190905104
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Lab 5

Study of Domain Name Server & Study of DHCP Server

1)

Network details:
DNS Client – R1
DNS Server – R2
R1 – f0/0 – 10.10.10.1/24
R2 – f0/0 – 10.10.10.2/24
R2 – Loopback – 2.2.2.2 loopback.R2.com

Setting up R1:

```
R1#enable
R1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#hostname r1
r1(config)#hostname R1
R1(config)#ip address 10.10.10.1 255.255.255.0
                   ^
% Invalid input detected at '^' marker.

R1(config)#interface f0/0
R1(config-if)#ip address 10.10.10.1 255.255.255.0
R1(config-if)#no shut
R1(config-if)#do
*Nov  2 07:52:21.247: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
R1(config-if)#do wr
*Nov  2 07:52:21.247: %ENTITY_ALARM-6-INFO: CLEAR INFO Fa0/0 Physical Port Administrativ
e State Down
*Nov  2 07:52:22.247: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, c
hanged state to up
R1(config-if)#do wr
Building configuration...
[OK]
R1(config-if)#end
```

Setting up R2:

```
R2#enable
R2#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#interface f0/0
R2(config-if)#ip address 10.10.10.2 255.255.255.0
R2(config-if)#no shut
R2(config-if)#do
*Nov  2 07:52:54.867: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state t
o up
R2(config-if)#do wr
*Nov  2 07:52:54.867: %ENTITY_ALARM-6-INFO: CLEAR INFO Fa0/0 Physical Port Admin
istrative State Down
*Nov  2 07:52:55.867: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthern
et0/0, changed state to up
R2(config-if)#do wr
Building configuration...
[OK]
R2(config-if)#end
R2#
```

Setting up DNS server to translate **loopback.R2.com to 2.2.2.2**

```
R2#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#ip dns server
R2(config)#ip host loopback.R2.com 2.2.2.2
R2(config)#
```

```
R2(config-if)#ip address 2.2.2.2 255.255.255.255
R2(config-if)#end
R2#
```

Pinging the address **loopback.R2.com** from R2 to check if address is translating

```
R2#ping loopback.R2.com

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2.2.2.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms
R2#
```

Address is not reachable as R1 is not configured to lookup addresses

```
R1#ping loopback.R2.com

Translating "loopback.R2.com"
% Unrecognized host or address, or protocol not running.
```

Setup R1 to resolve address on R2

```
R1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#ip domain lookup
R1(config)#ip name-server 10.10.10.2
R1(config)#end
R1#
```

Set up Routing table

```
R1#config t
Enter configuration commands, one per line.  End
R1(config)#ip route 0.0.0.0 0.0.0.0 10.10.10.2
R1(config)#end
R1#
```

Successful Ping

```
R1#ping loopback.R2.com

Translating "loopback.R2.com"...domain server (10.10.10.2) [OK]

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2.2.2.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 60/60/64 ms
```

Address resolution

4	9.669964	10.10.10.1	10.10.10.2	DNS	75 Standard query 0x0003 A loopback.R2.com
5	9.680377	10.10.10.2	10.10.10.1	DNS	91 Standard query response 0x0003 A loopback.R2.com A 2.2.2.2

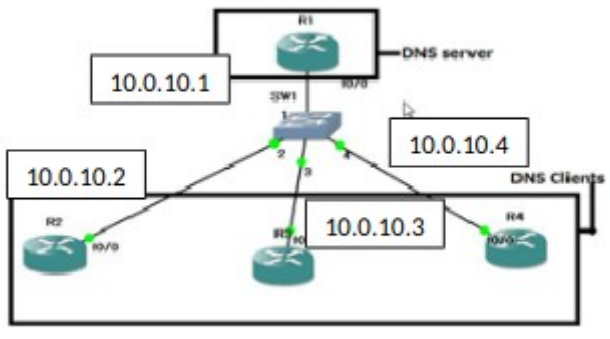
First R1 sends the address to R2 and then R2 returns the IP address to R1.

