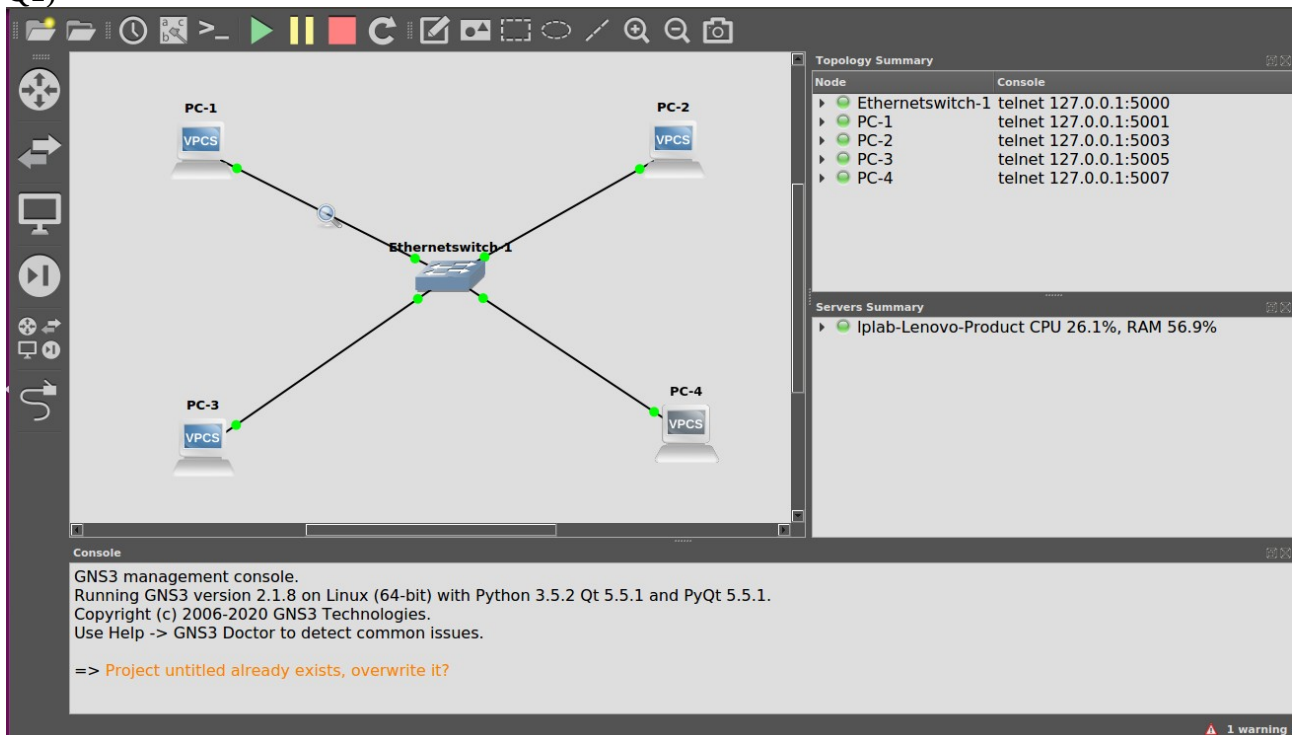


Q1)



PC1

```
PC-1> ip 10.0.1.11/24 10.0.1.1
Checking for duplicate address...
PC1 : 10.0.1.11 255.255.255.0 gateway 10.0.1.1
```

PC2

```
PC-2> ip 10.0.1.12 10.0.1.1
Checking for duplicate address...
PC1 : 10.0.1.12 255.255.255.0 gateway 10.0.1.1
```

PC3

```
PC-3> ip 10.0.1.13/24 10.0.1.1
Checking for duplicate address...
PC1 : 10.0.1.13 255.255.255.0 gateway 10.0.1.1
```

