

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 Administrative State Down
*Nov  2 07:52:22.247: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed 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 to up
R2(config-if)#do wr
*Nov  2 07:52:54.867: %ENTITY_ALARM-6-INFO: CLEAR INFO Fa0/0 Physical Port Administrative State Down
*Nov  2 07:52:55.867: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, 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
R1#
```

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

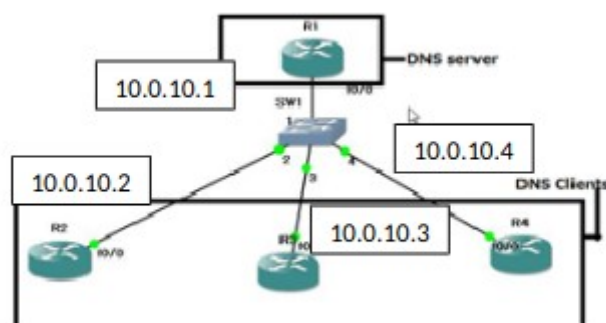
First R1 sends the address to R2 and then R2 returns the IP address to R1.

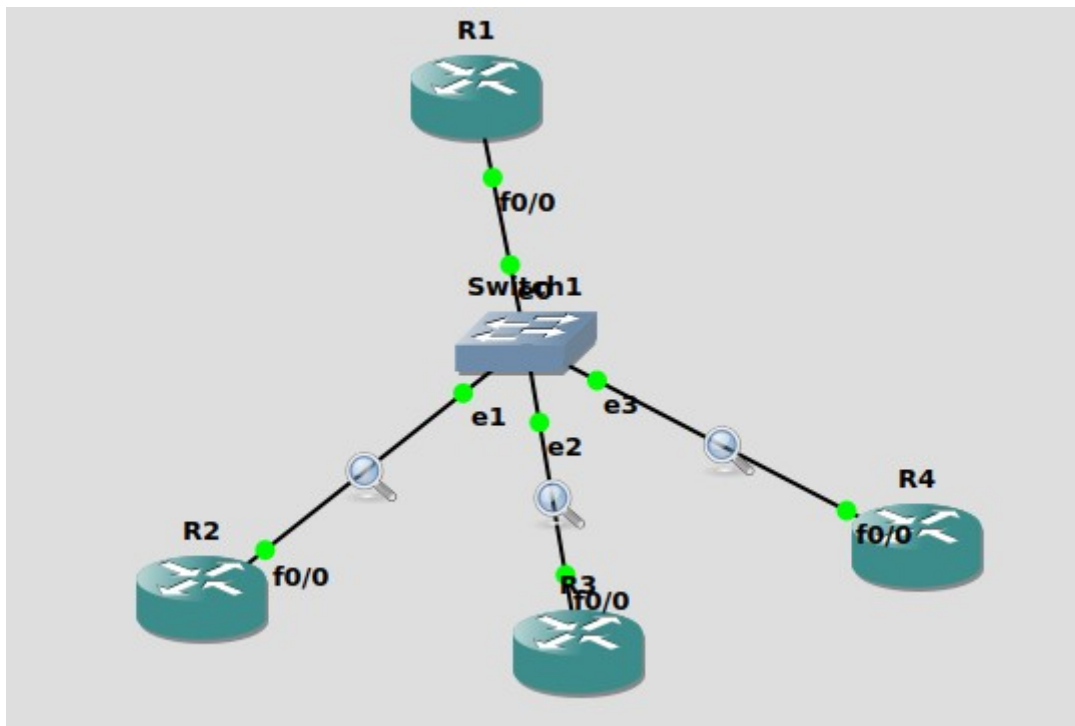
- ▼ Domain Name System (response)
 - Transaction ID: 0x0004
 - ▶ Flags: 0x8180 Standard query response, No error
 - Questions: 1
 - Answer RRs: 1
 - Authority RRs: 0
 - Additional RRs: 0
 - ▼ Queries
 - ▶ loopback.R2.com: type A, class IN
 - ▼ Answers
 - ▶ loopback.R2.com: type A, class IN, addr 2.2.2.2
- [\[Request In: 72\]](#)
[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 14)

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 to up
R1(config-if)#
*Nov  2 08:21:49.815: %ENTITY_ALARM-6-INFO: CLEAR INFO Fa0/0 Physical Port Administrative State Down
*Nov  2 08:21:50.815: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
R1(config-if)#do wr
Building configuration...
[OK]
R1(config-if)#end
R1#

```

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
R1#

```

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 line. End with CNTL/Z.
R2(config)#ip domain lookup
R2(config)#ip name-server 10.0.10.1
R2(config)#

```

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
R2#

```

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#
```


Capturing from Standard input [R3 FastEthernet0/0 to Switch1 Ethernet2]

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

Apply a display filter ... <Ctrl-/> Expression...