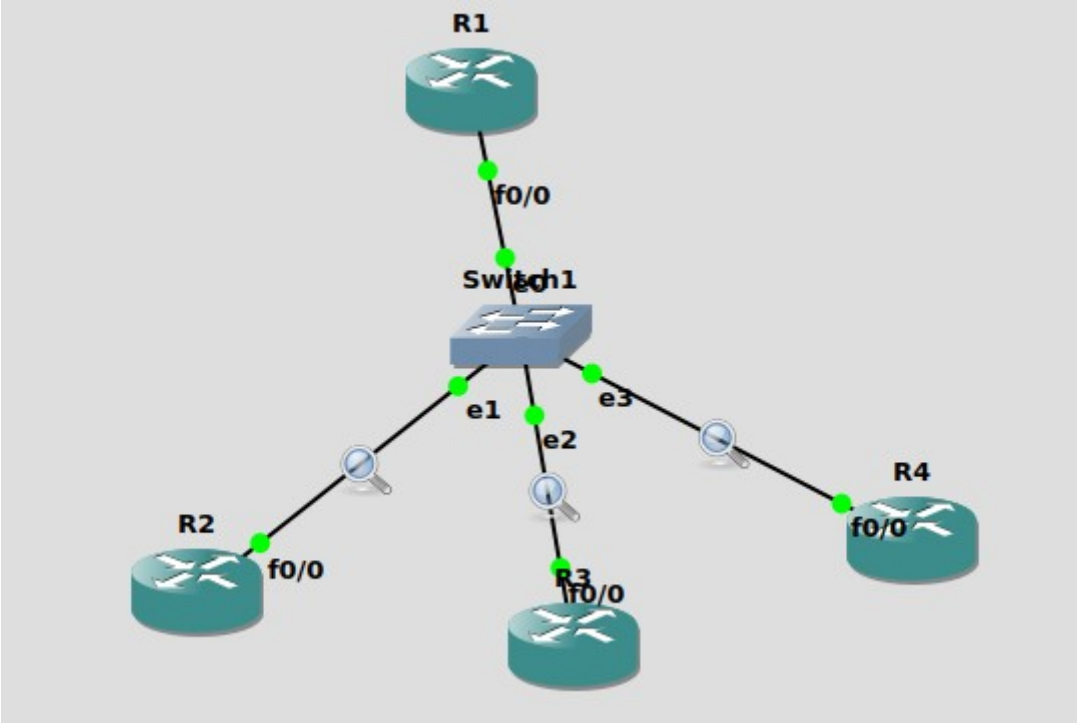
```
▾ Domain Name System (response)
    Transaction ID: 0x0004
  ▸ Flags: 0x8180 Standard query response, No error
    Questions: 1
    Answer RRs: 1
    Authority RRs: 0
    Additional RRs: 0
  ▾ Queries
    ▸ loopback.R2.com: type A, class IN
  ▾ Answers
    ▸ loopback.R2.com: type A, class IN, addr 2.2.2.2
    [Request In: 72]
    [Time: 0.010476000 seconds]
```

Normal pinging between R1(10.10.10.1) and R2(2.2.2.2):

6	9.690297	10.10.10.1	2.2.2.2	ICMP	114 Echo (ping) request id=0x0002, seq=0/0, ttl=255 (reply in 7)
7	9.700576	2.2.2.2	10.10.10.1	ICMP	114 Echo (ping) reply id=0x0002, seq=0/0, ttl=255 (request in 6)
8	9.710668	10.10.10.1	2.2.2.2	ICMP	114 Echo (ping) request id=0x0002, seq=1/256, ttl=255 (reply in 9)
9	9.720935	2.2.2.2	10.10.10.1	ICMP	114 Echo (ping) reply id=0x0002, seq=1/256, ttl=255 (request in 8)
10	9.730982	10.10.10.1	2.2.2.2	ICMP	114 Echo (ping) request id=0x0002, seq=2/512, ttl=255 (reply in 11)
11	9.741151	2.2.2.2	10.10.10.1	ICMP	114 Echo (ping) reply id=0x0002, seq=2/512, ttl=255 (request in 10
12	9.751291	10.10.10.1	2.2.2.2	ICMP	114 Echo (ping) request id=0x0002, seq=3/768, ttl=255 (reply in 13)
13	9.761577	2.2.2.2	10.10.10.1	ICMP	114 Echo (ping) reply id=0x0002, seq=3/768, ttl=255 (request in 12
14	9.771559	10.10.10.1	2.2.2.2	ICMP	114 Echo (ping) request id=0x0002, seq=4/1024, ttl=255 (reply in 15)
15	9.781820	2.2.2.2	10.10.10.1	ICMP	114 Echo (ping) reply id=0x0002, seq=4/1024, ttl=255 (request in 1

