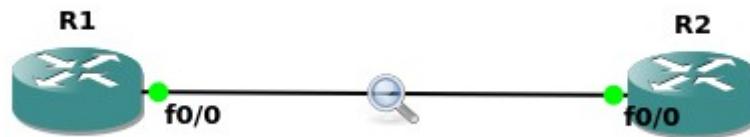


# LAB 5

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**Batch B3**

## Manual Lab 7 Exercise:

**1) Configure the below topology to setup DNS server. R1 will use R2 as DNS server to make DNS resolutions.**



DNS query response:

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	ca:02:0d:e8:00:00	ca:02:0d:e8:00:00	LOOP	60	Reply
2	0.472782	ca:01:0d:d9:00:08	ca:01:0d:d9:00:08	LOOP	60	Reply
3	10.430641	ca:02:0d:e8:00:00	ca:02:0d:e8:00:00	LOOP	60	Reply
4	10.894101	ca:01:0d:d9:00:08	ca:01:0d:d9:00:08	LOOP	60	Reply
5	12.204495	ca:01:0d:d9:00:08	Broadcast	ARP	60	Who has 10.10.10.2? Tell 10.10.10.1
6	12.214713	ca:02:0d:e8:00:00	ca:01:0d:d9:00:08	ARP	60	10.10.10.2 is at ca:02:0d:e8:00:00
7	15.671751	ca:02:0d:e8:00:00	CDP/VTP/DTP/PAgP/UDLD	CDP	347	Device ID: R2 Port ID: FastEthernet0/0
8	18.765688	10.10.10.1	10.10.10.2	DNS	75	Standard query 0x0001 A loopback.R2.com
9	18.785995	10.10.10.2	10.10.10.1	DNS	91	Standard query response 0x0001 A loopback.R2.com A 2.2.2.2
10	18.806048	10.10.10.1	2.2.2.2	ICMP	114	Echo (ping) request id=0x0000, seq=0/0, ttl=255 (reply in 11)
11	18.816284	2.2.2.2	10.10.10.1	ICMP	114	Echo (ping) reply id=0x0000, seq=0/0, ttl=255 (request in 10)
12	18.826280	10.10.10.1	2.2.2.2	ICMP	114	Echo (ping) request id=0x0000, seq=1/256, ttl=255 (reply in 13)
13	18.836454	2.2.2.2	10.10.10.1	ICMP	114	Echo (ping) reply id=0x0000, seq=1/256, ttl=255 (request in 12)
14	18.846499	10.10.10.1	2.2.2.2	ICMP	114	Echo (ping) request id=0x0000, seq=2/512, ttl=255 (reply in 15)
15	18.856587	2.2.2.2	10.10.10.1	ICMP	114	Echo (ping) reply id=0x0000, seq=2/512, ttl=255 (request in 14)
16	20.529468	ca:02:0d:e8:00:00	ca:02:0d:e8:00:00	LOOP	60	Reply

Ethernet II, Src: ca:02:0d:e8:00:00 (ca:02:0d:e8:00:00), Dst: ca:01:0d:d9:00:08 (ca:01:0d:d9:00:08)

Internet Protocol Version 4, Src: 10.10.10.2, Dst: 10.10.10.1

User Datagram Protocol, Src Port: 53, Dst Port: 54082

Domain Name System (response)

Transaction ID: 0x0001

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

0000 ca 01 0d d9 00 08 ca 02 0d e8 00 00 00 00 45 00 .....E

0010 00 4d 00 00 00 00 ff 11 93 89 0a 0a 0a 02 0a 0a .....M

0020 0a 01 00 35 d3 42 00 39 e5 ff 00 01 81 80 00 01 .....5 B 9

0030 00 01 00 00 00 00 00 6c 6f 6f 70 62 61 63 6b 02 .....l oopback

0040 52 32 03 63 6f 6d 00 00 01 00 01 c0 0c 00 01 00 .....R2.com

0050 01 00 00 00 0a 00 04 02 02 02 02

Text item (text), 21 bytes

Packets: 17 · Displayed: 17 (100.0%) · Dropped: 0 (0.0%) · Profile: Default

DNS query:

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	ca:02:0d:e8:00:00	ca:02:0d:e8:00:00	LOOP	60	Reply
2	0.472782	ca:01:0d:d9:00:08	ca:01:0d:d9:00:08	LOOP	60	Reply
3	10.430641	ca:02:0d:e8:00:00	ca:02:0d:e8:00:00	LOOP	60	Reply
4	10.894101	ca:01:0d:d9:00:08	ca:01:0d:d9:00:08	LOOP	60	Reply
5	12.204495	ca:01:0d:d9:00:08	Broadcast	ARP	60	Who has 10.10.10.2? Tell 10.10.10.1
6	12.214713	ca:02:0d:e8:00:00	ca:01:0d:d9:00:08	ARP	60	10.10.10.2 is at ca:02:0d:e8:00:00
7	15.671751	ca:02:0d:e8:00:00	CDP/VTP/DTP/PAGP/UDLD	CDP	347	Device ID: R2 Port ID: FastEthernet0/0
8	18.765688	10.10.10.1	10.10.10.2	DNS	75	Standard query 0x0001 A loopback.R2.com
9	18.785995	10.10.10.2	10.10.10.1	DNS	91	Standard query response 0x0001 A loopback.R2.com A 2.2.2.2
10	18.806048	10.10.10.1	2.2.2.2	ICMP	114	Echo (ping) request id=0x0000, seq=0/0, ttl=255 (reply in 11)
11	18.816284	2.2.2.2	10.10.10.1	ICMP	114	Echo (ping) reply id=0x0000, seq=0/0, ttl=255 (request in 10)
12	18.826280	10.10.10.1	2.2.2.2	ICMP	114	Echo (ping) request id=0x0000, seq=1/256, ttl=255 (reply in 13)
13	18.836454	2.2.2.2	10.10.10.1	ICMP	114	Echo (ping) reply id=0x0000, seq=1/256, ttl=255 (request in 12)
14	18.846499	10.10.10.1	2.2.2.2	ICMP	114	Echo (ping) request id=0x0000, seq=2/512, ttl=255 (reply in 15)
15	18.856587	2.2.2.2	10.10.10.1	ICMP	114	Echo (ping) reply id=0x0000, seq=2/512, ttl=255 (request in 14)
16	20.529468	ca:02:0d:e8:00:00	ca:02:0d:e8:00:00	LOOP	60	Reply

