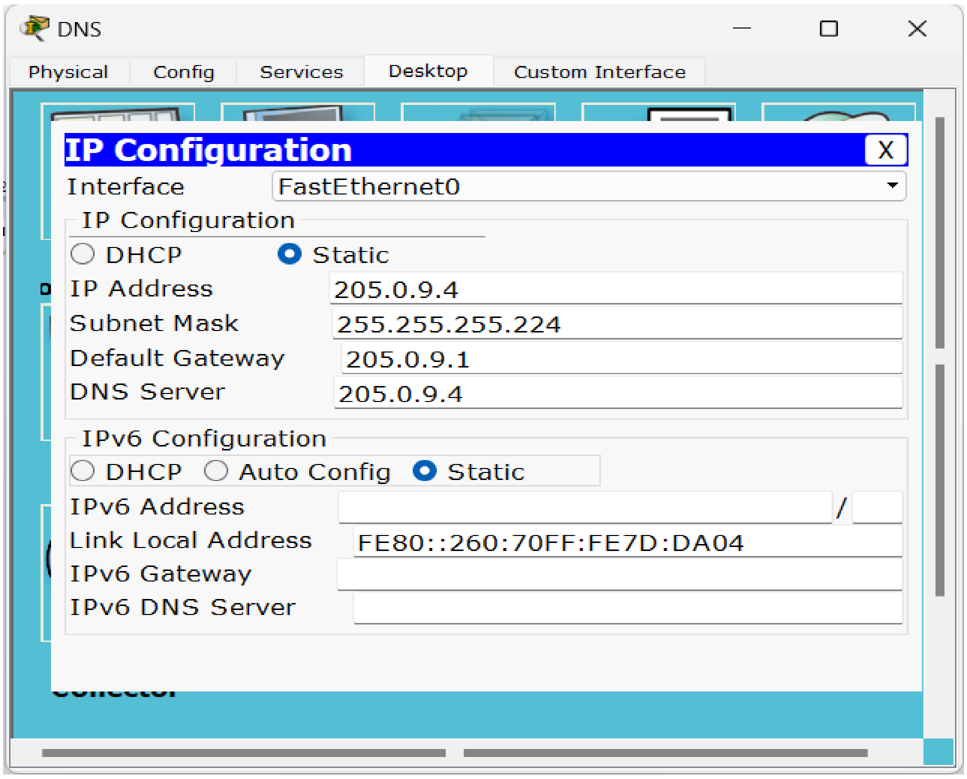
IP Configuration
○ DHCP ● Static
IP Address 205.0.9.6
Subnet Mask 255.255.255.224
Default Gateway 205.0.9.1
DNS Server 205.0.9.4

IPv6 Configuration
○ DHCP ○ Auto Config ● Static
IPv6 Address /
Link Local Address FE80::201:42FF:FEE0:E026
IPv6 Gateway
IPv6 DNS Server

Figure 11: IP address without DHCP

Servers' information:

DNS server information:



IP Configuration

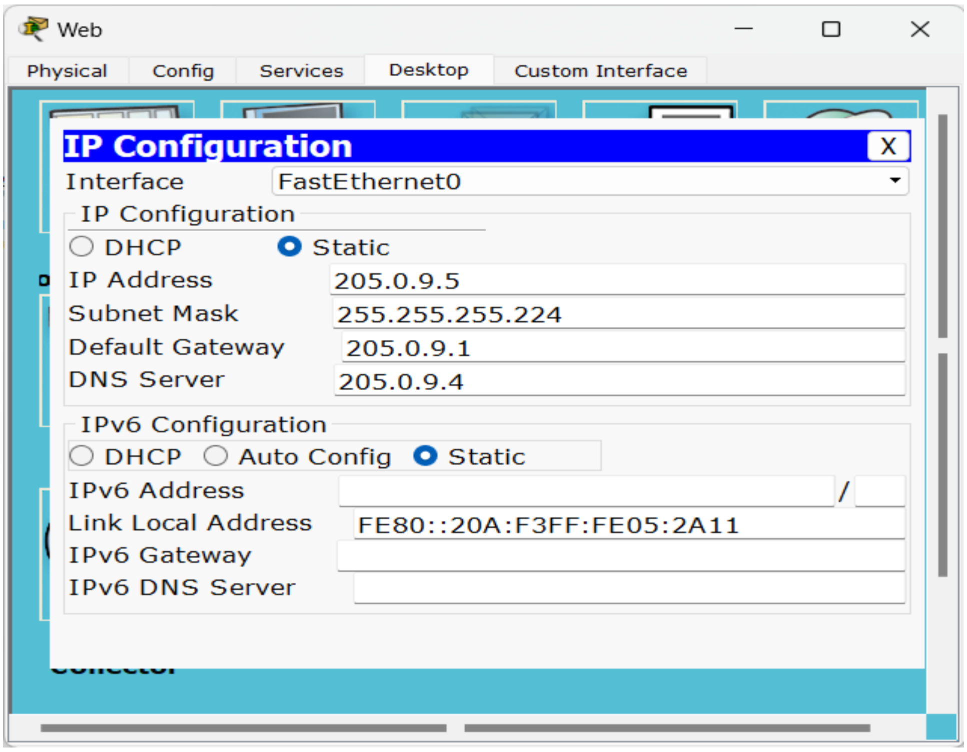
Interface FastEthernet0

IP Configuration
○ DHCP ● Static
IP Address 205.0.9.4
Subnet Mask 255.255.255.224
Default Gateway 205.0.9.1
DNS Server 205.0.9.4

IPv6 Configuration
○ DHCP ○ Auto Config ● Static
IPv6 Address /
Link Local Address FE80::260:70FF:FE7D:DA04
IPv6 Gateway
IPv6 DNS Server

Figure 12: DNS server

Web server information :



IP Configuration

Interface FastEthernet0

IP Configuration

○ DHCP ● Static

IP Address 205.0.9.5

Subnet Mask 255.255.255.224

Default Gateway 205.0.9.1

DNS Server 205.0.9.4

IPv6 Configuration

○ DHCP ○ Auto Config ● Static

IPv6 Address /

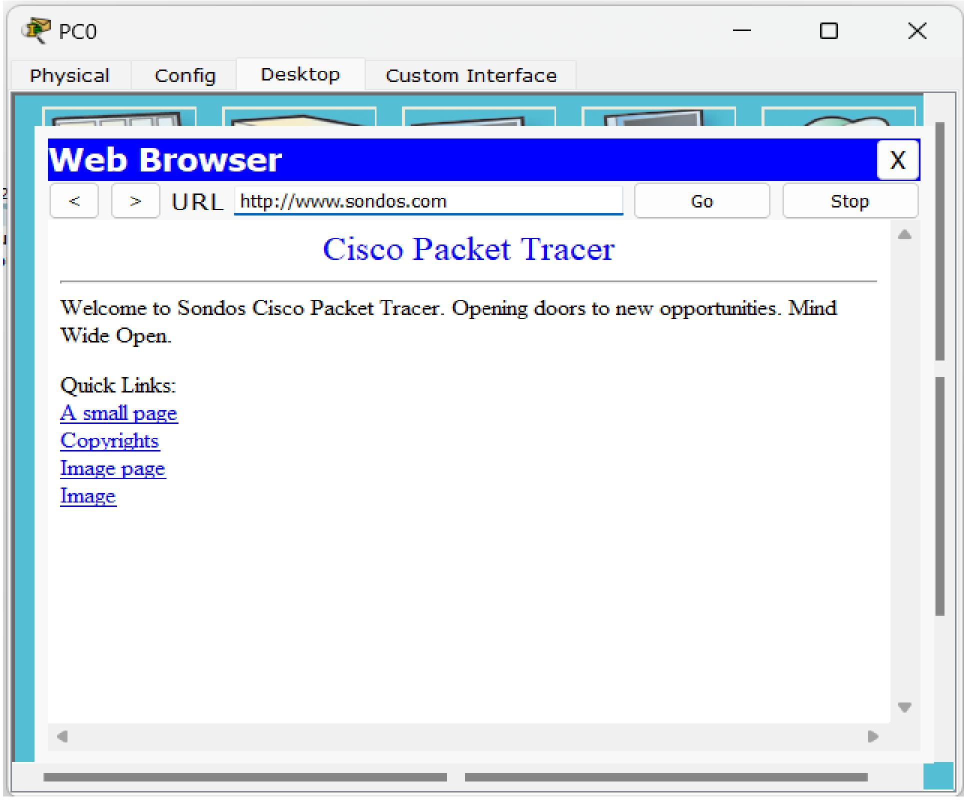
Link Local Address FE80::20A:F3FF:FE05:2A11