2)





Network details:
R1 – DNS server – f0/0 - 10.0.10.1
R1 – Loopback – 2.2.2.2
R2 – DNS Client - f0/0 – 10.0.10.2
R3 – DNS Client - f0/0 – 10.0.10.3
R4 – DNS Client - f0/0 – 10.0.10.4

Set up R1:

```
R1#enable
R1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#interface f0/0
R1(config-if)#ip address 10.0.10.1 255.255.255.0
R1(config-if)#no shut
R1(config-if)#
*Nov  2 08:21:49.815: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state t
o up
R1(config-if)#
*Nov  2 08:21:49.815: %ENTITY_ALARM-6-INFO: CLEAR INFO Fa0/0 Physical Port Admin
istrative State Down
*Nov  2 08:21:50.815: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthern
et0/0, changed state to up
R1(config-if)#do wr
Building configuration...
[OK]
R1(config-if)#end
```

Setting back DNS server and loopback IP address on R1:

```
R1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#ip dns server
R1(config)#ip host loopback.R1.com 2.2.2.2
R1(config)#interface loopback 1
R1(config-if)#
*Nov  2 08:27:09.171: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1,
 changed state to up
R1(config-if)#ip address 2.2.2.2 255.255.255.255
R1(config-if)#end
```

Set up R2 IP address and similarly set up the other routers as well:

```
R2#enable
R2#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#interface f0/0
R2(config-if)#ip address 10.0.10.2 255.255.255.0
R2(config-if)#no shut
R2(config-if)#do wr
```

Set up domain lookup address in R2, R3 and R4:

```
R2#conf t
Enter configuration commands, one per l
R2(config)#ip domain lookup
R2(config)#ip name-server 10.0.10.1
```

Set up routing table

```
R2#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#ip route 0.0.0.0 0.0.0.0 10.0.10.1
R2(config)#end
```

Successful ping and address translation in R1:

```
R2#ping loopback.R1.com

Translating "loopback.R1.com"...domain server (10.0.10.1) [OK]

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2.2.2.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 56/60/68 ms
R2#
```

Capture in wireshark for DNS:

2	1.903191	10.0.10.2	10.0.10.1	DNS	75 Standard query 0x0002 A loopback.R1.com
3	1.911687	10.0.10.1	10.0.10.2	DNS	91 Standard query response 0x0002 A loopback.R1.com A 2.2.2.2