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	ca:04:13:b3:00:00	CDP/VTP/DTP/PAGP/UDLD	CDP	338	Device ID: R4 Port ID: FastEthernet0/0
2	5.368496	ca:03:13:a4:00:00	ca:03:13:a4:00:00	LOOP	60	Reply
3	5.783390	10.0.10.3	10.0.10.1	DNS	75	Standard query 0x0002 A loopback.R1.com
4	5.793545	10.0.10.1	10.0.10.3	DNS	91	Standard query response 0x0002 A loopback.R1.com A 2.2.2.2
5	5.803673	10.0.10.3	2.2.2.2	ICMP	114	Echo (ping) request id=0x0001, seq=0/0, ttl=255 (reply in 6)
6	5.813834	2.2.2.2	10.0.10.3	ICMP	114	Echo (ping) reply id=0x0001, seq=0/0, ttl=255 (request in 5)
7	5.823951	10.0.10.3	2.2.2.2	ICMP	114	Echo (ping) request id=0x0001, seq=1/256, ttl=255 (reply in 8)
8	5.834404	2.2.2.2	10.0.10.3	ICMP	114	Echo (ping) reply id=0x0001, seq=1/256, ttl=255 (request in 7)
9	5.844233	10.0.10.3	2.2.2.2	ICMP	114	Echo (ping) request id=0x0001, seq=2/512, ttl=255 (reply in 10)
10	5.854620	2.2.2.2	10.0.10.3	ICMP	114	Echo (ping) reply id=0x0001, seq=2/512, ttl=255 (request in 9)
11	5.864501	10.0.10.3	2.2.2.2	ICMP	114	Echo (ping) request id=0x0001, seq=3/768, ttl=255 (reply in 12)
12	5.875094	2.2.2.2	10.0.10.3	ICMP	114	Echo (ping) reply id=0x0001, seq=3/768, ttl=255 (request in 11)
13	5.884818	10.0.10.3	2.2.2.2	ICMP	114	Echo (ping) request id=0x0001, seq=4/1024, ttl=255 (reply in 14)
14	5.895307	2.2.2.2	10.0.10.3	ICMP	114	Echo (ping) reply id=0x0001, seq=4/1024, ttl=255 (request in 13)
15	14.736036	ca:02:13:95:00:00	CDP/VTP/DTP/PAGP/UDLD	CDP	338	Device ID: R2 Port ID: FastEthernet0/0
16	15.645244	ca:03:13:a4:00:00	ca:03:13:a4:00:00	LOOP	60	Reply
17	17.231850	ca:03:13:a4:00:00	CDP/VTP/DTP/PAGP/UDLD	CDP	338	Device ID: R3 Port ID: FastEthernet0/0

Ethernet II, Src: ca:01:13:86:00:00 (ca:01:13:86:00:00), Dst: ca:03:13:a4:00:00 (ca:03:13:a4:00:00)

Internet Protocol Version 4, Src: 10.0.10.1, Dst: 10.0.10.3

User Datagram Protocol, Src Port: 53, Dst Port: 49793

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

[Request In: 3]

[Time: 0.010155000 seconds]

0000 ca 03 13 a4 00 00 ca 01 13 86 00 00 00 00 45 00E.

0010 00 4d 00 03 00 00 ff 11 93 99 0a 00 0a 01 0a 00M.....

Ready to load or capture Packets: 17 · Displayed: 17 (100.0%) Profile: Default

Testing on R4:

```
R4#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 = 56/59/60 ms
```

