LAB5

Q1)

ip 10.0.1.11 255.255.255.0 10.0.1.254

Checking for duplicate address...

PC1 : 10.0.1.11 255.255.255.0 gateway 10.0.1.254

a)

show arp

arp table is empty

PC2> ping 10.0.1.11

84 bytes from 10.0.1.11 icmp_seq=1 ttl=64 time=0.395 ms

84 bytes from 10.0.1.11 icmp_seq=2 ttl=64 time=0.555 ms

84 bytes from 10.0.1.11 icmp_seq=3 ttl=64 time=0.493 ms

84 bytes from 10.0.1.11 icmp_seq=4 ttl=64 time=0.508 ms

84 bytes from 10.0.1.11 icmp_seq=5 ttl=64 time=0.255 ms

^C

PC1> show arp

00:50:79:66:68:01 10.0.1.12 expires in 111 seconds

b)

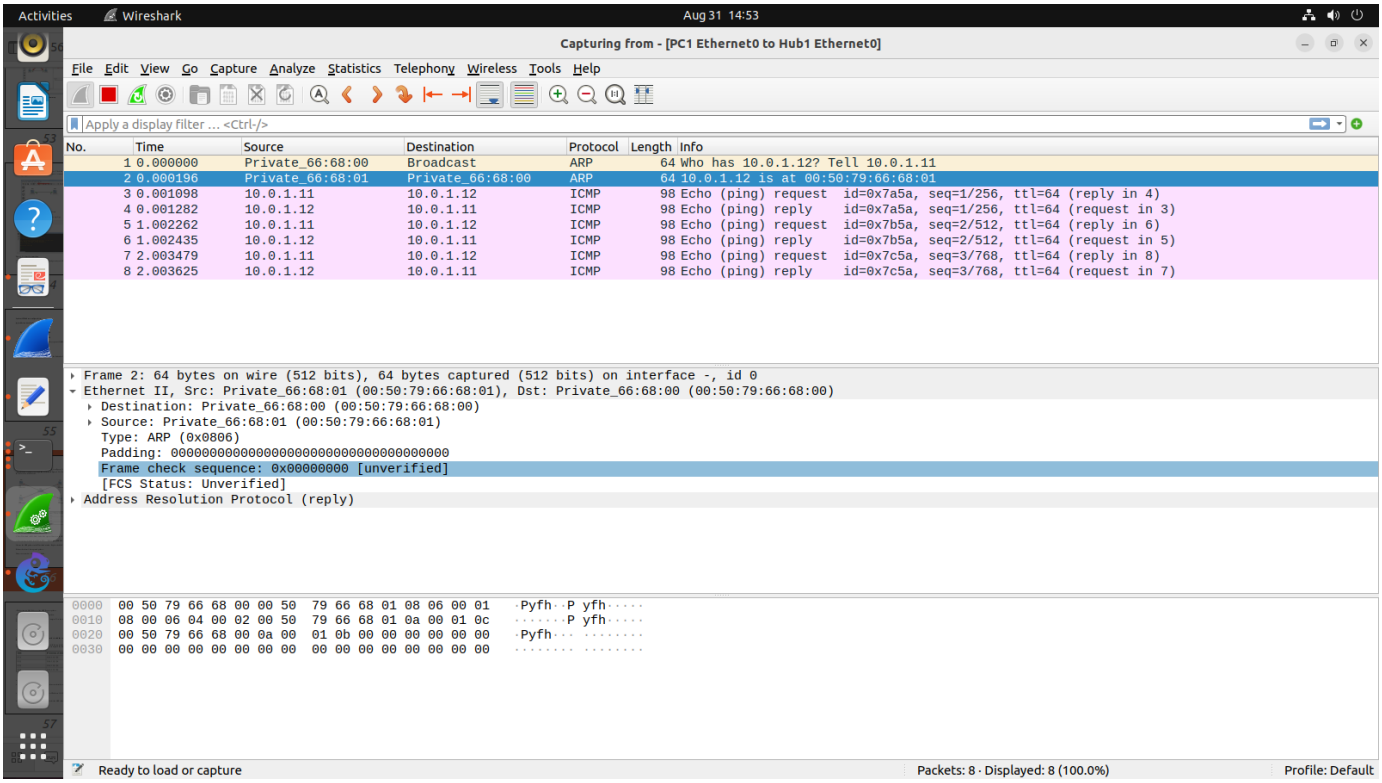
on wireshark filter: ip.addr == 10.0.1.12

c)