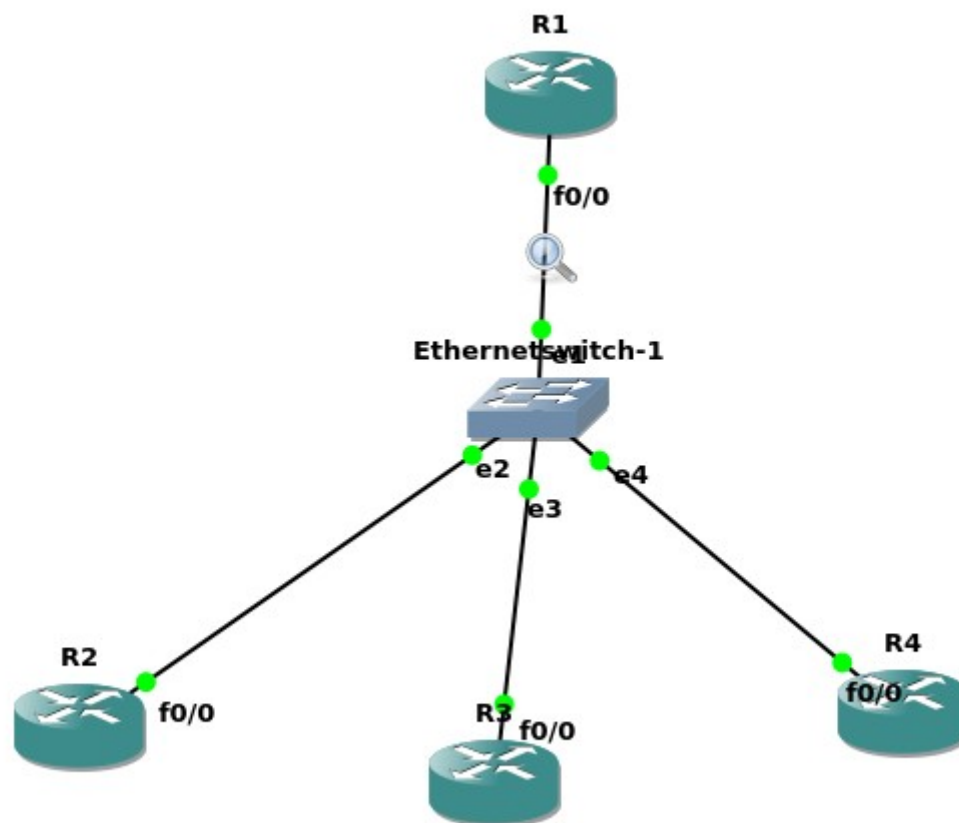
  

► Ethernet II, Src: ca:01:0d:d9:00:08 (ca:01:0d:d9:00:08), Dst: ca:02:0d:e8:00:00 (ca:02:0d:e8:00:00)
► Internet Protocol Version 4, Src: 10.10.10.1, Dst: 10.10.10.2
► User Datagram Protocol, Src Port: 54082, Dst Port: 53
▼ Domain Name System (query)
Transaction ID: 0x0001
► Flags: 0x0100 Standard query
Questions: 1
Answer RRs: 0
Authority RRs: 0
Additional RRs: 0
▼ Queries
► loopback.R2.com: type A, class IN
<a href="#">[Response In: 9]</a>

0000	ca 02 0d e8 00 00 ca 01 0d d9 00 08 08 00 45 00	.....E..
0010	00 3d 00 01 00 00 ff 11 93 98 0a 0a 0a 01 0a 0a	.....=.
0020	0a 02 d3 42 00 35 00 29 87 65 00 01 01 00 00 01	...B.5.)..e.....
0030	00 00 00 00 00 00 08 6c 6f 6f 70 62 61 63 6b 02	.....l oopback.
0040	52 32 03 63 6f 6d 00 00 01 00 01	R2.com.....

**2) Configure the below DNS Server and DNS Client. Test the setup. Analyze the Interaction.**



Configuring R1 ip and hostname:

```
R1#enable
R1#config t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#hostname R1
R1(config)#int f0/0
R1(config-if)#ip address 10.0.10.1 255.255.255.0
R1(config-if)#no shut
R1(config-if)#do wr
*Nov  6 13:54:32.467: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
R1(config-if)#do wr

*Nov  6 13:54:32.467: %ENTITY_ALARM-6-INFO: CLEAR INFO Fa0/0 Physical Port Administrative State Down
*Nov  6 13:54:33.467: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
Building configuration...
[OK]
R1(config-if)#end
```

Setting up R1 as DNS Server and pinging to check if it is correct:

```

R1#config 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)#int loopback 1
R1(config-if)#ip a
*Nov  6 13:59:42.483: %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#
*Nov  6 13:59:57.139: %SYS-5-CONFIG_I: Configured from console by console
R1#ping loopback.R1.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 = 1/3/4 ms
R1#

```

Configuring R2 ip and hostname:

Setup R2 to resolve hostnames using R1 and ping so we can capture packets:

```

R2#config 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)#ip route 0.0.0.0 0.0.0.0 10.0.10.1
R2(config)#end
R2#
*Nov  6 14:00:57.111: %SYS-5-CONFIG_I: Configured from console by console
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 = 56/60/64 ms
R2#

R2(config-if)#no shut
R2(config-if)#do wr
*Nov  6 13:55:00.607: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
R2(config-if)#do wr
*Nov  6 13:55:00.607: %ENTITY_ALARM-6-INFO: CLEAR INFO Fa0/0 Physical Port Administrative State Down
*Nov  6 13:55:01.607: %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#
*Nov  6 13:55:07.655: %SYS-5-CONFIG I: Configured from console by console

```

Configuring R3 ip and hostname:



```

R3#
R3#enable
R3#config t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#hostname R3
R3(config)#int f0/0
R3(config-if)#ip address 10.0.10.3 255.255.255.0
R3(config-if)#no shut
R3(config-if)#do wr
*Nov 6 13:55:42.279: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
R3(config-if)#do wr
Building configuration...

*Nov 6 13:55:42.279: %ENTITY_ALARM-6-INFO: CLEAR INFO Fa0/0 Physical Port Administrative State Down
*Nov 6 13:55:43.311: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up[OK]
R3(config-if)#end
R3#
*Nov 6 13:55:48.467: %SYS-5-CONFIG_I: Configured from console by console