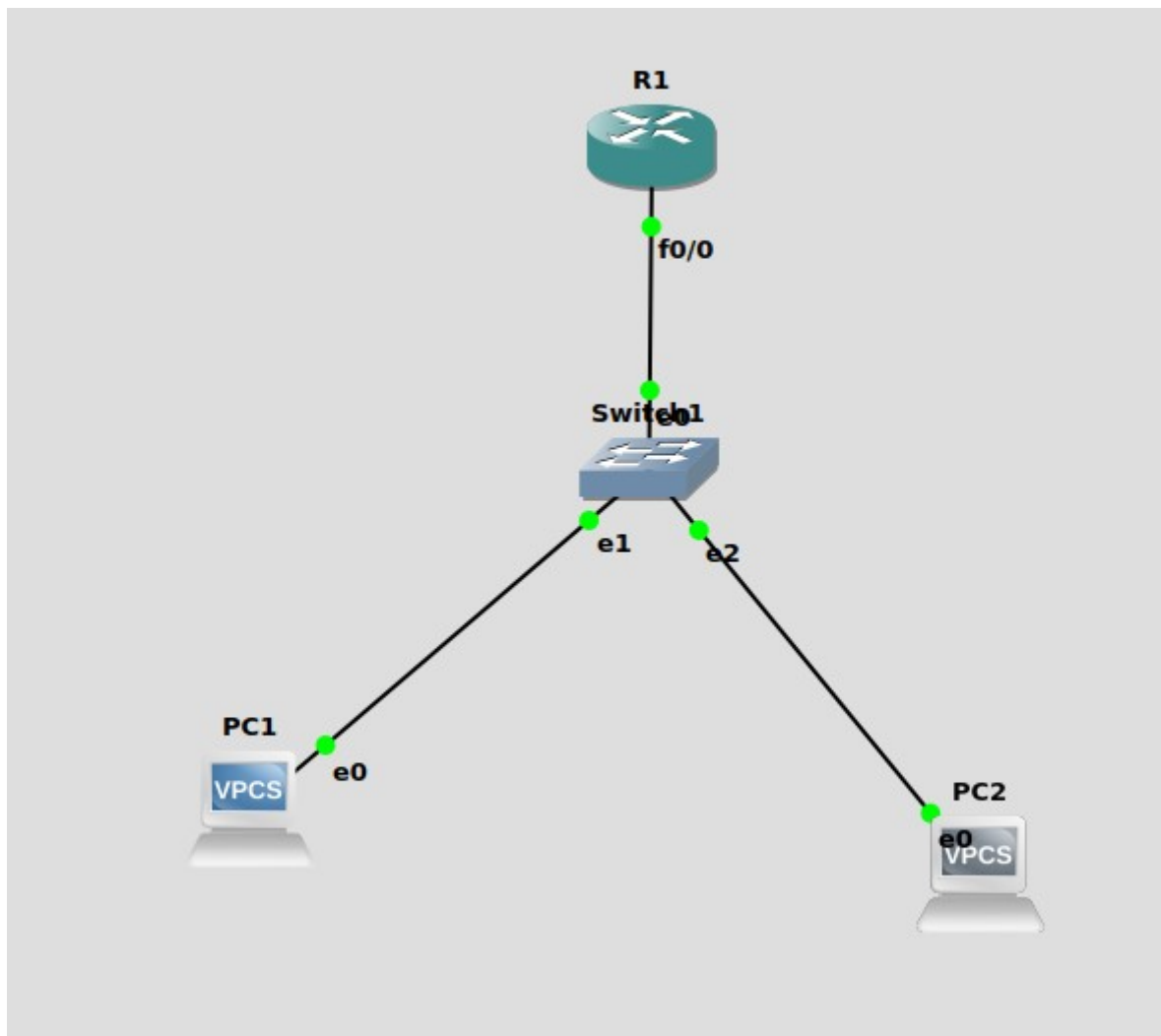
```
244#
```

2	2.560625	10.0.10.4	10.0.10.1	DNS	75	Standard query 0x0002 A loopback.R1.com
3	2.570824	10.0.10.1	10.0.10.4	DNS	91	Standard query response 0x0002 A loopback.R1.com A 2.2.2.2
4	2.580868	10.0.10.4	2.2.2.2	ICMP	114	Echo (ping) request id=0x0003, seq=0/0, ttl=255 (reply in 5)
5	2.591109	2.2.2.2	10.0.10.4	ICMP	114	Echo (ping) reply id=0x0003, seq=0/0, ttl=255 (request in 4)
6	2.601150	10.0.10.4	2.2.2.2	ICMP	114	Echo (ping) request id=0x0003, seq=1/256, ttl=255 (reply in 7)
7	2.611314	2.2.2.2	10.0.10.4	ICMP	114	Echo (ping) reply id=0x0003, seq=1/256, ttl=255 (request in 6)
8	2.621389	10.0.10.4	2.2.2.2	ICMP	114	Echo (ping) request id=0x0003, seq=2/512, ttl=255 (reply in 9)
9	2.631535	2.2.2.2	10.0.10.4	ICMP	114	Echo (ping) reply id=0x0003, seq=2/512, ttl=255 (request in 8)
10	2.641582	10.0.10.4	2.2.2.2	ICMP	114	Echo (ping) request id=0x0003, seq=3/768, ttl=255 (reply in 11)
11	2.651865	2.2.2.2	10.0.10.4	ICMP	114	Echo (ping) reply id=0x0003, seq=3/768, ttl=255 (request in 10)
12	2.661853	10.0.10.4	2.2.2.2	ICMP	114	Echo (ping) request id=0x0003, seq=4/1024, ttl=255 (reply in 13)
13	2.672169	2.2.2.2	10.0.10.4	ICMP	114	Echo (ping) reply id=0x0003, seq=4/1024, ttl=255 (request in 12)

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 192.168.3.1 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 FastEthernet0/0 is now up
R1(config-if)#
*Nov  2 09:14:04.819: %ENTITY_ALARM-6-INFO: CLEAR Interface FastEthernet0/0 Administrative State Down
*Nov  2 09:14:05.819: %LINEPROTO-5-UPDOWN: Line protocol is now up
R1(config-if)#ip address 192.168.3.1 255.255.255.0
```

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
ODORA 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	480	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