

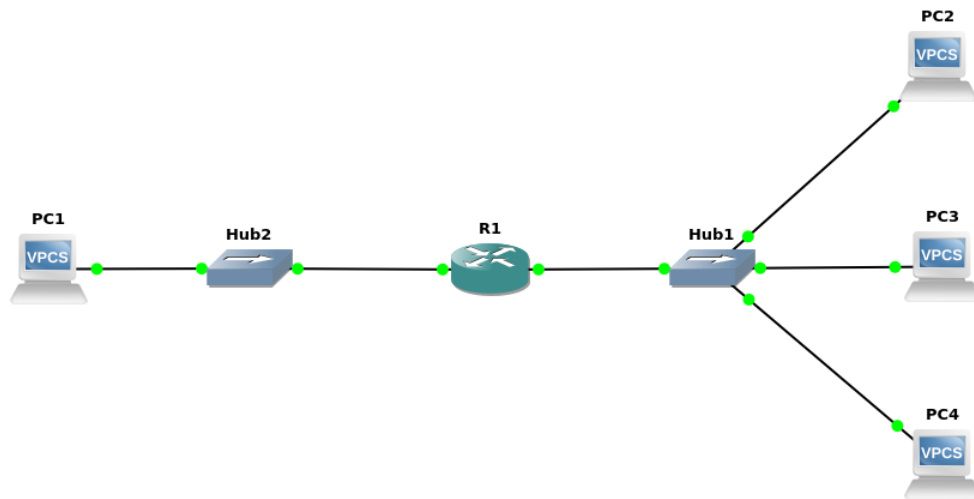
## CN Lab Session 3

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### Question 1:

Topology:



Conf:

#### interface F0/0 in router1:

```
enable
conf t
int f0/0
ip address 10.0.1.1 255.0.0.0
no shutdown
exit
exit
write
```

#### interface F0/1 in router1:

```
enable
conf t
int f0/1
ip address 10.0.2.138 255.255.255.0
no shutdown
exit
exit
write
```

#### check interfaces

```
show interfaces
```

Pings from PC1:

```
PC1
File Edit View Search Terminal Help

PC1> ping 10.0.2.10 -c 5

10.0.2.10 icmp_seq=1 timeout
84 bytes from 10.0.2.10 icmp_seq=2 ttl=63 time=17.743 ms
84 bytes from 10.0.2.10 icmp_seq=3 ttl=63 time=19.062 ms
84 bytes from 10.0.2.10 icmp_seq=4 ttl=63 time=19.188 ms
84 bytes from 10.0.2.10 icmp_seq=5 ttl=63 time=19.023 ms

PC1> ping 10.0.2.137 -c 5

10.0.2.137 icmp_seq=1 timeout
84 bytes from 10.0.2.137 icmp_seq=2 ttl=63 time=16.063 ms
84 bytes from 10.0.2.137 icmp_seq=3 ttl=63 time=18.880 ms
84 bytes from 10.0.2.137 icmp_seq=4 ttl=63 time=19.294 ms
84 bytes from 10.0.2.137 icmp_seq=5 ttl=63 time=18.945 ms

PC1> ping 10.0.2.139 -c 5

10.0.2.139 icmp_seq=1 timeout
84 bytes from 10.0.2.139 icmp_seq=2 ttl=63 time=14.526 ms
84 bytes from 10.0.2.139 icmp_seq=3 ttl=63 time=18.586 ms
84 bytes from 10.0.2.139 icmp_seq=4 ttl=63 time=18.668 ms
84 bytes from 10.0.2.139 icmp_seq=5 ttl=63 time=19.300 ms

PC1> 
```

Wireshark:

Mon 2:45 PM  
\*Standard input [Hub2 Ethernet1 to PC1 Ethernet0]