```

Setup R3 to resolve hostnames using R1 and pinging so we can capture packets:

```

R3#config t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#ip domain lookup
R3(config)#ip name-server 10.0.10.1
R3(config)#ip route 0.0.0.0 0.0.0.0 10.0.10.1
R3(config)#end
R3#
*Nov 6 14:02:29.383: %SYS-5-CONFIG_I: Configured from console by console
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 = 56/59/64 ms
R3#

```

Configuring R4 ip and hostname:

```

R4#enable
R4#cofig t
^
% Invalid input detected at '^' marker.

R4#config t
Enter configuration commands, one per line. End with CNTL/Z.
R4(config)#hostname R4
R4(config)#int f0/0
R4(config-if)#ip address 10.0.10.4 255.255.255.0
R4(config-if)#no shut
R4(config-if)#do wr
Building configuration...
[OK]
R4(config-if)#
*Nov 6 13:56:02.435: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
*Nov 6 13:56:02.435: %ENTITY_ALARM-6-INFO: CLEAR INFO Fa0/0 Physical Port Administrative State Down
R4(config-if)#en
*Nov 6 13:56:03.435: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
R4(config-if)#end
R4#
*Nov 6 13:56:05.303: %SYS-5-CONFIG_I: Configured from console by console

```

Setup R4 to resolve hostnames using R1 and pinging so we can capture packets:

```

R4#config t
Enter configuration commands, one per line. End with CNTL/Z.
R4(config)#ip domain lookup
R4(config)#ip name-server 10.0.10.1
R4(config)#ip route 0.0.0.0 0.0.0.0 10.0.10.1
R4(config)#end
R4#
*Nov  6 14:02:36.071: %SYS-5-CONFIG_I: Configured from console by console
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 = 60/60/64 ms
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 = 36/55/60 ms
R4#

```

DNS query response when we ping from R2 to R1:

The image shows a Wireshark packet capture of a DNS query and response. The top pane displays a list of packets, with packet 11 selected. The middle pane shows the details of the selected packet, and the bottom pane shows the raw packet data in hexadecimal and ASCII.

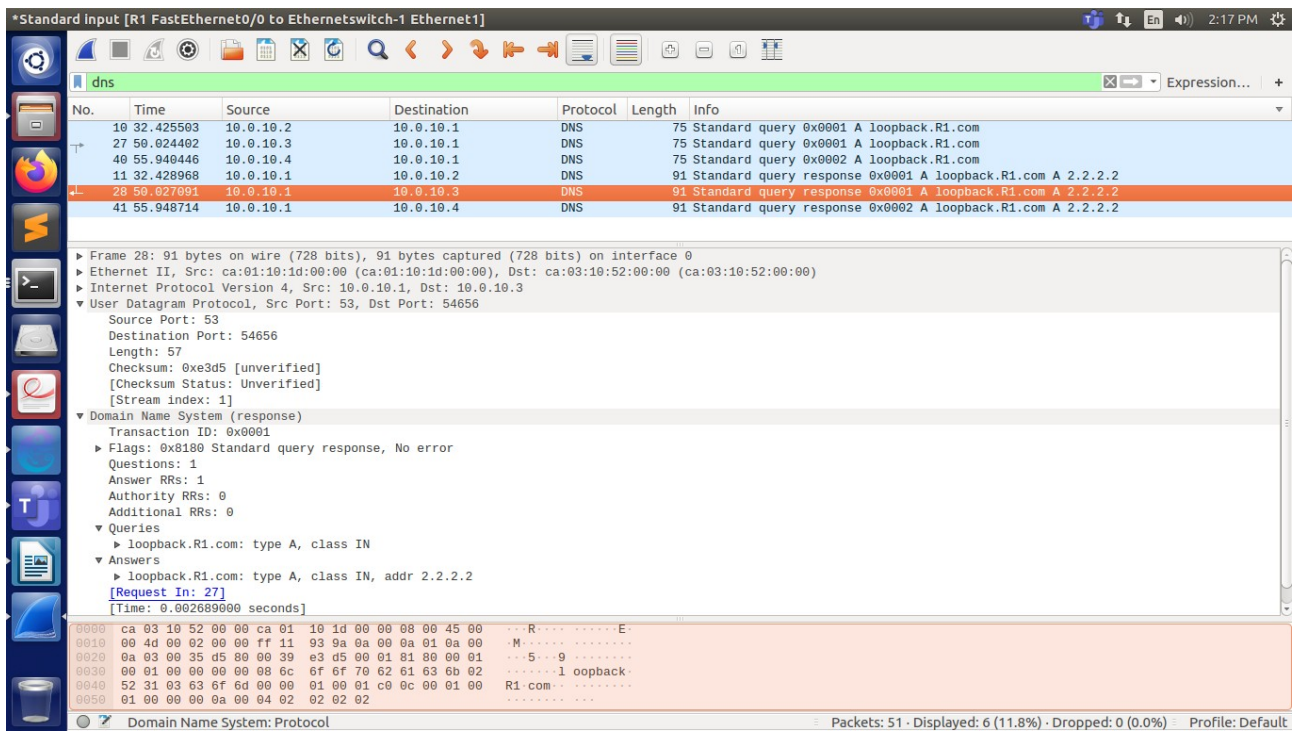
No.	Time	Source	Destination	Protocol	Length	Info
10	32.425503	10.0.10.2	10.0.10.1	DNS	75	Standard query 0x0001 A loopback.R1.com
27	50.024402	10.0.10.3	10.0.10.1	DNS	75	Standard query 0x0001 A loopback.R1.com
40	55.940446	10.0.10.4	10.0.10.1	DNS	75	Standard query 0x0002 A loopback.R1.com
11	32.428968	10.0.10.1	10.0.10.2	DNS	91	Standard query response 0x0001 A loopback.R1.com A 2.2.2.2
28	50.027091	10.0.10.1	10.0.10.3	DNS	91	Standard query response 0x0001 A loopback.R1.com A 2.2.2.2
41	55.948714	10.0.10.1	10.0.10.4	DNS	91	Standard query response 0x0002 A loopback.R1.com A 2.2.2.2