PC4

```
PC-4> ip 10.0.1.14/24 10.0.1.1
Checking for duplicate address...
PC1 : 10.0.1.14 255.255.255.0 gateway 10.0.1.1
```

a) show arp

```
PC-1> show arp

arp table is empty
```

Ping and arp

```
PC-1> ping 10.0.1.12 -c3
84 bytes from 10.0.1.12 icmp_seq=1 ttl=64 time=0.257 ms
84 bytes from 10.0.1.12 icmp_seq=2 ttl=64 time=0.338 ms
84 bytes from 10.0.1.12 icmp_seq=3 ttl=64 time=0.360 ms
84 bytes from 10.0.1.12 icmp_seq=4 ttl=64 time=0.310 ms
84 bytes from 10.0.1.12 icmp_seq=5 ttl=64 time=0.414 ms

PC-1> show arp

00:50:79:66:68:01 10.0.1.12 expires in 85 seconds
```

after 2mins arp

```
PC-1> show arp

arp table is empty
```

Wireshark screen

The image shows a Wireshark network traffic capture. The top pane displays a list of captured packets. The bottom pane shows the details of the selected packet (Frame 1).

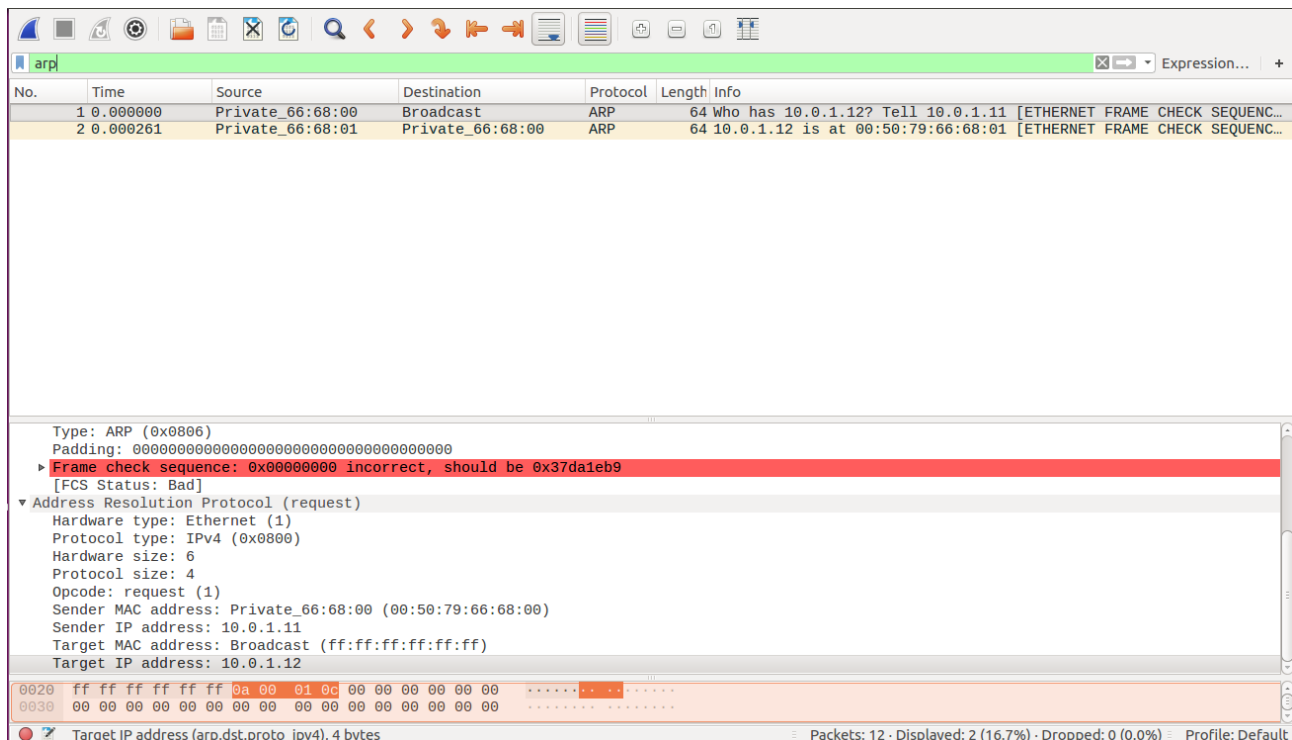
No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	Private_66:68:00	Broadcast	ARP	64	Who has 10.0.1.12? Tell 10.0.1.11 [ETHERNET FRAME CHECK SEQUENC...
2	0.000261	Private_66:68:01	Private_66:68:00	ARP	64	10.0.1.12 is at 00:50:79:66:68:01 [ETHERNET FRAME CHECK SEQUENC...
3	0.001030	10.0.1.11	10.0.1.12	ICMP	98	Echo (ping) request id=0x3080, seq=1/256, ttl=64 (reply in 4)
4	0.001146	10.0.1.12	10.0.1.11	ICMP	98	Echo (ping) reply id=0x3080, seq=1/256, ttl=64 (request in 3)
5	1.002183	10.0.1.11	10.0.1.12	ICMP	98	Echo (ping) request id=0x3180, seq=2/512, ttl=64 (reply in 6)
6	1.002343	10.0.1.12	10.0.1.11	ICMP	98	Echo (ping) reply id=0x3180, seq=2/512, ttl=64 (request in 5)
7	2.003349	10.0.1.11	10.0.1.12	ICMP	98	Echo (ping) request id=0x3280, seq=3/768, ttl=64 (reply in 8)
8	2.003533	10.0.1.12	10.0.1.11	ICMP	98	Echo (ping) reply id=0x3280, seq=3/768, ttl=64 (request in 7)
9	3.004489	10.0.1.11	10.0.1.12	ICMP	98	Echo (ping) request id=0x3380, seq=4/1024, ttl=64 (reply in 10)
10	3.004635	10.0.1.12	10.0.1.11	ICMP	98	Echo (ping) reply id=0x3380, seq=4/1024, ttl=64 (request in ...)
11	4.005683	10.0.1.11	10.0.1.12	ICMP	98	Echo (ping) request id=0x3480, seq=5/1280, ttl=64 (reply in 12)
12	4.005887	10.0.1.12	10.0.1.11	ICMP	98	Echo (ping) reply id=0x3480, seq=5/1280, ttl=64 (request in ...)