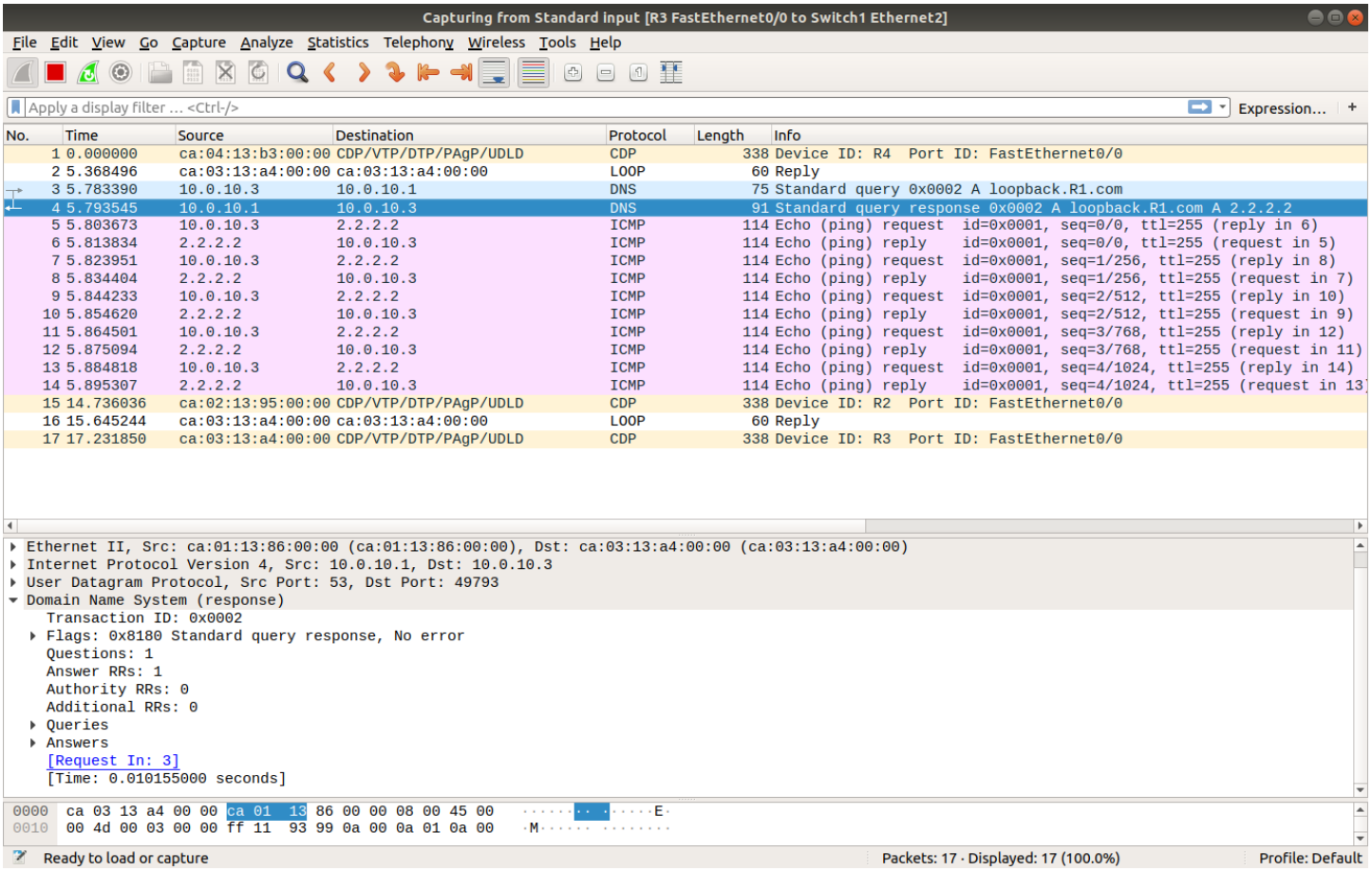
As you can see, it returns the address 2.2.2.2 for loopback.R1.com

```
▾ Domain Name System (response)
    Transaction ID: 0x0002
  ▸ Flags: 0x8180 Standard query response, No error
    Questions: 1
    Answer RRs: 1
    Authority RRs: 0
    Additional RRs: 0
  ▸ Queries
  ▾ Answers
    ▸ loopback.R1.com: type A, class IN, addr 2.2.2.2
    [Request In: 2]
    [Time: 0.008496000 seconds]
```

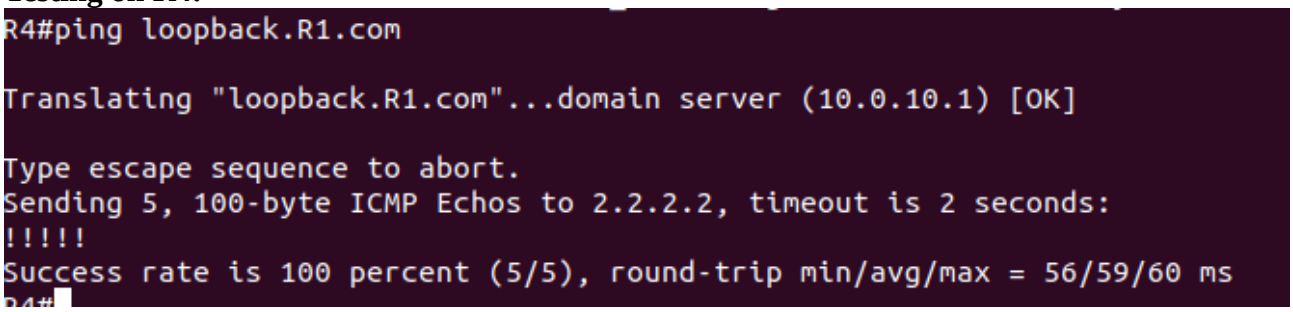
Testing on R3:

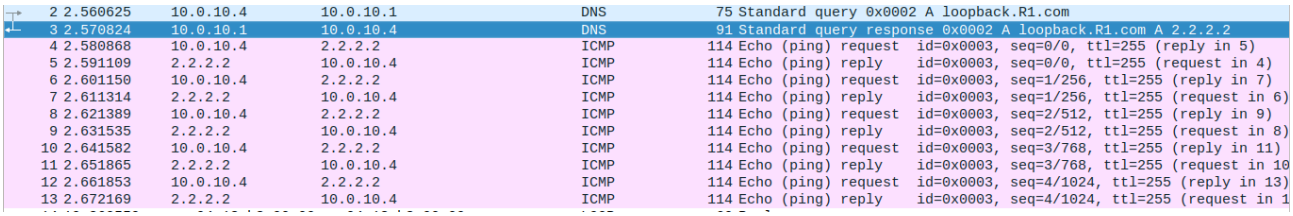
```
R3(config)#ip domain lookup
R3(config)#ip name-server 10.0.10.1
R3(config)#end
R3#conf t
*Nov  2 08:32:53.067: %SYS-5-CONFIG_I: Configured from console by console
R3#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#ip route 0.0.0.0 0.0.0.0 10.0.10.1
R3(config)#end
R3#
```

```
R3#ping loopback.R1.com

Translating "loopback.R1.com"...domain server (10.0.10.1) [OK]

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2.2.2.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 60/62/68 ms
R3#
```



Testing on R4:

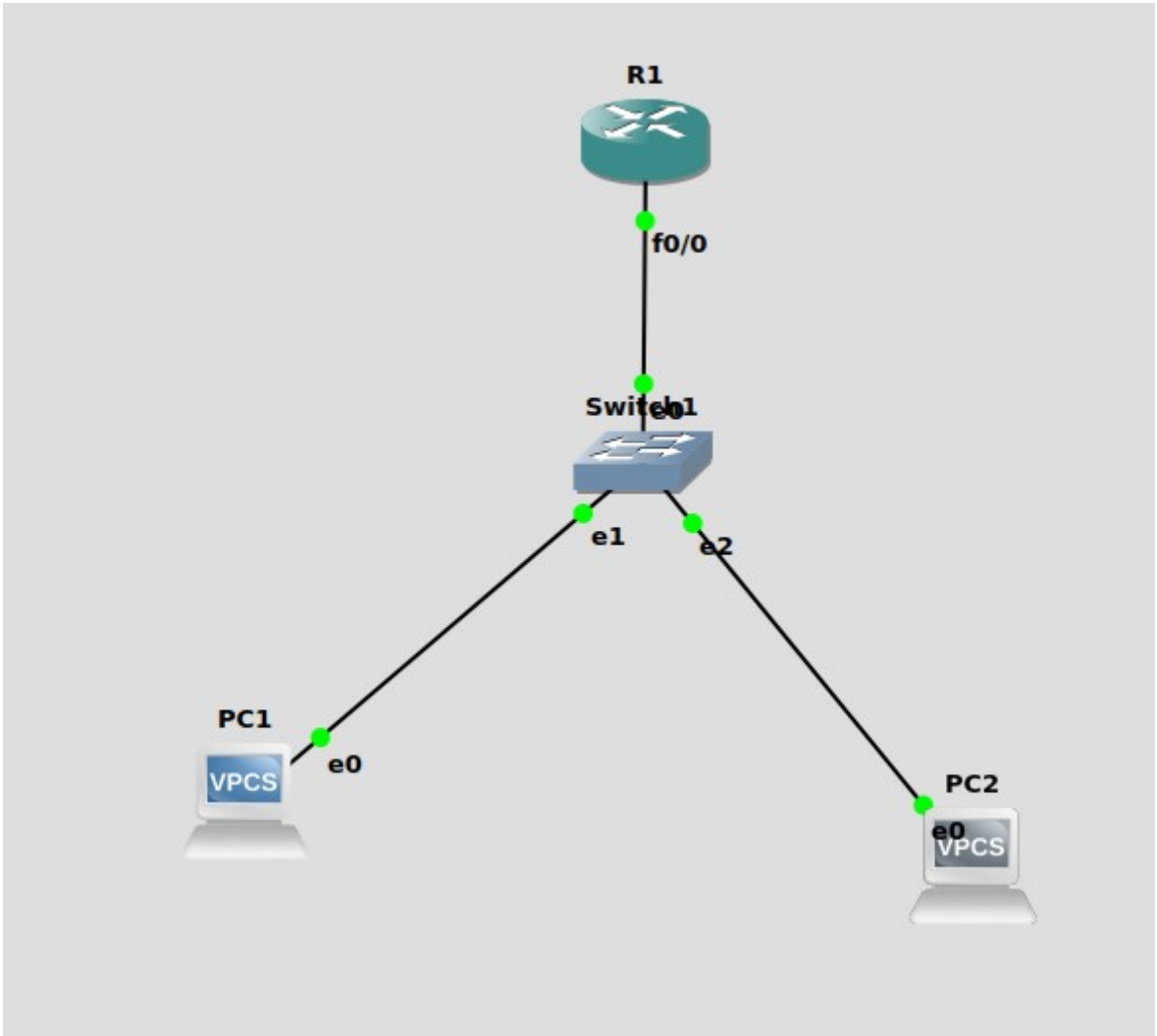




Query and answer clearly visible in this picture

```
▸ User Datagram Protocol, Src Port: 53, Dst Port: 56439
▾ Domain Name System (response)
    Transaction ID: 0x0002
  ▸ Flags: 0x8180 Standard query response, No error
    Questions: 1
    Answer RRs: 1
    Authority RRs: 0
    Additional RRs: 0
  ▾ Queries
    ▸ loopback.R1.com: type A, class IN
  ▾ Answers
    ▸ loopback.R1.com: type A, class IN, addr 2.2.2.2
    [Request In: 2]
    [Time: 0.010199000 seconds]
```

3)



Setting up DHCP

```
R1#enable
R1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#IP dhcp pool NAME
R1(dhcp-config)#Network 192.168.3.0 255.255.255.0
R1(dhcp-config)#Default-router 192.168.3.1
R1(dhcp-config)#exit
```

Setting IP address 198.168.3.1 to f0/0

```
R1(config)#interface f0/0
R1(config-if)#No shutdown
R1(config-if)#
*Nov  2 09:14:04.819: %LINK-3-UPDOWN: Interface Fas
o up
R1(config-if)#
*Nov  2 09:14:04.819: %ENTITY_ALARM-6-INFO: CLEAR I
istrative State Down
*Nov  2 09:14:05.819: %LINEPROTO-5-UPDOWN: Line pro
et0/0, changed state to up
R1(config-if)#ip address 198.168.3.1 255.255.255.0
```

IP address of PC1:

```
PC1> show ip

NAME        : PC1[1]
IP/MASK     : 0.0.0.0/0
GATEWAY     : 0.0.0.0
DNS         :
MAC         : 00:50:79:66:68:00
LPORT       : 10008
RHOST:PORT  : 127.0.0.1:10009
MTU         : 1500
```

After running dhcp

```
PC1> dhcp
DDORA IP 192.168.3.2/24 GW 192.168.3.1

PC1> show ip

NAME        : PC1[1]
IP/MASK     : 192.168.3.2/24
GATEWAY     : 192.168.3.1
DNS         :
DHCP SERVER : 192.168.3.1
DHCP LEASE  : 86394, 86400/43200/75600
MAC         : 00:50:79:66:68:00
LPORT       : 10008
RHOST:PORT  : 127.0.0.1:10009
MTU         : 1500
```