Frame 11: 91 bytes on wire (728 bits), 91 bytes captured (728 bits) on interface 0  
 Ethernet II, Src: ca:01:10:1d:00:00 (ca:01:10:1d:00:00), Dst: ca:02:10:43:00:00 (ca:02:10:43:00:00)  
 Internet Protocol Version 4, Src: 10.0.10.1, Dst: 10.0.10.2  
 User Datagram Protocol, Src Port: 53, Dst Port: 53813  
 Source Port: 53  
 Destination Port: 53813  
 Length: 57  
 Checksum: 0xe721 [unverified]  
 [Checksum Status: Unverified]  
 [Stream index: 0]  
 Domain Name System (response)  
 Transaction ID: 0x0001  
 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: 10]  
 [Time: 0.003465000 seconds]

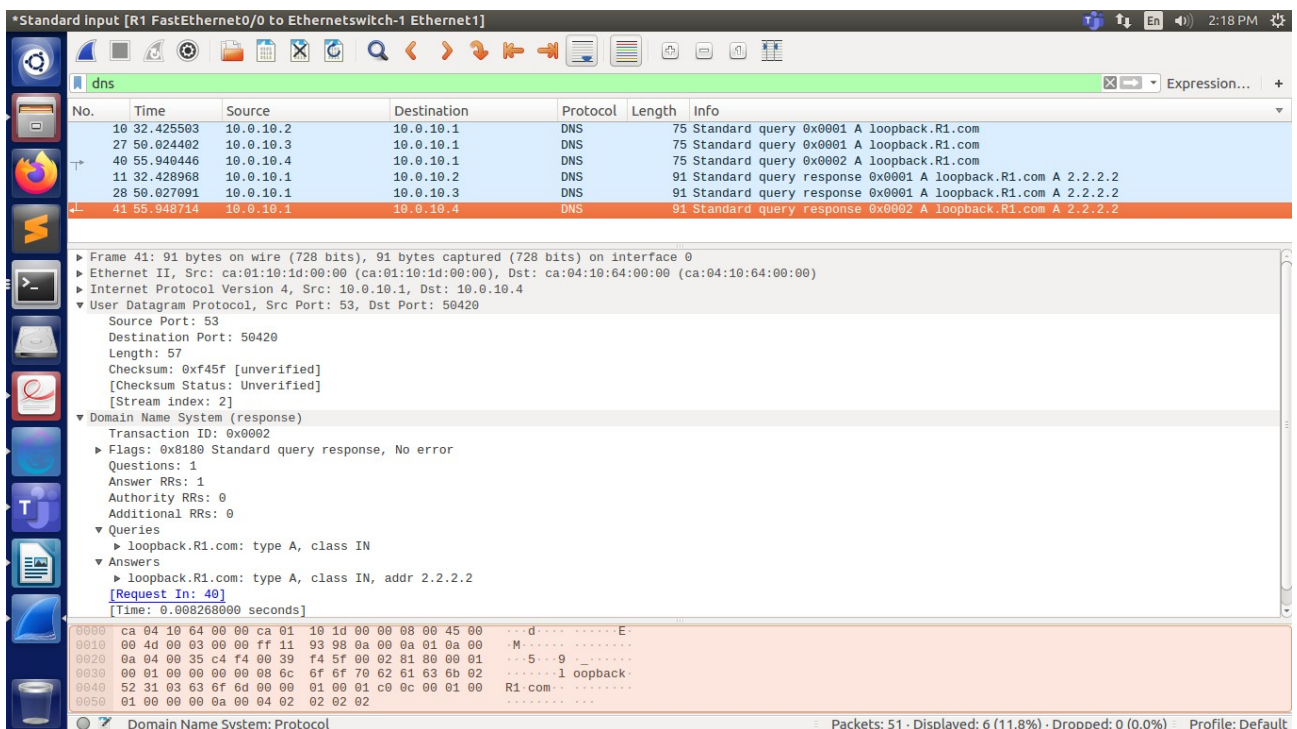
0000 ca 02 10 43 00 00 ca 01 10 1d 00 00 08 00 45 00 ...C...E:  
 0010 00 4d 00 01 00 00 ff 11 93 9c 0a 00 0a 01 0a 00 ...M...:  
 0020 0a 02 00 35 02 35 00 39 e7 21 00 01 81 00 00 01 ...5 5 9 !:  
 0030 00 01 00 00 00 00 00 6c 6f 6f 70 62 61 63 6b 02 .....l oopback-  
 0040 52 31 03 63 6f 6d 00 00 01 00 01 c0 0c 00 01 00 R1 com-  
 0050 01 00 00 00 0a 00 04 02 02 02 02 .....:

DNS query response when we ping from R3 to R1:



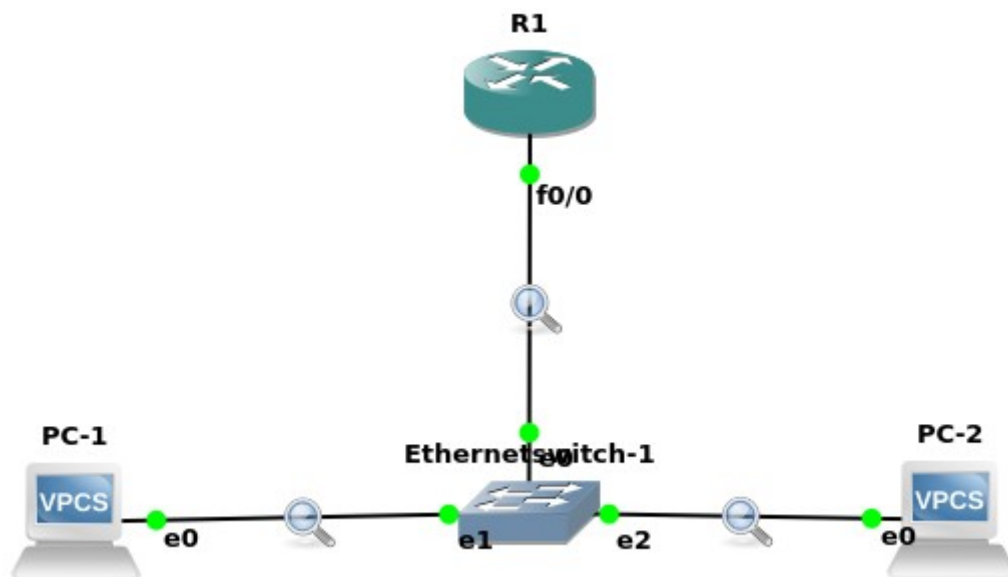


DNS query response when we ping from R4 to R1:



## Manual Lab 8 Exercise:

**1) Configure two VMs that will be used to test connectivity from end to end and R1 will serve as a DHCP server to distribute IP addresses.**



Configure R1 as DHCP server:

```
R1#config t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#IP dhcp pool R1
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
```

Configure interface f0/0:

```
R1(config)#int f0/0
R1(config-if)#no shut
R1(config-if)#ip
*Nov 6 14:38:30.319: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
R1(config-if)#ip address
*Nov 6 14:38:30.319: %ENTITY_ALARM-6-INFO: CLEAR INFO Fa0/0 Physical Port Administrative State Down
*Nov 6 14:38:31.319: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
R1(config-if)#ip address 192.168.3.1 255.255.255.0
R1(config-if)#exit
R1(config)#exit
R1#
*Nov 6 14:39:10.123: %SYS-5-CONFIG_I: Configured from console by console
R1#
```

PC1 terminal:

```
PC-1> dhcp
DORA IP 192.168.3.2/24 GW 192.168.3.1
PC-1> 
```

PC2 terminal:

```
PC-2> dhcp
DORA IP 192.168.3.3/24 GW 192.168.3.1
PC-2> 
```



## Traffic patterns between PC1 and DHCP router:

PC1 dhcp ex.pcapng [PC-1 Ethernet0 to Ethernetswitch-1 Ethernet1]

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

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	0.0.0.0	255.255.255.255	DHCP	406	DHCP Discover - Transaction ID 0x866d9f34
2	0.009675	192.168.3.1	192.168.3.2	DHCP	342	DHCP Offer - Transaction ID 0x866d9f34
3	1.000117	0.0.0.0	255.255.255.255	DHCP	406	DHCP Request - Transaction ID 0x866d9f34
4	1.005895	192.168.3.1	192.168.3.2	DHCP	342	DHCP ACK - Transaction ID 0x866d9f34
5	2.000214	Private_66:68:00	Broadcast	ARP	64	Gratuitous ARP for 192.168.3.2 (Request) [ETHERNET FRAME CHECK SEQUENCE INCORREC...
6	3.000437	Private_66:68:00	Broadcast	ARP	64	Gratuitous ARP for 192.168.3.2 (Request) [ETHERNET FRAME CHECK SEQUENCE INCORREC...
7	4.001115	Private_66:68:00	Broadcast	ARP	64	Gratuitous ARP for 192.168.3.2 (Request) [ETHERNET FRAME CHECK SEQUENCE INCORREC...

Frame 1: 406 bytes on wire (3248 bits), 406 bytes captured (3248 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)  
Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255  
User Datagram Protocol, Src Port: 68, Dst Port: 67  
Bootstrap Protocol (Discover)  
Message type: Boot Request (1)  
Hardware type: Ethernet (0x01)  
Hardware address length: 6  
Hops: 0  
Transaction ID: 0x866d9f34  
Seconds elapsed: 0  
Bootp flags: 0x0000 (Unicast)  
Client IP address: 0.0.0.0  
Your (client) IP address: 0.0.0.0  
Next server IP address: 0.0.0.0  
Relay agent IP address: 0.0.0.0  
Client MAC address: Private\_66:68:00 (00:50:79:66:68:00)  
Client hardware address padding: 00000000000000000000  
Server host name not given  
Boot file name not given  
Magic cookie: DHCP  
Option: (53) DHCP Message Type (Discover)  
Option: (12) Host Name  
Option: (61) Client identifier  
Option: (255) End

Ready to load or capture

Packets: 7 · Displayed: 7 (100.0%) · Dropped: 0 (0.0%) · Profile: Default

## Traffic patterns between PC2 and DHCP router:

PC2 dhcp ex.pcapng [PC-2 Ethernet0 to Ethernetswitch-1 Ethernet2]

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

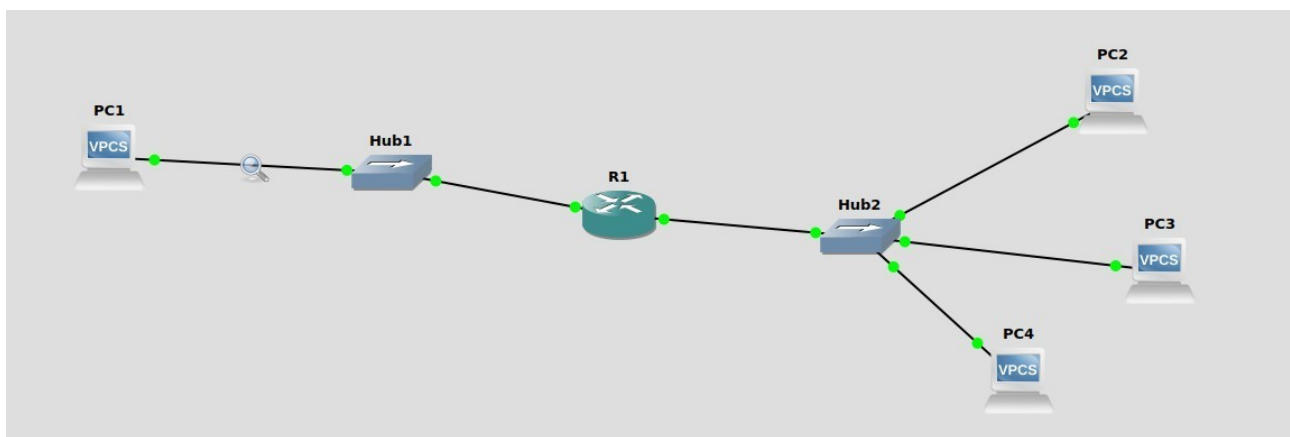
No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	0.0.0.0	255.255.255.255	DHCP	406	DHCP Discover - Transaction ID 0x475c6d61
2	0.008424	192.168.3.1	192.168.3.3	DHCP	342	DHCP Offer - Transaction ID 0x475c6d61
3	0.119146	ca:01:14:2d:00:00	CDP/VTP/DTP/PAGP/UDLD	CDP	338	Device ID: R1 Port ID: FastEthernet0/0
4	1.000078	0.0.0.0	255.255.255.255	DHCP	406	DHCP Request - Transaction ID 0x475c6d61
5	1.004342	192.168.3.1	192.168.3.3	DHCP	342	DHCP ACK - Transaction ID 0x475c6d61
6	2.000166	Private_66:68:01	Broadcast	ARP	64	Gratuitous ARP for 192.168.3.3 (Request) [ETHERNET FRAME CHECK SEQUENCE INCORREC...
7	3.000557	Private_66:68:01	Broadcast	ARP	64	Gratuitous ARP for 192.168.3.3 (Request) [ETHERNET FRAME CHECK SEQUENCE INCORREC...
8	4.000856	Private_66:68:01	Broadcast	ARP	64	Gratuitous ARP for 192.168.3.3 (Request) [ETHERNET FRAME CHECK SEQUENCE INCORREC...