Frame 1: 64 bytes on wire (512 bits), 64 bytes captured (512 bits) on interface 0
Ethernet II, Src: Private_66:68:00 (00:50:79:66:68:00), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
Address Resolution Protocol (request)

0000 ff ff ff ff ff ff 00 50 79 66 68 00 08 06 30 01 P yfh...
0010 38 00 06 04 00 01 00 50 79 66 68 00 0a 00 01 0b P yfh....

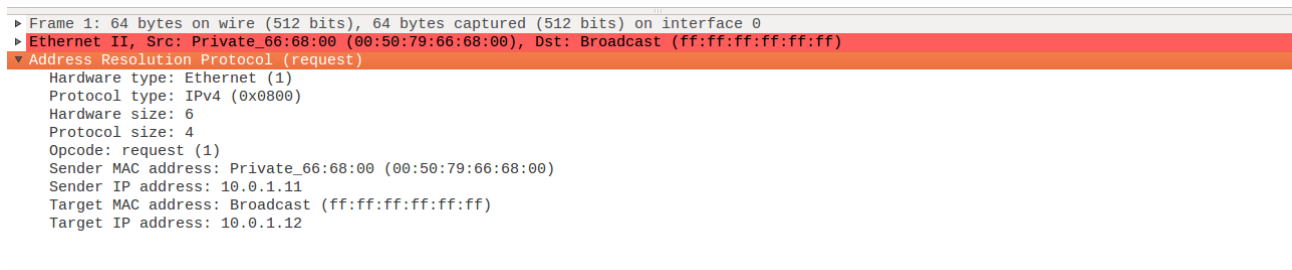
Address Resolution Protocol (arp), 28 bytes Packets: 12 - Displayed: 12 (100.0%) - Dropped: 0 (0.0%) - Profile: Default

after arp filter



Answers

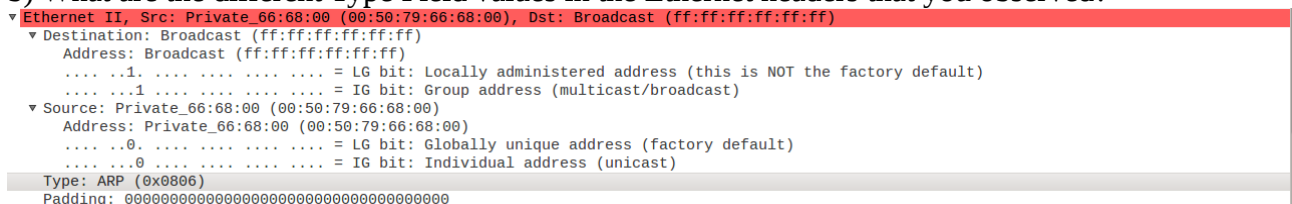
a) Destination MAC address of an ARP Request packet



Target MAC address: Broadcast (ff:ff:ff:ff:ff:ff)

Target IP address: 10.0.1.12

b) What are the different Type Field values in the Ethernet headers that you observed?