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

icmp

No.	Time	Source	Destination	Protocol	Length	Info
24	180.054574	10.0.1.10	10.0.2.10	ICMP	98	Echo (ping) request id=0x982a, seq=1/256, ttl=64 (no response found!)
26	182.055745	10.0.1.10	10.0.2.10	ICMP	98	Echo (ping) request id=0x9b2a, seq=2/512, ttl=64 (reply in 27)
27	182.074185	10.0.2.10	10.0.1.10	ICMP	98	Echo (ping) reply id=0x9b2a, seq=2/512, ttl=63 (request in 26)
28	183.075354	10.0.1.10	10.0.2.10	ICMP	98	Echo (ping) request id=0x9c2a, seq=3/768, ttl=64 (reply in 29)
29	183.093497	10.0.2.10	10.0.1.10	ICMP	98	Echo (ping) reply id=0x9c2a, seq=3/768, ttl=63 (request in 28)
31	193.561130	10.0.1.10	10.0.2.137	ICMP	98	Echo (ping) request id=0xa62a, seq=1/256, ttl=64 (no response found!)
32	195.561942	10.0.1.10	10.0.2.137	ICMP	98	Echo (ping) request id=0xa82a, seq=2/512, ttl=64 (reply in 33)
33	195.582134	10.0.2.137	10.0.1.10	ICMP	98	Echo (ping) reply id=0xa82a, seq=2/512, ttl=63 (request in 32)
34	196.582983	10.0.1.10	10.0.2.137	ICMP	98	Echo (ping) request id=0xa92a, seq=3/768, ttl=64 (reply in 35)
35	196.601394	10.0.2.137	10.0.1.10	ICMP	98	Echo (ping) reply id=0xa92a, seq=3/768, ttl=63 (request in 34)
37	204.065122	10.0.1.10	10.0.2.138	ICMP	98	Echo (ping) request id=0xb12a, seq=1/256, ttl=64 (reply in 38)
38	204.074693	10.0.2.138	10.0.1.10	ICMP	98	Echo (ping) reply id=0xb12a, seq=1/256, ttl=255 (request in 37)
39	205.075130	10.0.1.10	10.0.2.138	ICMP	98	Echo (ping) request id=0xb22a, seq=2/512, ttl=64 (reply in 40)
40	205.084555	10.0.2.138	10.0.1.10	ICMP	98	Echo (ping) reply id=0xb22a, seq=2/512, ttl=255 (request in 39)
41	206.084954	10.0.1.10	10.0.2.138	ICMP	98	Echo (ping) request id=0xb32a, seq=3/768, ttl=64 (reply in 42)
42	206.094889	10.0.2.138	10.0.1.10	ICMP	98	Echo (ping) reply id=0xb32a, seq=3/768, ttl=255 (request in 41)

Frame 24: 98 bytes on wire (784 bits), 98 bytes captured (784 bits) on interface 0  
Ethernet II, Src: Private\_66:68:00 (00:50:79:66:68:00), Dst: ca:01:0c:6b:00:08 (ca:01:0c:6b:00:08)  
Internet Protocol Version 4, Src: 10.0.1.10, Dst: 10.0.2.10  
Internet Control Message Protocol

Internet Control Message Protocol: Protocol

Packets: 114 · Displayed: 16 (14.0%)

Profile: Default

Show arp on pc1:

```
PC1
File Edit View Search Terminal Help

PC1> show arp

ca:01:0c:6b:00:08 10.0.1.1 expires in 102 seconds

PC1> 
```

Show arp on pc2:

```
PC3
File Edit View Search Terminal Help

Trying 127.0.0.1...
Connected to localhost.
Escape character is '^]'.
show arp

ca:01:0c:6b:00:06 10.0.2.138 expires in 86 seconds

PC3> 
```

Routing table:

```
R1
File Edit View Search Terminal Help

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

    10.0.0.0/24 is subnetted, 2 subnets
C       10.0.2.0 is directly connected, FastEthernet0/1
C       10.0.1.0 is directly connected, FastEthernet0/0
R1# 
```