Frame 1: 406 bytes on wire (3248 bits), 406 bytes captured (3248 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)  
Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255  
User Datagram Protocol, Src Port: 68, Dst Port: 67  
Bootstrap Protocol (Discover)  
Message type: Boot Request (1)  
Hardware type: Ethernet (0x01)  
Hardware address length: 6  
Hops: 0  
Transaction ID: 0x475c6d61  
Seconds elapsed: 0  
Bootp flags: 0x0000 (Unicast)  
Client IP address: 0.0.0.0  
Your (client) IP address: 0.0.0.0  
Next server IP address: 0.0.0.0  
Relay agent IP address: 0.0.0.0  
Client MAC address: Private\_66:68:01 (00:50:79:66:68:01)  
Client hardware address padding: 00000000000000000000  
Server host name not given  
Boot file name not given  
Magic cookie: DHCP  
Option: (53) DHCP Message Type (Discover)  
Option: (12) Host Name  
Option: (61) Client identifier  
Option: (255) End

Ready to load or capture

Packets: 8 · Displayed: 8 (100.0%) · Profile: Default

## 2) Network Prefixes and Routing



```
R1#config t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#int f0/0
R1(config-if)#exit
R1(config)#IP dhcp pool NAME
R1(dhcp-config)#Network 10.0.1.1 255.255.255.0
R1(dhcp-config)#Default-router 10.0.1.1
R1(dhcp-config)#exit
R1(config)#int f0/0
R1(config-if)#ip address 10.0.1.1 255.255.255.0
R1(config-if)#no shut
R1(config-if)#exit
R1(config)#
*Nov 13 16:24:24.155: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state t
o up
*Nov 13 16:24:25.155: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthern
et0/0, changed state to upw
R1(config)#
```

Default gateway is set to f0/0 so we get dhcp command in PC1 not PC2,PC3,PC4

```
PC1> dhcp
DDORA IP 10.0.1.3/24 GW 10.0.1.1
```

Capturing from - [PC1 Ethernet0 to Hub1 Ethernet0]

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

Apply a display filter ... <Ctrl>-

No.	Time	Source	Destination	Protocol	Length	Info
2 9.992108	0.0.0.0	ca:01:3b:a3:00:00	ca:01:3b:a3:00:00	LOOP	60	Reply
3 14.156818	0.0.0.0	255.255.255.255	255.255.255.255	DHCP	408	DHCP Discover - Transaction ID 0xc2cbf76b
4 14.164980	10.0.1.1	10.0.1.2	10.0.1.2	DHCP	342	DHCP Offer - Transaction ID 0xc2cbf76b
5 15.156856	0.0.0.0	255.255.255.255	255.255.255.255	DHCP	408	DHCP Request - Transaction ID 0xc2cbf76b
6 15.162437	10.0.1.1	10.0.1.2	10.0.1.2	DHCP	342	DHCP ACK - Transaction ID 0xc2cbf76b
7 16.156939	Private 06:00:01	Broadcast	Broadcast	ARP	64	Gratuitous ARP for 10.0.1.2 (Request)
8 17.156951	Private 06:00:01	Broadcast	Broadcast	ARP	64	Gratuitous ARP for 10.0.1.2 (Request)
9 18.157295	Private 06:00:01	Broadcast	Broadcast	ARP	64	Gratuitous ARP for 10.0.1.2 (Request)
10 19.996731	ca:01:3b:a3:00:00	ca:01:3b:a3:00:00	ca:01:3b:a3:00:00	LOOP	60	Reply
11 28.642757	ca:01:3b:a3:00:00	ca:01:3b:a3:00:00	ca:01:3b:a3:00:00	CDP/VTP/DTP/PagP/UD...	368	Device ID: R1 Port ID: FastEthernet0/0
12 29.993384	ca:01:3b:a3:00:00	ca:01:3b:a3:00:00	ca:01:3b:a3:00:00	LOOP	60	Reply
13 39.998195	ca:01:3b:a3:00:00	ca:01:3b:a3:00:00	ca:01:3b:a3:00:00	LOOP	60	Reply
14 49.994677	ca:01:3b:a3:00:00	ca:01:3b:a3:00:00	ca:01:3b:a3:00:00	LOOP	60	Reply
15 59.999346	ca:01:3b:a3:00:00	ca:01:3b:a3:00:00	ca:01:3b:a3:00:00	LOOP	60	Reply

Frame 1: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface -, id 0  
Ethernet II, Src: ca:01:3b:a3:00:00 (ca:01:3b:a3:00:00), Dst: ca:01:3b:a3:00:00 (ca:01:3b:a3:00:00)  
Configuration Test Protocol (loopback)  
Data (48 bytes)

Ready to load or capture Packets: 29 - Displayed: 29 (100.0%) Profile: Default

```
PC2> dhcp
DDD
Can't find dhcp server
```

```
*Nov 13 18:04:38.471: %SYS-5-CONFIG_I: Configured from console by console
R1#config t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#IP dhcp pool NAME
R1(dhcp-config)#Network 10.0.2.138 255.255.255.0
R1(dhcp-config)#default-router 10.0.2.138
R1(dhcp-config)#exit
R1(config)#int f1/0
R1(config-if)#ip address 10.0.2.138 255.255.255.0
R1(config-if)#no shut
R1(config-if)#
*Nov 13 18:05:59.847: %LINK-3-UPDOWN: Interface FastEthernet1/0, changed state t
o up
R1(config-if)#
```



f1/0 is set as `default gateway and so we get the dhcp in pc 2/3/4:

```
PC1> dhcp
DDD
Can't find dhcp server
PC1>
```

```
PC2> dhcp
DDORA IP 10.0.2.1/24 GW 10.0.2.138
```