Type: ARP (0x0806)

c) Which Ping operations were successfull

All ping operations were successfull as all have the same sub net mask

ADITYA PRADHAN 180905350 CSE D

saved wireshark output file

```
student@lpLab-Lenovo-Product:~/180905350/cn/week2/lab4$ cat wireshark.out
No.      Time                Source                Destination            Protocol Length
  Info
  1 0.000000          Private_66:68:00      Broadcast               ARP                64
    Who has 10.0.1.12? Tell 10.0.1.11 [ETHERNET FRAME CHECK SEQUENCE INCORRECT]

Frame 1: 64 bytes on wire (512 bits), 64 bytes captured (512 bits) on interface
0
Ethernet II, Src: Private_66:68:00 (00:50:79:66:68:00), Dst: Broadcast (ff:ff:ff
:ff:ff:ff)
Address Resolution Protocol (request)

No.      Time                Source                Destination            Protocol Length
  Info
  2 0.000261          Private_66:68:01      Private_66:68:00       ARP                64
    10.0.1.12 is at 00:50:79:66:68:01 [ETHERNET FRAME CHECK SEQUENCE INCORRECT]

Frame 2: 64 bytes on wire (512 bits), 64 bytes captured (512 bits) on interface
0
Ethernet II, Src: Private_66:68:01 (00:50:79:66:68:01), Dst: Private_66:68:00 (0
0:50:79:66:68:00)
Address Resolution Protocol (reply)
student@lpLab-Lenovo-Product:~/180905350/cn/week2/lab4$
```

Q4.2)

Ping

i. pc1 – pc3

```
PC-1> ping 10.0.1.120/24
84 bytes from 10.0.1.120 icmp_seq=1 ttl=64 time=0.307 ms
84 bytes from 10.0.1.120 icmp_seq=2 ttl=64 time=0.326 ms
84 bytes from 10.0.1.120 icmp_seq=3 ttl=64 time=0.328 ms
84 bytes from 10.0.1.120 icmp_seq=4 ttl=64 time=0.273 ms
84 bytes from 10.0.1.120 icmp_seq=5 ttl=64 time=0.385 ms
```

ii. pc1-pc2

```
PC-1> ping 10.0.1.101/28
84 bytes from 10.0.1.101 icmp_seq=1 ttl=64 time=0.244 ms
84 bytes from 10.0.1.101 icmp_seq=2 ttl=64 time=0.280 ms
84 bytes from 10.0.1.101 icmp_seq=3 ttl=64 time=0.478 ms
84 bytes from 10.0.1.101 icmp_seq=4 ttl=64 time=0.352 ms
84 bytes from 10.0.1.101 icmp_seq=5 ttl=64 time=0.285 ms
```

iii. From PC1 pingPC4.

```
PC-1> ping 10.0.1.121/28
10.0.1.121 icmp_seq=1 timeout
10.0.1.121 icmp_seq=2 timeout
10.0.1.121 icmp_seq=3 timeout
10.0.1.121 icmp_seq=4 timeout
10.0.1.121 icmp_seq=5 timeout
```

iv. From PC4 pingPC1.

```
PC-4> ping 10.0.1.100/24
No gateway found
```

v. From PC2 ping PC4.

```
PC-2> ping 10.0.1.121/28
No gateway found
```

vi. From PC2 ping PC3.

```
PC-2> ping 10.0.1.120/24
No gateway found
```

4.6)