IPv6 Gateway

IPv6 DNS Server

Figure 13: Web server

Web request for www.sondos.com



URL http://www.sondos.com

Cisco Packet Tracer

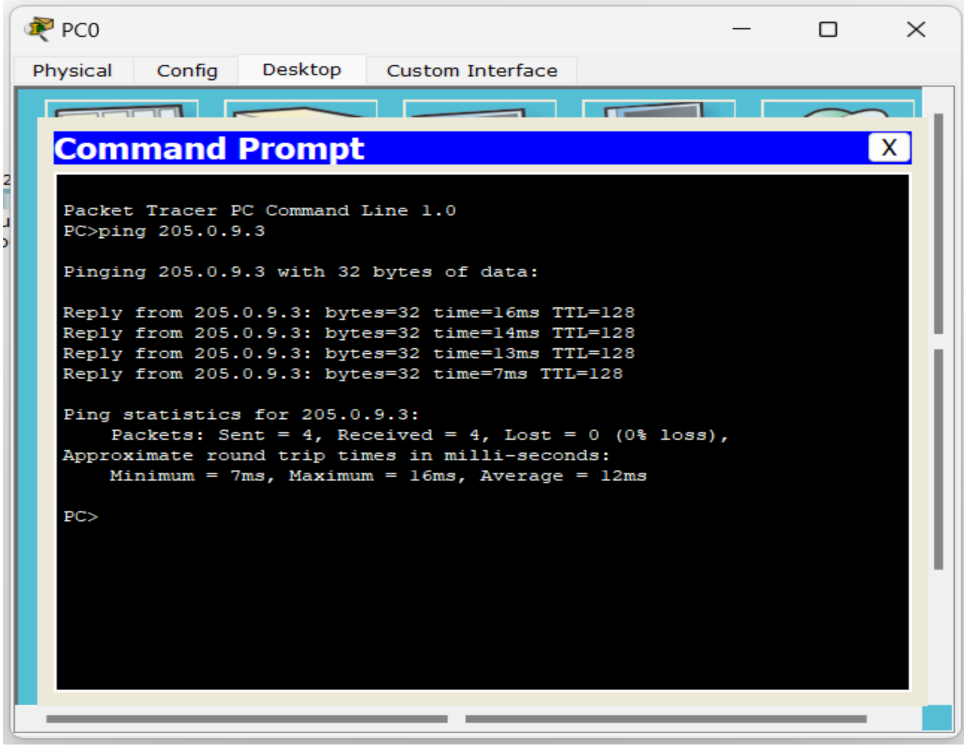
Welcome to Sondos Cisco Packet Tracer. Opening doors to new opportunities. Mind Wide Open.

Quick Links:
A small page
Copyrights
Image page
Image

Figure 14: Web browser

Ping some IPs:

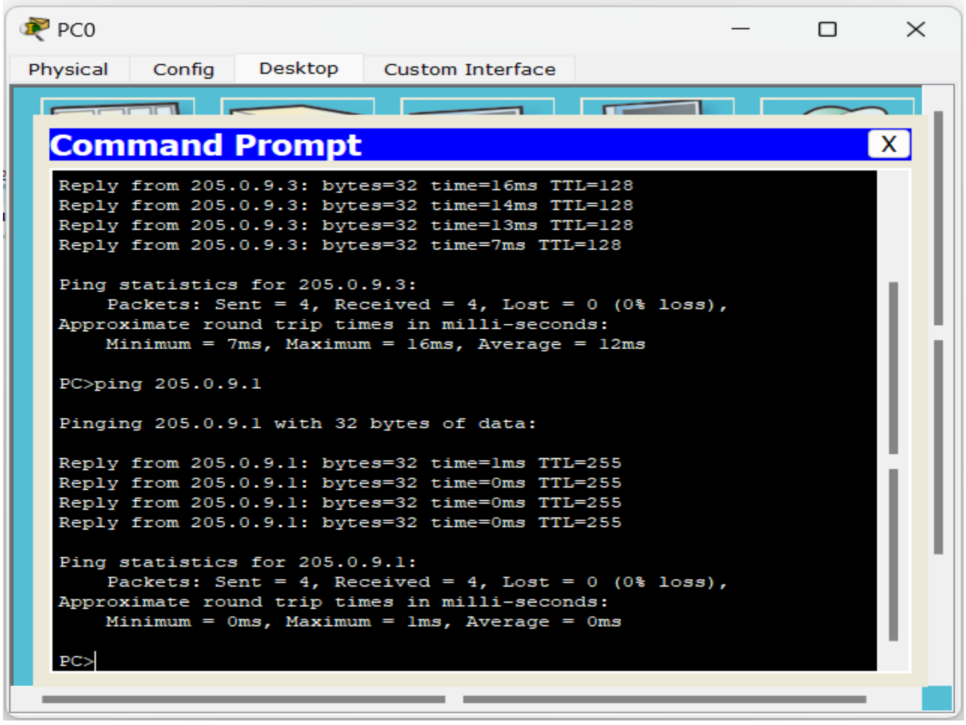
Ping for PC0:



```
Packet Tracer PC Command Line 1.0
PC>ping 205.0.9.3

Pinging 205.0.9.3 with 32 bytes of data:

Reply from 205.0.9.3: bytes=32 time=16ms TTL=128
Reply from 205.0.9.3: bytes=32 time=14ms TTL=128
Reply from 205.0.9.3: bytes=32 time=13ms TTL=128
Reply from 205.0.9.3: bytes=32 time=7ms TTL=128

Ping statistics for 205.0.9.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 7ms, Maximum = 16ms, Average = 12ms

PC>
```

Figure 15: ping for PC0

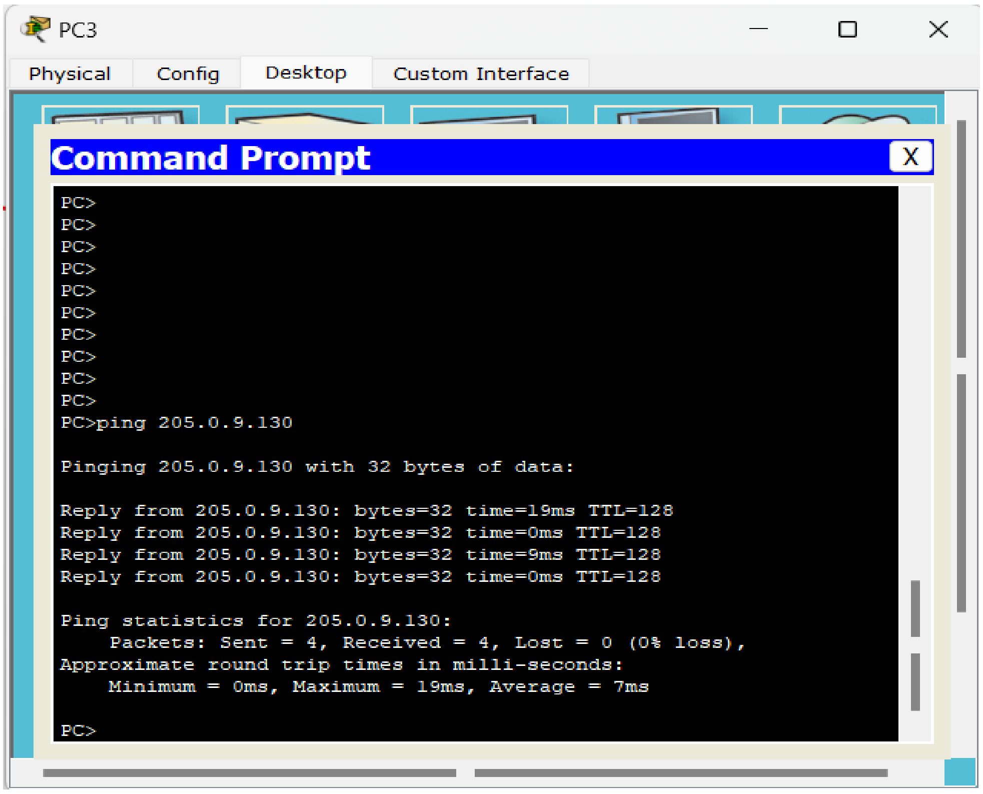
Ping router0:



```
Reply from 205.0.9.3: bytes=32 time=16ms TTL=128
Reply from 205.0.9.3: bytes=32 time=14ms TTL=128
Reply from 205.0.9.3: bytes=32 time=13ms TTL=128
Reply from 205.0.9.3: bytes=32 time=7ms TTL=128

Ping statistics for 205.0.9.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 7ms, Maximum = 16ms, Average = 12ms

PC>ping 205.0.9.1

Pinging 205.0.9.1 with 32 bytes of data:

Reply from 205.0.9.1: bytes=32 time=1ms TTL=255
Reply from 205.0.9.1: bytes=32 time=0ms TTL=255
Reply from 205.0.9.1: bytes=32 time=0ms TTL=255
Reply from 205.0.9.1: bytes=32 time=0ms TTL=255

Ping statistics for 205.0.9.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>
```