Destination: Private_66:68:00 (00:50:79:66:68:00)

Source: Private_66:68:01 (00:50:79:66:68:01)

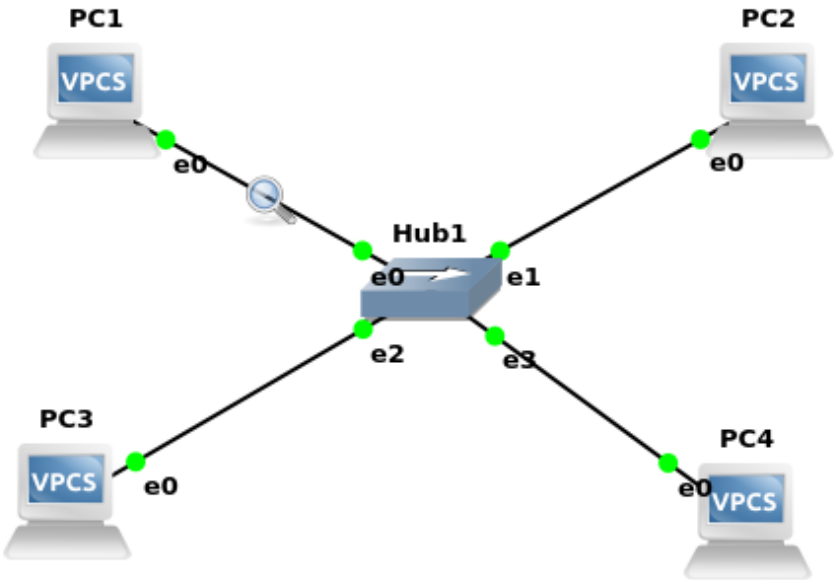
Type: ARP (0x0806)



d)

PC1> show arp

00:50:79:66:68:01 10.0.1.12 expires in 111 seconds



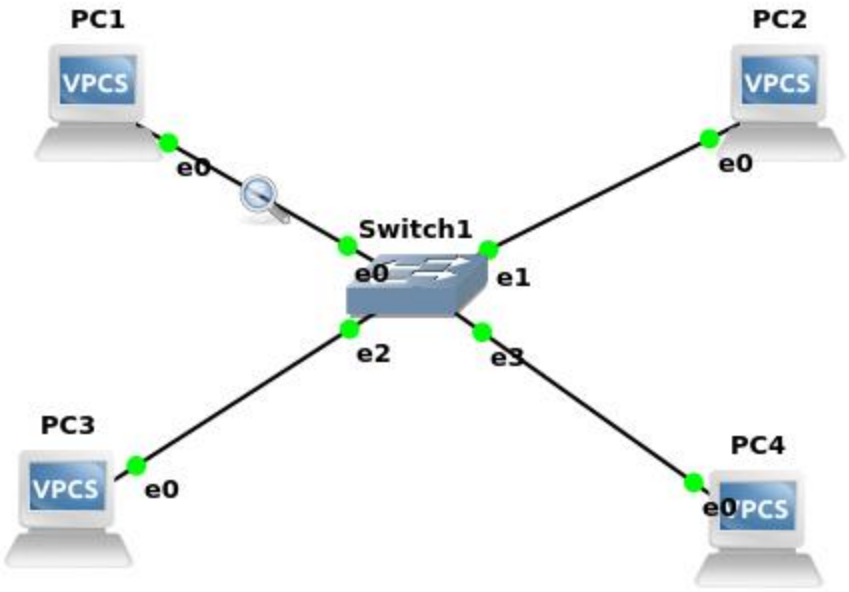
Q3)

PC1> ip 10.0.1.100 / 24

Checking for duplicate address...