Topology Summary

Node	Console
Ethernetswitch-1	telnet 127.0.0.1:5002
Ethernetswitch-2	telnet 127.0.0.1:5003
PC-1	telnet 127.0.0.1:5004
PC-2	telnet 127.0.0.1:5006
PC-3	telnet 127.0.0.1:5008
PC-4	telnet 127.0.0.1:5010
R1	telnet 127.0.0.1:5000
R2	telnet 127.0.0.1:5001

Servers Summary

- Iplab-Lenovo-Product CPU 13.4%, RAM 66.7%

Console

GNS3 management console.
Running GNS3 version 2.1.8 on Linux (64-bit) with Python 3.5.2 Qt 5.5.1 and PyQt 5.5.1.
Copyright (c) 2006-2020 GNS3 Technologies.
Use Help -> GNS3 Doctor to detect common issues.

=> Project untitled already exists, overwrite it?

Configuring r1

```
*Dec 12 15:38:39.287: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0, changed state to down
*Dec 12 15:38:39.323: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/1, changed state to down
*Dec 12 15:38:39.355: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/2, changed state to down
*Dec 12 15:38:39.363: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/3, changed state to down
R1#
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#int f0/0
R1(config-if)#ip addr 10.0.0.1 255.255.255.0
R1(config-if)#no shut
R1(config-if)#
*Dec 12 15:40:47.671: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
R1(config-if)#
*Dec 12 15:40:47.671: %ENTITY_ALARM-6-INFO: CLEAR INFO Fa0/0 Physical Port Administrative State Down
*Dec 12 15:40:48.671: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
R1(config-if)#exit
R1(config)#ip s1/0
^
% Invalid input detected at '^' marker.
R1(config)#int s1/0
R1(config-if)#ip addr 20.0.0.1 255.255.255.0
R1(config-if)#no shut
R1(config-if)#
*Dec 12 15:42:26.883: %LINK-3-UPDOWN: Interface Serial1/0, changed state to up
R1(config-if)#
*Dec 12 15:42:26.883: %ENTITY_ALARM-6-INFO: CLEAR INFO Se1/0 Physical Port Administrative State Down
R1(config-if)#
*Dec 12 15:42:27.887: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0, changed state to up
R1(config-if)#exit
R1(config)#exit
R1#
*Dec 12 15:42:47.031: %SYS-5-CONFIG_I: Configured from console by console
R1#show ip interface b
*Dec 12 15:42:57.243: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0, changed state to down
R1#show ip interface brief
Interface                IP-Address      OK? Method Status      Protocol
FastEthernet0/0          10.0.0.1        YES manual up          up
Serial1/0                 20.0.0.1        YES manual up          down
Serial1/1                 unassigned      YES unset   administratively down down
Serial1/2                 unassigned      YES unset   administratively down down
Serial1/3                 unassigned      YES unset   administratively down down
R1#
```

Configuring R2

```
R2#
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#int f0/
R2(config)#int f0/0
R2(config-if)#ip addr 30.0.0.1 255.255.255.0
R2(config-if)#no shut
R2(config-if)#
*Dec 12 15:45:11.683: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
R2(config-if)#
*Dec 12 15:45:11.683: %ENTITY_ALARM-6-INFO: CLEAR INFO Fa0/0 Physical Port Administrative State Down
*Dec 12 15:45:12.683: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
R2(config-if)#exit
R2(config)#int s1/0
R2(config-if)#ip addr 20.0.0.2 255.255.255.0
R2(config-if)#no shut
R2(config-if)#
*Dec 12 15:46:50.899: %LINK-3-UPDOWN: Interface Serial1/0, changed state to up
R2(config-if)#
*Dec 12 15:46:50.899: %ENTITY_ALARM-6-INFO: CLEAR INFO Se1/0 Physical Port Administrative State Down
R2(config-if)#
*Dec 12 15:46:51.903: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0, changed state to up
R2(config-if)#exit
R2(config)#show ip int brief
R2#
% Invalid input detected at '^' marker.

R2(config)#exit
R2#sho
*Dec 12 15:49:03.591: %SYS-5-CONFIG_I: Configured from console by console
R2#show ip interface brief
Interface      IP-Address      OK? Method Status      Protocol
FastEthernet0/0 30.0.0.1        YES manual up          up
Serial1/0       20.0.0.2        YES manual up          up
Serial1/1       unassigned      YES unset  administratively down down
Serial1/2       unassigned      YES unset  administratively down down
Serial1/3       unassigned      YES unset  administratively down down
R2#
```