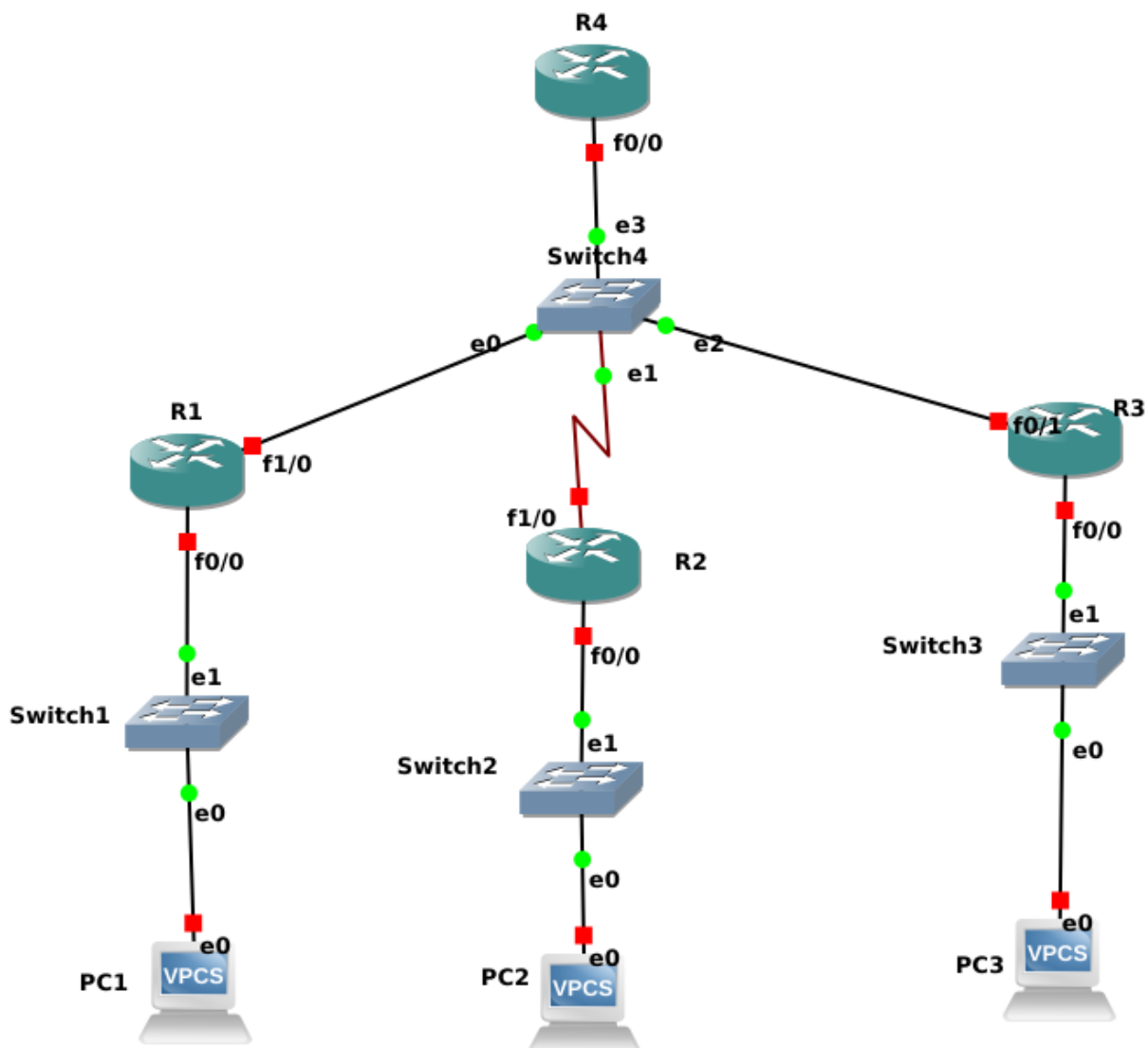
## Question 2:

There are 256 addresses in this block. the first address is 14.24.74.0/24; The last address is 14.24.74.255/24.

The number of addresses in the largest subblock ,which requires 120 addresses, is not power of 2, we allocate 128 addresses .The subnet mask for this subnet = 25. The first address in this block is 14.24.74.0/25 and the last address is 14.24.74.127/25.