IP adress of PC2

```
PC2> show ip

NAME        : PC2[1]
IP/MASK     : 0.0.0.0/0
GATEWAY     : 0.0.0.0
DNS         :
MAC         : 00:50:79:66:68:01
LPORT       : 10010
RHOST:PORT  : 127.0.0.1:10011
MTU         : 1500
```

After dhcp

```
PC2> dhcp
DDORA IP 192.168.3.3/24 GW 192.168.3.1

PC2> show ip

NAME        : PC2[1]
IP/MASK     : 192.168.3.3/24
GATEWAY     : 192.168.3.1
DNS         :
DHCP SERVER : 192.168.3.1
DHCP LEASE  : 86385, 86400/43200/75600
MAC         : 00:50:79:66:68:01
LPORT       : 10010
RHOST:PORT  : 127.0.0.1:10011
MTU         : 1500
```

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	Private_66:68:00	Broadcast	ARP	64	Who has 192.168.3.3? Tell 192.168.3.2 [ETHERNET FRAME CHECK SEQUE
2	0.000360	Private_66:68:01	Private_66:68:00	ARP	64	192.168.3.3 is at 00:50:79:66:68:01 [ETHERNET FRAME CHECK SEQUENC
3	0.001053	192.168.3.2	192.168.3.3	ICMP	98	Echo (ping) request id=0x5705, seq=1/256, ttl=64 (reply in 4)
4	0.001421	192.168.3.3	192.168.3.2	ICMP	98	Echo (ping) reply id=0x5705, seq=1/256, ttl=64 (request in 3)
5	1.002333	192.168.3.2	192.168.3.3	ICMP	98	Echo (ping) request id=0x5805, seq=2/512, ttl=64 (reply in 6)
6	1.002788	192.168.3.3	192.168.3.2	ICMP	98	Echo (ping) reply id=0x5805, seq=2/512, ttl=64 (request in 5)
7	2.003572	192.168.3.2	192.168.3.3	ICMP	98	Echo (ping) request id=0x5905, seq=3/768, ttl=64 (reply in 8)
8	2.004033	192.168.3.3	192.168.3.2	ICMP	98	Echo (ping) reply id=0x5905, seq=3/768, ttl=64 (request in 7)
9	3.004798	192.168.3.2	192.168.3.3	ICMP	98	Echo (ping) request id=0x5a05, seq=4/1024, ttl=64 (reply in 10)
10	3.005335	192.168.3.3	192.168.3.2	ICMP	98	Echo (ping) reply id=0x5a05, seq=4/1024, ttl=64 (request in 9)
11	4.005929	192.168.3.2	192.168.3.3	ICMP	98	Echo (ping) request id=0x5b05, seq=5/1280, ttl=64 (reply in 12)
12	4.006362	192.168.3.3	192.168.3.2	ICMP	98	Echo (ping) reply id=0x5b05, seq=5/1280, ttl=64 (request in 11

We see a discover message followed by an offer, request, and an acknowledgement.

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	0.0.0.0	255.255.255.255	DHCP	400	DHCP Discover - Transaction ID 0x94b8e53d
2	0.007052	192.168.3.1	192.168.3.2	DHCP	342	DHCP Offer - Transaction ID 0x94b8e53d
3	1.000120	0.0.0.0	255.255.255.255	DHCP	406	DHCP Request - Transaction ID 0x94b8e53d
4	1.007348	192.168.3.1	192.168.3.2	DHCP	342	DHCP ACK - Transaction ID 0x94b8e53d
5	2.000270	Private_66:68:00	Broadcast	ARP	64	Gratuitous ARP for 192.168.3.2 (Request) [ETHERNET FRAME CHECK SEQUENCE INCORRECT]
6	3.000411	Private_66:68:00	Broadcast	ARP	64	Gratuitous ARP for 192.168.3.2 (Request) [ETHERNET FRAME CHECK SEQUENCE INCORRECT]
7	4.001042	Private_66:68:00	Broadcast	ARP	64	Gratuitous ARP for 192.168.3.2 (Request) [ETHERNET FRAME CHECK SEQUENCE INCORRECT]
8	48.160992	ca:01:21:27:00:00	CDP/VTP/DTP/PAgP/UD…	CDP	338	Device ID: R1 Port ID: FastEthernet0/0