Configuring pc1

```
PC-1> ip 10.0.0.10 255.255.255.0 10.0.0.1
Checking for duplicate address...
PC1 : 10.0.0.10 255.255.255.0 gateway 10.0.0.1
```

Configuring pc2

```
PC-2> ip 10.0.0.20 255.255.255.0 10.0.0.1
Checking for duplicate address...
PC1 : 10.0.0.20 255.255.255.0 gateway 10.0.0.1
PC-2> 
```

Configuring pc3

```
PC-3> ip 30.0.0.10 255.255.255.0 30.0.0.1
Checking for duplicate address...
PC1 : 30.0.0.10 255.255.255.0 gateway 30.0.0.1
```

Configuring pc4

```
PC-4> ip 30.0.0.20 255.255.255.0 30.0.0.1
Checking for duplicate address...
PC1 : 30.0.0.20 255.255.255.0 gateway 30.0.0.1
```


Configuring Routing table R2

```
R2(config)#ip route 10.0.0.0 255.255.255.0 20.0.0.1
R2(config)#exit
R2#show ip interface brief
*Dec 12 16:01:30.083: %SYS-5-CONFIG_I: Configured from console by console
R2#show ip route
Codes: 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
       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 not set

    20.0.0.0/24 is subnetted, 1 subnets
C       20.0.0.0 is directly connected, Serial1/0
    10.0.0.0/24 is subnetted, 1 subnets
S       10.0.0.0 [1/0] via 20.0.0.1
    30.0.0.0/24 is subnetted, 1 subnets
C       30.0.0.0 is directly connected, FastEthernet0/0
R2#
```

R1

```
R1(config)#ip route 30.0.0.0 255.255.255.0 20.0.0.2
R1(config)#exit
R1#show ip interface route
*Dec 12 16:09:53.187: %SYS-5-CONFIG_I: Configured from console by console
R1#show ip interface route
      ^
% Invalid input detected at '^' marker.

R1#show ip route
Codes: 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
       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 not set

    20.0.0.0/24 is subnetted, 1 subnets
C       20.0.0.0 is directly connected, Serial1/0
    10.0.0.0/24 is subnetted, 1 subnets
C       10.0.0.0 is directly connected, FastEthernet0/0
    30.0.0.0/24 is subnetted, 1 subnets
S       30.0.0.0 [1/0] via 20.0.0.2
R1#
```

Pinging pc1 from pc4

```
PC-4> ping 10.0.0.10
84 bytes from 10.0.0.10 icmp_seq=1 ttl=62 time=41.493 ms
84 bytes from 10.0.0.10 icmp_seq=2 ttl=62 time=35.022 ms
84 bytes from 10.0.0.10 icmp_seq=3 ttl=62 time=25.675 ms
84 bytes from 10.0.0.10 icmp_seq=4 ttl=62 time=25.248 ms
84 bytes from 10.0.0.10 icmp_seq=5 ttl=62 time=24.995 ms
```