PC1 : 10.0.1.100 255.255.255.0

Similarly for all



b)

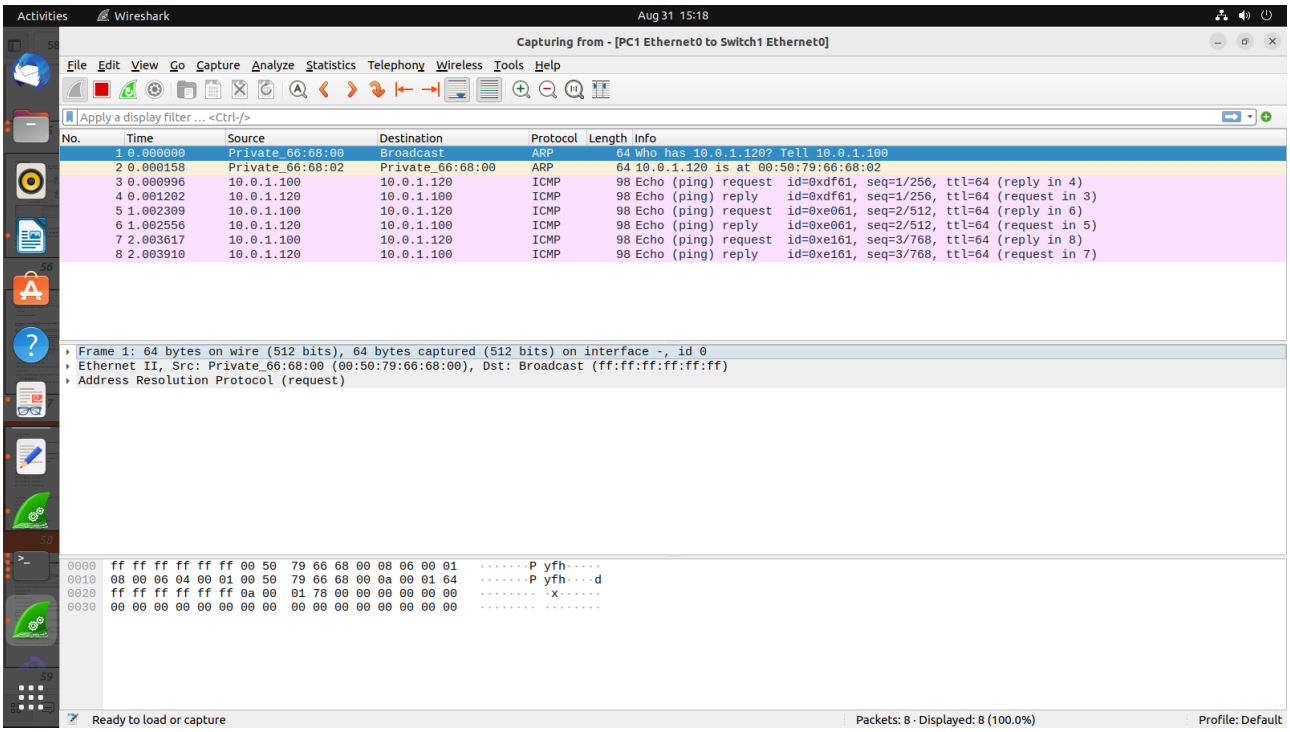
1)