The number of addresses in the second largest subblock, which requires 60 addresses , is not a power of 2 either, so we allocate 64 addresses .The subnet mask for this subnet = 26. The first address in this block is 14.24.74.128/26 and the last address is 14.24.74.191/26

The number of addresses in the smallest subblock ,which requires 10 addresses, is not a power of 2 so we allocate 16 addresses.The subnet mask for this subnet = 28. The first address in this block is 14.24.74.192/28 and the last address is 14.24.74.207/28



### **Setting up ip address, mask and default gateway for pc1, pc2 and pc3:**

```
PC1> ip 14.24.74.194/28 14.24.74.193
Checking for duplicate address...
PC1 : 14.24.74.194 255.255.255.240 gateway 14.24.74.193
```

```
PC2> ip 14.24.74.130/26 14.24.74.129
Checking for duplicate address...
PC1 : 14.24.74.130 255.255.255.192 gateway 14.24.74.129
```

```
PC3> ip 14.24.74.2/25 14.24.74.1
Checking for duplicate address...
PC1 : 14.24.74.2 255.255.255.128 gateway 14.24.74.1
```

### **Setting router interfaces :**

#### **R1:**

```
R1#enable
R1#conf t

R1(config)#int f0/0
R1(config-if)#ip add 14.24.74.193 255.255.255.240
R1(config-if)#no shutdown
R1(config-if)#exit

R1(config)#int f1/0
R1(config-if)#ip add 10.0.1.1 255.255.255.0
R1(config-if)#no shutdown
R1(config-if)#exit

R1(config)#exit
R1#write
```

#### **R2:**

```
R2#enable
R2#conf t

R2(config)#int f0/0
R2(config-if)#ip add 14.24.74.129 255.255.255.192
R2(config-if)#no shutdown
R2(config-if)#exit

R2(config)#int f1/0
R2(config-if)#ip add 10.0.1.2 255.255.255.0
R2(config-if)#no shutdown
R2(config-if)#exit

R2(config)#exit
R2#write
```

### R3:

```
R3#enable
```

```
R3#conf t
```

```
R3(config)#int f0/0
```

```
R3(config-if)#ip add 14.24.74.1 255.255.255.128
```

```
R3(config-if)#no shutdown
```

```
R3(config-if)#exit
```

```
R3(config)#int f1/0
```

```
R3(config-if)#ip add 10.0.1.3 255.255.255.0
```

```
R3(config-if)#no shutdown
```

```
R3(config-if)#exit
```

```
R3(config)#exit
```

```
R3#write
```

```
Building configuration...
```

### Configuring static tables in routers R1, R2, R3

```
R1(config)#ip route 14.24.74.0 255.255.255.128 10.0.1.3
```

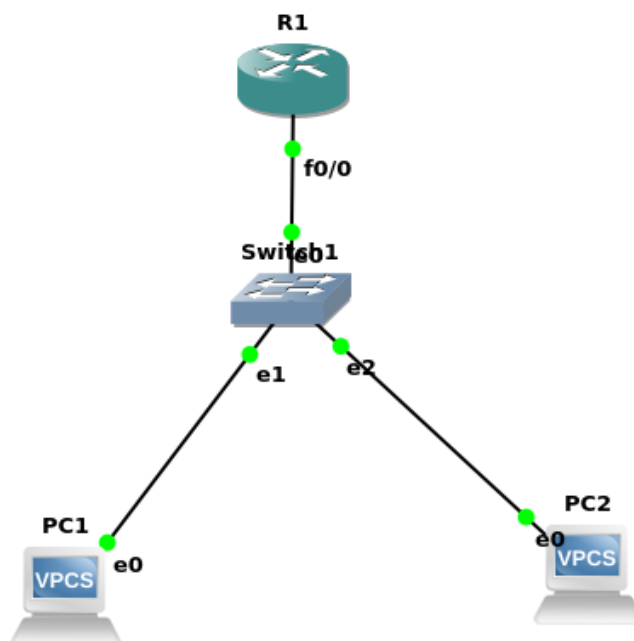
```
R1(config)#ip route 14.24.74.128 255.255.255.192 10.0.1.2
```

```
R2(config)#ip route 14.24.74.192 255.255.255.240 10.0.1.1
```

```
R3(config)#ip route 14.24.74.192 255.255.255.240 10.0.1.1
```

### Q3 DHCP

Topology:



## Router:

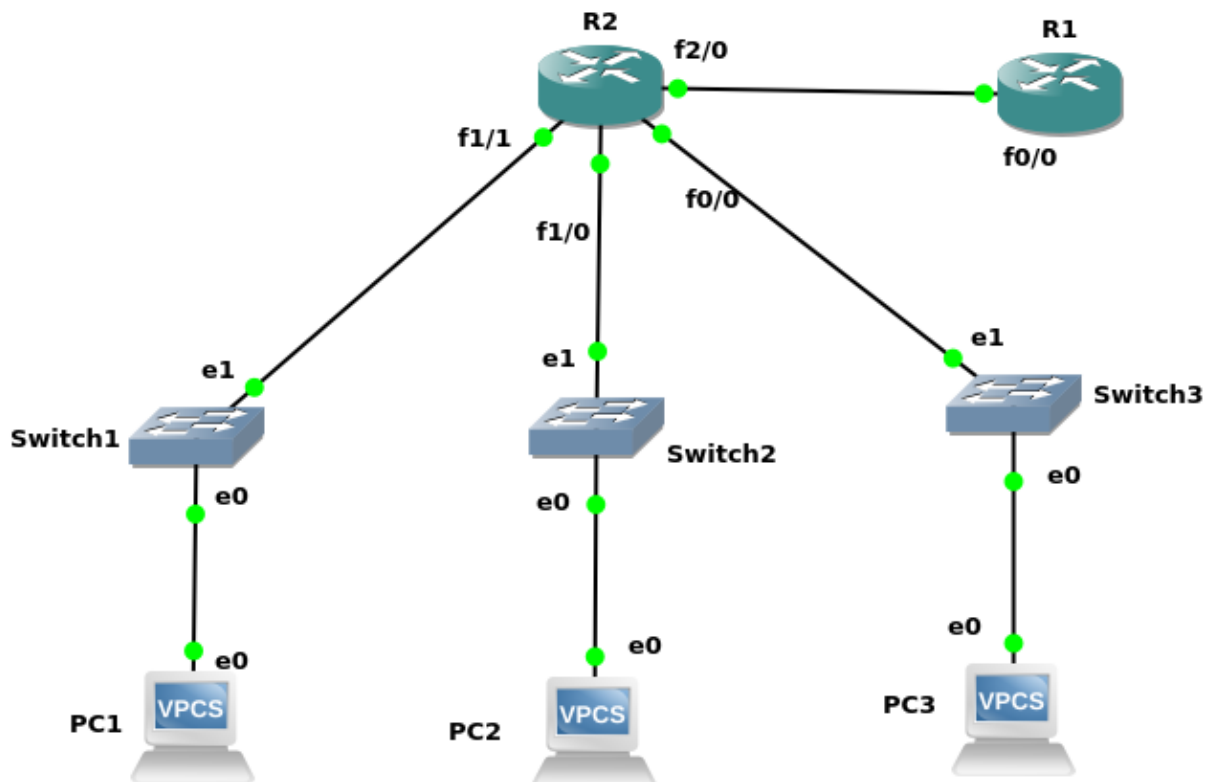
```
R1# enable
R1(config)# int f0/0
R1(config-if)# ip address 10.0.1.1 255.255.255.0
R1(config-if)# no shutdown
R1(config-if)# exit
```

```
R1(config)# ip dhcp pool lan1
R1(dhcp-config)# network 10.0.1.0 255.255.255.0
R1(dhcp-config)# Default-router 10.0.1.1
R1(dhcp-config)# exit
R1(config)# exit
```

## On pc1 and pc2

dhcp

## 4. DHCP 2



## **Configuring R1 router as DHCP**

```
R1#enable
```

```
R1#conf t
```

```
R1(config)#ip dhcp pool lan1
```

```
R1(dhcp-config)#network 10.0.1.0 255.255.255.0
```

```
R1(dhcp-config)#default-router 10.0.1.1
```

```
R1(dhcp-config)#exit
```

```
R1(config)#ip dhcp pool lan2
```

```
R1(dhcp-config)#network 10.0.2.0 255.255.255.0
```

```
R1(dhcp-config)#default-router 10.0.2.1
```

```
R1(dhcp-config)#exit
```

```
R1(config)#ip dhcp pool lan3
```

```
R1(dhcp-config)#network 10.0.3.0 255.255.255.0
```

```
R1(dhcp-config)#default-router 10.0.3.1
```

```
R1(dhcp-config)#exit
```

```
R1(config)#exit
```

```
R1#write
```