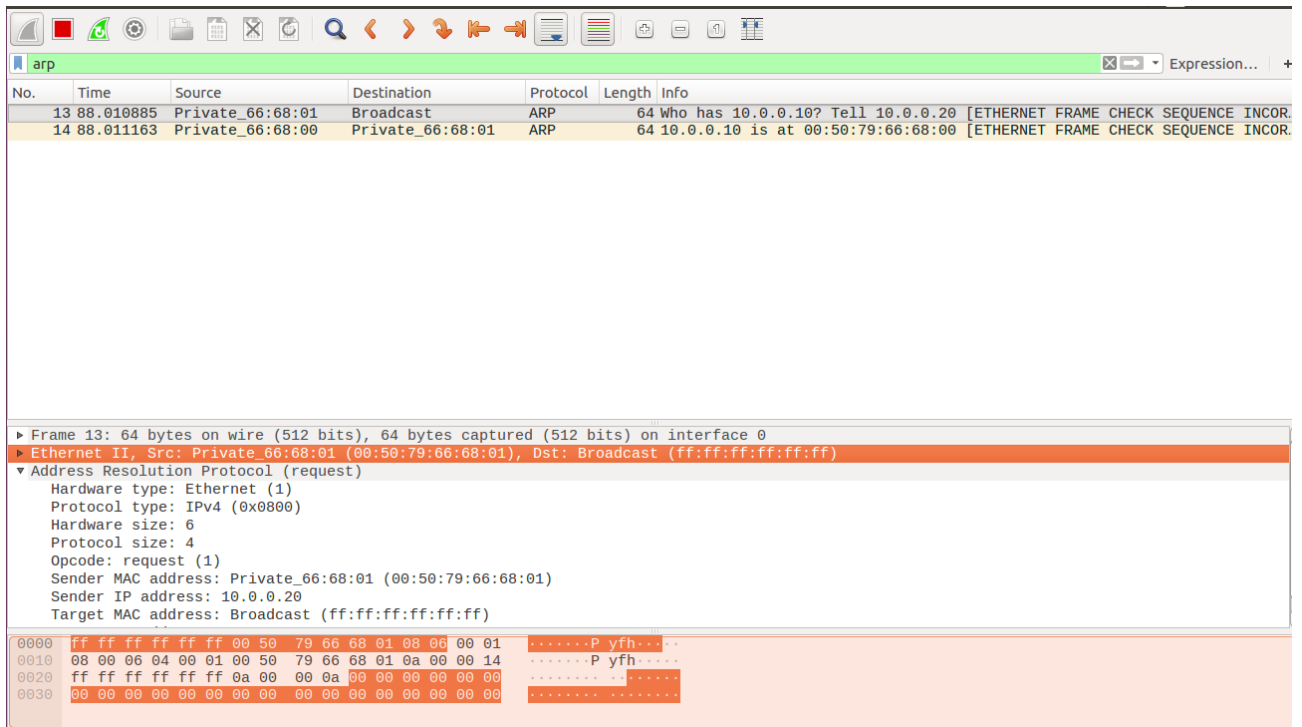
```
PC-4> 
```

It gives no arp

Pinging pc1 from pc2

```
PC-2> ping 10.0.0.10
84 bytes from 10.0.0.10 icmp_seq=1 ttl=64 time=0.285 ms
84 bytes from 10.0.0.10 icmp_seq=2 ttl=64 time=0.453 ms
84 bytes from 10.0.0.10 icmp_seq=3 ttl=64 time=0.380 ms
84 bytes from 10.0.0.10 icmp_seq=4 ttl=64 time=0.413 ms
84 bytes from 10.0.0.10 icmp_seq=5 ttl=64 time=0.358 ms
```

gives arp



Wireshark packet capture interface showing ARP traffic. The packet list displays two packets:

No.	Time	Source	Destination	Protocol	Length	Info
13	88.010885	Private_66:68:01	Broadcast	ARP	64	who has 10.0.0.10? Tell 10.0.0.20 [ETHERNET FRAME CHECK SEQUENCE INCOR.
14	88.011163	Private_66:68:00	Private_66:68:01	ARP	64	10.0.0.10 is at 00:50:79:66:68:00 [ETHERNET FRAME CHECK SEQUENCE INCOR.

The packet details pane for the first packet (Frame 13) shows:

- Frame 13: 64 bytes on wire (512 bits), 64 bytes captured (512 bits) on interface 0
- Ethernet II, Src: Private_66:68:01 (00:50:79:66:68:01), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
- Address Resolution Protocol (request)
 - Hardware type: Ethernet (1)
 - Protocol type: IPv4 (0x0800)
 - Hardware size: 6
 - Protocol size: 4
 - Opcode: request (1)
 - Sender MAC address: Private_66:68:01 (00:50:79:66:68:01)
 - Sender IP address: 10.0.0.20
 - Target MAC address: Broadcast (ff:ff:ff:ff:ff:ff)

The packet bytes pane shows the raw data in hexadecimal and ASCII:

```
0000 ff ff ff ff ff 00 50 79 66 68 01 08 06 00 01 .....P yfh...
0010 08 00 06 04 00 01 00 50 79 66 68 01 0a 00 00 14 .....P yfh...
0020 ff ff ff ff ff 0a 00 00 0a 00 00 00 00 00 00 .....
0030 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
```