PC1> ping 10.0.1.120 / 24 -c 3

84 bytes from 10.0.1.120 icmp_seq=1 ttl=64 time=0.327 ms

84 bytes from 10.0.1.120 icmp_seq=2 ttl=64 time=0.493 ms

84 bytes from 10.0.1.120 icmp_seq=3 ttl=64 time=0.633 ms



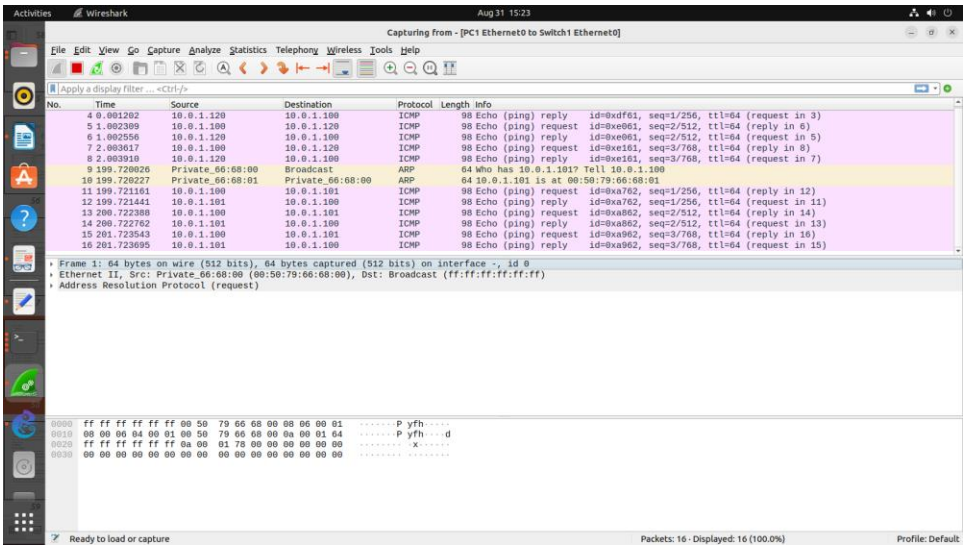
2)

PC1> ping 10.0.1.101 / 28 -c 3

84 bytes from 10.0.1.101 icmp_seq=1 ttl=64 time=0.553 ms

84 bytes from 10.0.1.101 icmp_seq=2 ttl=64 time=0.604 ms

84 bytes from 10.0.1.101 icmp_seq=3 ttl=64 time=0.356 ms



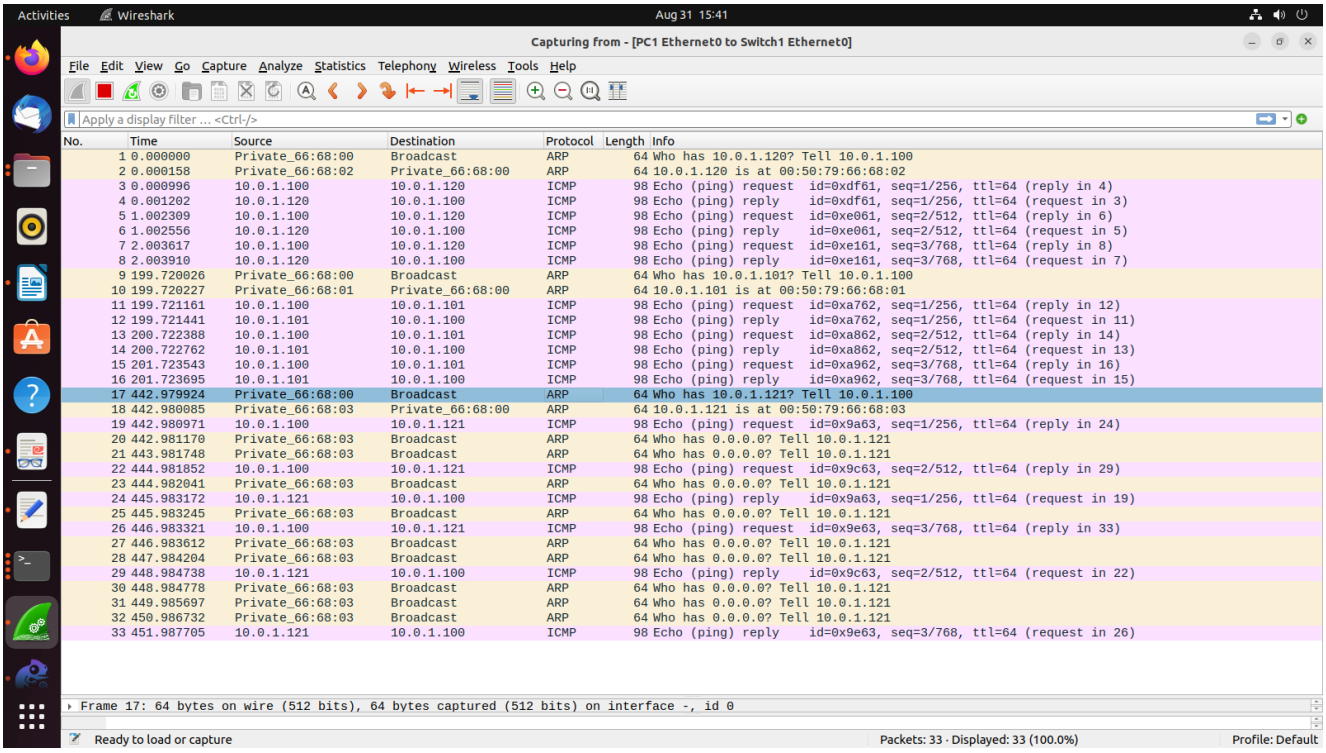
3)