## **Setting next hop address on R1 :**

```
R1#conf t
```

```
R1(config)#ip route 10.0.1.0 255.255.255.0 30.0.0.2
```

```
R1(config)#ip route 10.0.2.0 255.255.255.0 30.0.0.2
```

```
R1(config)#ip route 10.0.3.0 255.255.255.0 30.0.0.2
```

```
R1(config)#exit
```

```
R1#write
```



## Setting R2 interface and helper address(i.e relay server to r1 for dhcp)

```
R2#enable
```

```
R2#conf t
```

```
R2(config)#int f2/0
```

```
R2(config-if)#ip add 30.0.0.2 255.255.255.0
```

```
R2(config-if)#ip helper-address 30.0.0.1
```

```
R2(config-if)#no shutdown
```

```
R2(config)#exit
```

```
R2#write
```

```
R2#conf t
```

```
R2(config)#int f1/1
```

```
R2(config-if)#ip add 10.0.1.1 255.255.255.0
```

```
R2(config-if)#ip helper-address 30.0.0.1
```

```
R2(config-if)#no shutdown
```

```
R2(config-if)#exit
```

```
R2(config)#int f1/0
```

```
R2(config-if)#ip add 10.0.2.1 255.255.255.0
```

```
R2(config-if)#ip helper-address 30.0.0.1
```

```
R2(config-if)#no shutdown
```

```
R2(config-if)#int f0/0
```

```
R2(config-if)#ip add 10.0.3.1 255.255.255.0
```

```
R2(config-if)#ip helper-address 30.0.0.1
```

```
R2(config-if)#no shutdown
```

```
R2(config-if)#int f2/0
```

```
R2(config-if)#ip add 30.0.0.2 255.255.255.0
```

```
R2(config-if)#no shutdown
```

```
R2(config-if)#exit
```

```
R2(config)#exit
```

```
R2#write
```

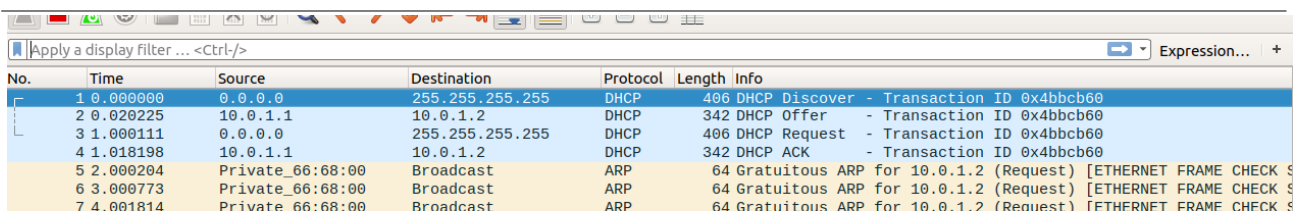
## OUTPUT:

```
PC1> dhcp
```

```
DDORA IP 10.0.1.2/24 GW 10.0.1.1
```

```
PC3> dhcp
```

```
DDORA IP 10.0.3.2/24 GW 10.0.3.1
```



The image shows a Wireshark packet capture window with a display filter set to 'Expression...'. The packet list shows the following traffic:

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	0.0.0.0	255.255.255.255	DHCP	406	DHCP Discover - Transaction ID 0x4bbcb60
2	0.020225	10.0.1.1	10.0.1.2	DHCP	342	DHCP Offer - Transaction ID 0x4bbcb60
3	1.000111	0.0.0.0	255.255.255.255	DHCP	406	DHCP Request - Transaction ID 0x4bbcb60
4	1.018198	10.0.1.1	10.0.1.2	DHCP	342	DHCP ACK - Transaction ID 0x4bbcb60
5	2.000294	Private_66:68:00	Broadcast	ARP	64	Gratuitous ARP for 10.0.1.2 (Request) [ETHERNET FRAME CHECK S
6	3.000773	Private_66:68:00	Broadcast	ARP	64	Gratuitous ARP for 10.0.1.2 (Request) [ETHERNET FRAME CHECK S
7	4.001814	Private_66:68:00	Broadcast	ARP	64	Gratuitous ARP for 10.0.1.2 (Request) [ETHERNET FRAME CHECK S