27	210.004758	ca:01:3b:a3:00:38	ca:01:3b:a3:00:38	LOOP	60	Reply	
28	220.001979	ca:01:3b:a3:00:38	ca:01:3b:a3:00:38	LOOP	60	Reply	
29	230.001241	ca:01:3b:a3:00:38	ca:01:3b:a3:00:38	LOOP	60	Reply	
30	239.999811	ca:01:3b:a3:00:38	ca:01:3b:a3:00:38	LOOP	60	Reply	
31	248.045782	0.0.0.0	255.255.255.255	DHCP	406	DHCP Discover	- Transaction ID 0x71a45c73
32	249.045835	0.0.0.0	255.255.255.255	DHCP	406	DHCP Discover	- Transaction ID 0x71a45c73
33	249.070938	10.0.2.138	10.0.2.1	DHCP	342	DHCP Offer	- Transaction ID 0x71a45c73
34	249.101257	10.0.2.138	10.0.2.1	DHCP	342	DHCP Offer	- Transaction ID 0x71a45c73
35	250.008887	ca:01:3b:a3:00:38	ca:01:3b:a3:00:38	LOOP	60	Reply	
36	252.045972	0.0.0.0	255.255.255.255	DHCP	406	DHCP Request	- Transaction ID 0x71a45c73
37	253.046088	0.0.0.0	255.255.255.255	DHCP	406	DHCP Request	- Transaction ID 0x71a45c73
38	253.050329	10.0.2.138	10.0.2.1	DHCP	342	DHCP ACK	- Transaction ID 0x71a45c73
39	253.060453	10.0.2.138	10.0.2.1	DHCP	342	DHCP ACK	- Transaction ID 0x71a45c73
40	254.046201	Private_66:68:00	Broadcast	ARP	64	Gratuitous ARP for 10.0.2.1 (Request)	
41	255.047070	Private_66:68:00	Broadcast	ARP	64	Gratuitous ARP for 10.0.2.1 (Request)	
42	255.720732	ca:01:3b:a3:00:38	CDP/VTP/DTP/PagP/UD...	CDP	375	Device ID: R1 Port ID: FastEthernet2/0	
43	256.047342	Private_66:68:00	Broadcast	ARP	64	Gratuitous ARP for 10.0.2.1 (Request)	
44	260.002597	ca:01:3b:a3:00:38	ca:01:3b:a3:00:38	LOOP	60	Reply	
45	270.004959	ca:01:3b:a3:00:38	ca:01:3b:a3:00:38	LOOP	60	Reply	

```
PC3> dhcp
DDORA IP 10.0.2.2/24 GW 10.0.2.138
```

11	82.075023	ca:01:3b:a3:00:38	CDP/VTP/DTP/PagP/UD...	CDP	375	Device ID: R1 Port ID: FastEthernet2/0	
12	89.995334	ca:01:3b:a3:00:38	ca:01:3b:a3:00:38	LOOP	60	Reply	
13	93.699892	0.0.0.0	255.255.255.255	DHCP	406	DHCP Discover	- Transaction ID 0xd8d2a75a
14	94.699930	0.0.0.0	255.255.255.255	DHCP	406	DHCP Discover	- Transaction ID 0xd8d2a75a
15	94.701889	10.0.2.138	10.0.2.2	DHCP	342	DHCP Offer	- Transaction ID 0xd8d2a75a
16	94.711991	10.0.2.138	10.0.2.2	DHCP	342	DHCP Offer	- Transaction ID 0xd8d2a75a
17	97.700052	0.0.0.0	255.255.255.255	DHCP	406	DHCP Request	- Transaction ID 0xd8d2a75a
18	98.700165	0.0.0.0	255.255.255.255	DHCP	406	DHCP Request	- Transaction ID 0xd8d2a75a
19	98.704400	10.0.2.138	10.0.2.2	DHCP	342	DHCP ACK	- Transaction ID 0xd8d2a75a
20	98.714496	10.0.2.138	10.0.2.2	DHCP	342	DHCP ACK	- Transaction ID 0xd8d2a75a
21	99.700252	Private_66:68:02	Broadcast	ARP	64	Gratuitous ARP for 10.0.2.2 (Request)	
22	99.994806	ca:01:3b:a3:00:38	ca:01:3b:a3:00:38	LOOP	60	Reply	
23	100.701207	Private_66:68:02	Broadcast	ARP	64	Gratuitous ARP for 10.0.2.2 (Request)	
24	101.701823	Private_66:68:02	Broadcast	ARP	64	Gratuitous ARP for 10.0.2.2 (Request)	
25	110.001431	ca:01:3b:a3:00:38	ca:01:3b:a3:00:38	LOOP	60	Reply	
26	119.995343	ca:01:3b:a3:00:38	ca:01:3b:a3:00:38	LOOP	60	Reply	
27	130.003975	ca:01:3b:a3:00:38	ca:01:3b:a3:00:38	LOOP	60	Reply	
28	133.730338	ca:01:3b:a3:00:38	CDP/VTP/DTP/PagP/UD...	CDP	375	Device ID: R1 Port ID: FastEthernet2/0	
29	139.998583	ca:01:3b:a3:00:38	ca:01:3b:a3:00:38	LOOP	60	Reply	

```
PC4> dhcp
DDORA IP 10.0.2.3/24 GW 10.0.2.138
```



1 0.000000	ca:01:3b:a3:00:38	CDP/VTP/DTP/PagP/UD...	CDP	375	Device ID: R1	Port ID: FastEthernet2/0
2 7.804505	ca:01:3b:a3:00:38	ca:01:3b:a3:00:38	LOOP	60	Reply	
3 13.212807	0.0.0.0	255.255.255.255	DHCP	406	DHCP Discover	- Transaction ID 0x838b576c
4 14.212875	0.0.0.0	255.255.255.255	DHCP	406	DHCP Discover	- Transaction ID 0x838b576c
5 14.248199	ca:01:3b:a3:00:38	Broadcast	ARP	60	Who has 10.0.2.3? Tell 10.0.2.138	
6 16.253294	10.0.2.138	10.0.2.3	DHCP	342	DHCP Offer	- Transaction ID 0x838b576c
7 17.212912	0.0.0.0	255.255.255.255	DHCP	406	DHCP Request	- Transaction ID 0x838b576c
8 17.854528	10.0.2.138	10.0.2.3	DHCP	342	DHCP ACK	- Transaction ID 0x838b576c
9 17.864714	ca:01:3b:a3:00:38	ca:01:3b:a3:00:38	LOOP	60	Reply	
10 18.213090	Private_66:68:03	Broadcast	ARP	64	Gratuitous ARP for 10.0.2.3 (Request)	
11 19.213933	Private_66:68:03	Broadcast	ARP	64	Gratuitous ARP for 10.0.2.3 (Request)	
12 20.214510	Private_66:68:03	Broadcast	ARP	64	Gratuitous ARP for 10.0.2.3 (Request)	
13 27.800505	ca:01:3b:a3:00:38	ca:01:3b:a3:00:38	LOOP	60	Reply	