Figure 16: ping for router0

Ping PC3 which DHCP protocol:

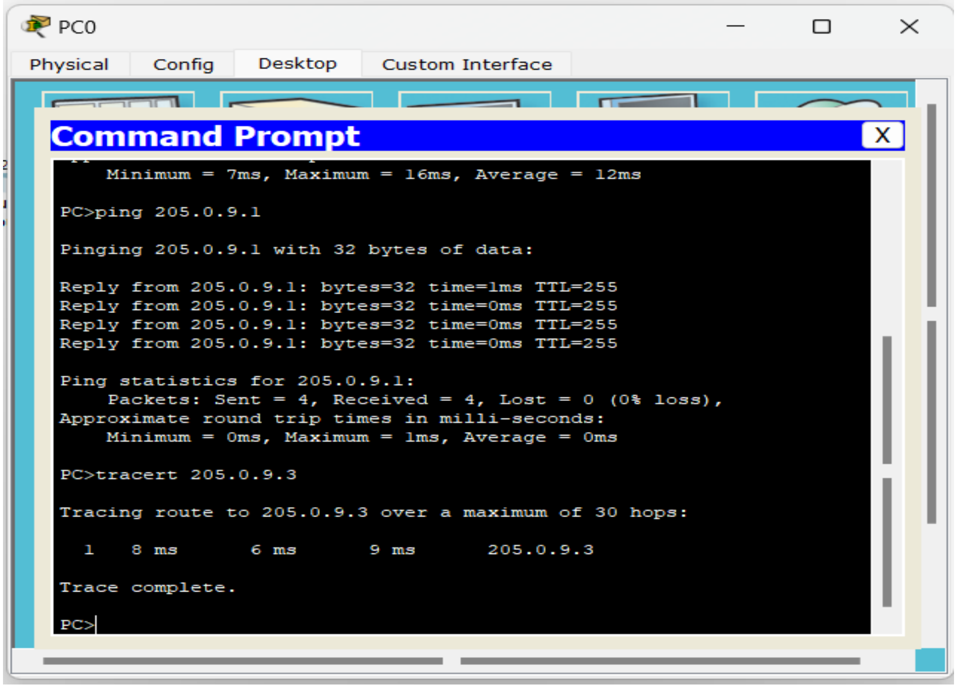


```
PC>
PC>
PC>
PC>
PC>
PC>
PC>
PC>
PC>
PC>
PC>ping 205.0.9.130

Pinging 205.0.9.130 with 32 bytes of data:

Reply from 205.0.9.130: bytes=32 time=19ms TTL=128
Reply from 205.0.9.130: bytes=32 time=0ms TTL=128
Reply from 205.0.9.130: bytes=32 time=9ms TTL=128
Reply from 205.0.9.130: bytes=32 time=0ms TTL=128

Ping statistics for 205.0.9.130:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 19ms, Average = 7ms

PC>
```