PC1> ping 10.0.1.121 / 28 -c 3

10.0.1.121 icmp_seq=1 timeout

10.0.1.121 icmp_seq=2 timeout

10.0.1.121 icmp_seq=3 timeout



4)

PC4> ping 10.0.1.100 / 24 -c 3

No gateway found

5)

PC2> ping 10.0.1.121 / 28 -c 3

No gateway found

6)

PC2> ping 10.0.1.120 / 24 -c 3

No gateway found

THEORY QUESTIONS BASED ON ABOVE QUESTIONS

Based on Q1

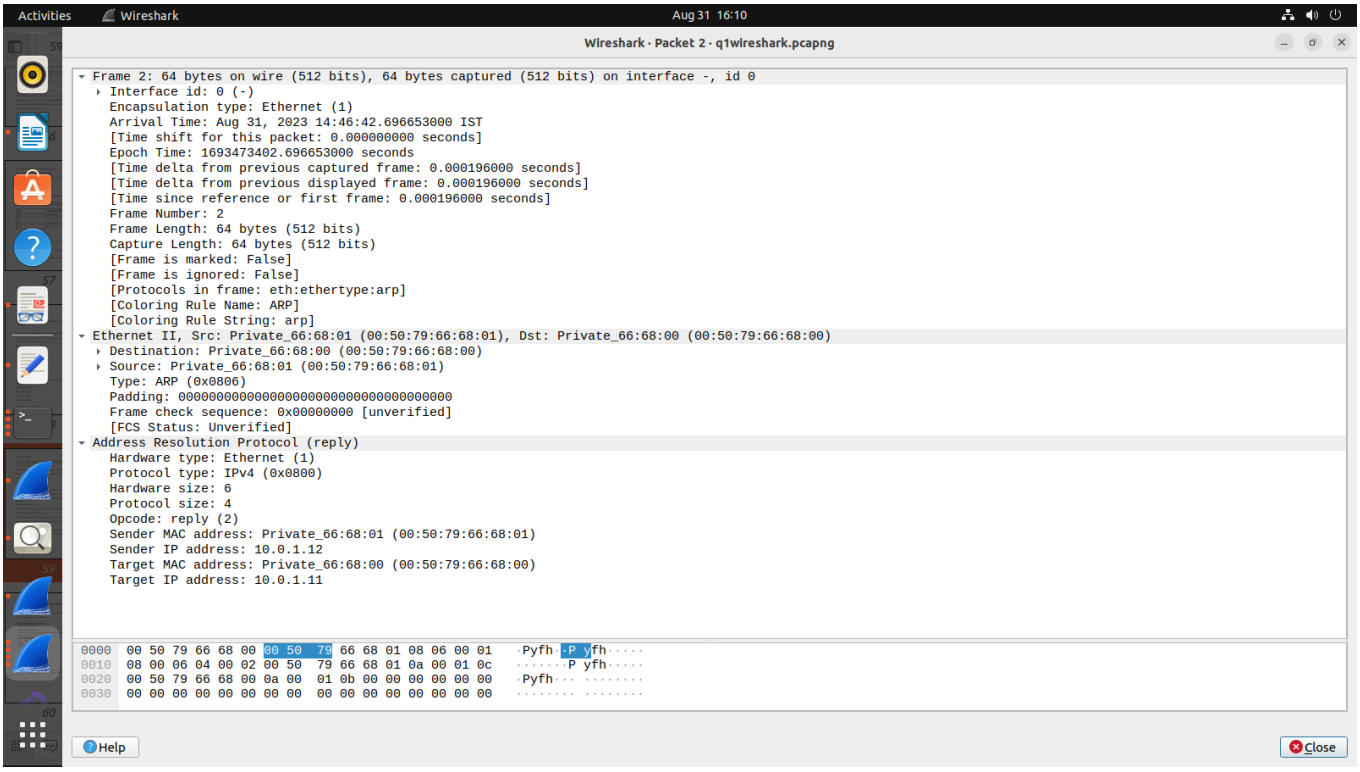
1. What is the destination MAC address of an ARP Request packet?