PC1> ping 10.0.2.3

84 bytes from 10.0.2.3 icmp\_seq=1 ttl=63 time=49.453 ms

Activities Wireshark Nov 14 00:16 Capturing from - [Hub2 Ethernet3 to PC4 Ethernet0]

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

Apply a display filter ... <Ctrl-F>

No.	Time	Source	Destination	Protocol	Length	Info
37	227.534979	ca:01:3b:a3:00:38	CDP/VTP/DTP/PagP/UD...	CDP	375	Device ID: R1 Port ID: FastEthernet2/0
38	227.807209	ca:01:3b:a3:00:38	ca:01:3b:a3:00:38	LOOP	60	Reply
39	229.046915	10.0.1.3	10.0.2.3	ICMP	98	Echo (ping) request id=0xc07, seq=1/256, ttl=63 (reply in 4...)
40	229.047133	Private_66:68:03	Broadcast	ARP	64	Who has 10.0.2.138? Tell 10.0.2.3
41	229.056909	ca:01:3b:a3:00:38	Private_66:68:03	ARP	60	10.0.2.138 is at ca:01:3b:a3:00:38
42	229.057886	10.0.2.3	10.0.1.3	ICMP	98	Echo (ping) reply id=0xc07, seq=1/256, ttl=64 (request in...)
43	230.075253	10.0.1.3	10.0.2.3	ICMP	98	Echo (ping) request id=0xd07, seq=2/512, ttl=63 (reply in 4...)
44	230.075482	10.0.2.3	10.0.1.3	ICMP	98	Echo (ping) reply id=0xd07, seq=2/512, ttl=64 (request in...)
45	231.092133	10.0.1.3	10.0.2.3	ICMP	98	Echo (ping) request id=0xd107, seq=3/768, ttl=63 (reply in 4...)
46	231.092464	10.0.2.3	10.0.1.3	ICMP	98	Echo (ping) reply id=0xd107, seq=3/768, ttl=64 (request in...)
47	232.109984	10.0.1.3	10.0.2.3	ICMP	98	Echo (ping) request id=0xd207, seq=4/1024, ttl=63 (reply in...)
48	232.110154	10.0.2.3	10.0.1.3	ICMP	98	Echo (ping) reply id=0xd207, seq=4/1024, ttl=64 (request in...)
49	233.127554	10.0.1.3	10.0.2.3	ICMP	98	Echo (ping) request id=0xd307, seq=5/1280, ttl=63 (reply in...)
50	233.127733	10.0.2.3	10.0.1.3	ICMP	98	Echo (ping) reply id=0xd307, seq=5/1280, ttl=64 (request in...)
51	237.804303	ca:01:3b:a3:00:38	ca:01:3b:a3:00:38	LOOP	60	Reply
52	247.807594	ca:01:3b:a3:00:38	ca:01:3b:a3:00:38	LOOP	60	Reply
53	257.803933	ca:01:3b:a3:00:38	ca:01:3b:a3:00:38	LOOP	60	Reply
54	267.801397	ca:01:3b:a3:00:38	ca:01:3b:a3:00:38	LOOP	60	Reply
55	277.805173	ca:01:3b:a3:00:38	ca:01:3b:a3:00:38	LOOP	60	Reply

Frame 1: 375 bytes on wire (3000 bits), 375 bytes captured (3000 bits) on interface -, id 0

- IEEE 802.3 Ethernet
- Logical-Link Control
- Cisco Discovery Protocol

```

0000  01 00 0c cc cc cc ca 01 3b a3 00 38 01 69 aa aa  ....:..i..
0010  03 00 00 0c 20 00 02 b4 7e 3b 00 01 00 06 52 31  ....~...R1
0020  00 05 00 fb 43 69 73 03 0f 20 49 4f 53 20 53 0f  ....Cisco IOS So
0030  66 74 77 61 72 65 2c 20 37 32 30 30 20 53 0f 66  ftware, 7208 Sof
0040  74 77 61 72 65 20 28 43 37 32 30 30 2d 41 44 56  tware (c 7208-ADV
0050  49 50 53 45 52 56 49 43 45 53 4b 39 2d 4d 29 2c  IPSERVIC ESK9-M),
0060  20 56 65 72 73 69 6f 6e 20 31 35 2e 32 28 34 29  Version 15.2(4)
0070  53 35 2c 20 52 45 4c 45 41 53 45 20 53 4f 46 54  S5, RELEASE SOFT
0080  57 41 52 45 20 28 66 63 31 29 0a 54 65 63 68 6e  WARE (fc 1) Techn
0090  09 63 61 6c 20 53 75 70 70 0f 72 74 3a 20 68 74  ical Sup port: ht
00a0  74 70 3a 2f 2f 77 77 77 2e 63 69 73 63 6f 2e 63  tp://www .cisco.c
00b0  6f 6d 2f 74 65 63 60 73 75 70 70 6f 72 74 0a 43  om/techs upport C
00c0  6f 70 79 72 69 67 68 74 20 28 63 29 20 31 39 38  opyright (c) 198
00d0  36 2d 32 30 31 34 20 62 79 20 43 69 73 63 6f 20  6-2014 b y Cisco
00e0  53 79 73 74 65 6d 73 2c 20 49 66 63 2e 0a 43 6f  Systems, Inc. Co
00f0  6d 70 69 6c 65 64 20 54 68 75 20 32 30 2d 46 65  mpiled T hu 20-Fe
0100  62 2d 31 34 20 30 36 3a 35 31 20 62 79 20 70 72  b-14 06: 51 by pr

```

Ready to load or capture Packets: 57 - Displayed: 57 (100.0%) Profile: Default