Figure 17: ping for PC3

Tracert for some PCs:

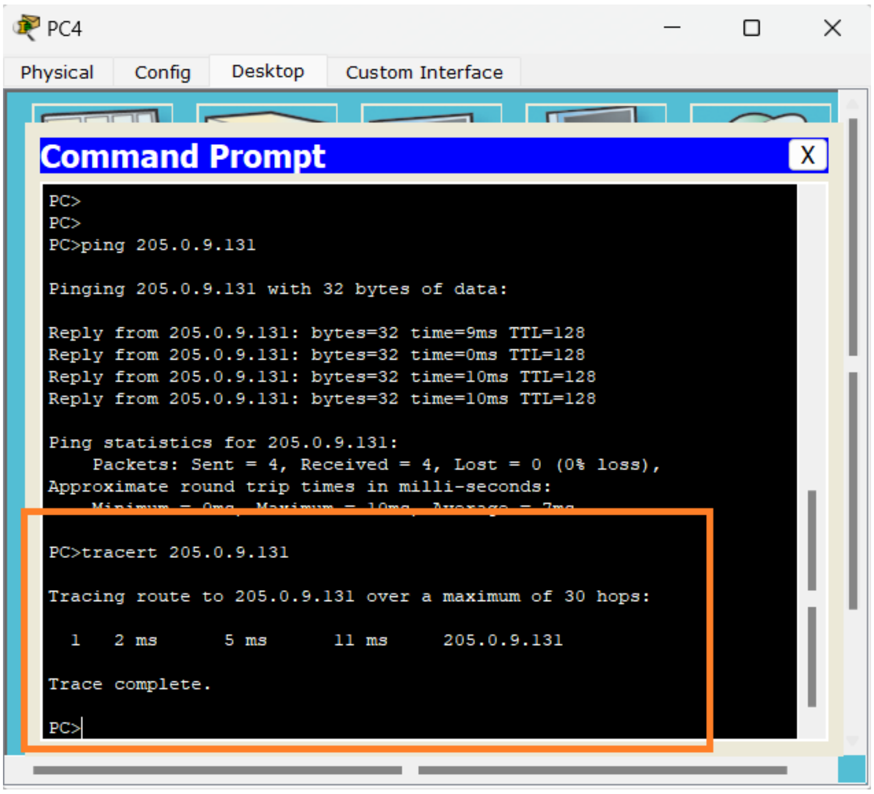
Tracert for PC0:



```
    Minimum = 7ms, Maximum = 16ms, Average = 12ms

PC>ping 205.0.9.1

Pinging 205.0.9.1 with 32 bytes of data:

Reply from 205.0.9.1: bytes=32 time=1ms TTL=255
Reply from 205.0.9.1: bytes=32 time=0ms TTL=255
Reply from 205.0.9.1: bytes=32 time=0ms TTL=255
Reply from 205.0.9.1: bytes=32 time=0ms TTL=255

Ping statistics for 205.0.9.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>tracert 205.0.9.3

Tracing route to 205.0.9.3 over a maximum of 30 hops:

  1   8 ms      6 ms      9 ms      205.0.9.3

Trace complete.

PC>
```

Figure 18: Tracert for PC0

Tracert for PC4:



```
PC>
PC>
PC>ping 205.0.9.131

Pinging 205.0.9.131 with 32 bytes of data:

Reply from 205.0.9.131: bytes=32 time=9ms TTL=128
Reply from 205.0.9.131: bytes=32 time=0ms TTL=128
Reply from 205.0.9.131: bytes=32 time=10ms TTL=128
Reply from 205.0.9.131: bytes=32 time=10ms TTL=128

Ping statistics for 205.0.9.131:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 10ms, Average = 7ms

PC>tracert 205.0.9.131

Tracing route to 205.0.9.131 over a maximum of 30 hops:

  1   2 ms      5 ms      11 ms     205.0.9.131

Trace complete.

PC>
```

Figure 19: Tracert for PC4