   00:50:79:66:68:00

2. What are the different Type Field values in the Ethernet headers that you observed?

   Type: ARP (0x0806)

3. Use the captured data to analyze the process in which ARP acquires the MAC address for IP address 10.0.1.12.



Based on Q3

Scenarios and Analysis:

PC1 10.0.1.100 / 24 255.255.255.0

PC2 10.0.1.101 / 28 255.255.255.240

PC3 10.0.1.120 / 24 255.255.255.0

PC4 10.0.1.121 / 28 255.255.255.240

let's expand the bits of the given IP addresses:

1. 10.0.1.100:

◦ IP address: 10.0.1.100

◦ Binary representation: 00001010.00000000.00000001.01100100

2. 10.0.1.101:

◦ IP address: 10.0.1.101

◦ Binary representation: 00001010.00000000.00000001.01100101

3. 10.0.1.120:

◦ IP address: 10.0.1.120

◦ Binary representation: 00001010.00000000.00000001.01111000

4. 10.0.1.121:

◦ IP address: 10.0.1.121

◦ Binary representation: 00001010.00000000.00000001.01111001

i. From PC1 ping PC3: Since PC1(10.0.1.100/24), and PC3(10.0.1.120/24) have IP addresses in the same /24 subnet they are on the same network.The ping operation between PC1 and PC3 will be successful because they can directly communicate within the same subnet.The first 24 bits of both the ip addresses match completely and the ping is successful.

ii. From PC1 ping PC2: PC1 and PC2 are in different subnets. PC1's IP address is in the subnet 10.0.1.100/24, and PC2's IP address is in the subnet 10.0.1.101/28. Even if they are within different subnets,the ping is successful.********why?Even though they have different subnet masks, their IP addresses are within the same range of IP addresses. The ping operation will be successful because they can directly communicate within the same subnet.When PC1 finds PC2,it looks for only the first 24 bits to match,as the match occurs,it requests successfully.When PC2 needs to reply to PC1,it looks for the first 28 bits of the ip address to match.Coincidentally,since both ip addresses are same for the first 28 bits,the reply is also sent successfully and the ping operation is successful.This is a completely coincidental case.

iii. From PC1 ping PC4: PC1 and PC4 are in different subnets due to their distinct subnet masks. PC1's IP address is in the subnet 10.0.1.100/24, and PC4's IP address is in the subnet 10.0.1.121/28. The ping operation will be unsuccessful because they are not on the same subnet.Moreover,a timeout occurs.**********why?The timeout occurs because when PC1 looks for a match of first 24 bits of the IP address,and since the first 24 bits are the same in the first ip address,PC1 assumes that it has found the host and requests.But PC4 looks for a match of the first 28 bits of the ip addresses and thus does not reply to PC1.Therefore a timeout occurs as PC1 is sending a request without a reply from PC4.

iv. From PC4 ping PC1: PC1 and PC4 are in different subnets due to their distinct subnet masks. PC1's IP address is in the subnet 10.0.1.100/24, and PC4's IP address is in the subnet 10.0.1.121/28. The ping operation will be unsuccessful because they are not on the same subnet.No gateway message is seen on the terminal.**********why?When PC4 is looking for

the first 28 bits of the ip address to match,it never finds a match and a no gateway message appears on the terminal due to this.

v. From PC2 ping PC4: PC2 and PC4 are in different subnets. PC2's IP address is in the subnet 10.0.1.101 / 28, and PC4's IP address is in the subnet 10.0.1.121 / 28. Similar to earlier scenarios, the ping operation was unsuccessful because they are not on the same subnet.No gateway message is seen on the terminal.****why?When PC2 is looking for the first 28 bits of the ip address to match,it never finds a match and a no gateway message appears on the terminal due to this.

vi. From PC2 ping PC3: PC2(10.0.1.101/28) and PC3(10.0.1.120/24) do not have IP addresses in the same /24 subnet.The ping is unsuccessful.No gateway message is seen on the terminal.****why?When PC2 is looking for the first 28 bits of the ip address to match,it never finds a match and a no gateway message appears on the terminal due to this.