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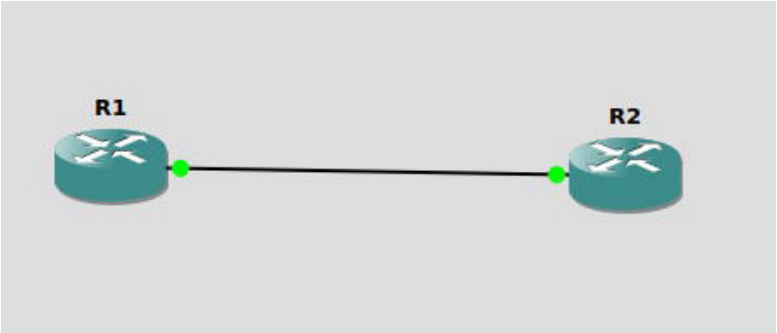
Computer Networks Lab 7:Study of Domain Name Server

1. Configure the below topology to setup DNS server. R1 will use R2 as DNS server to make DNS resolutions.
First, lets begin with R1. We'll setup hostname and IP related information.



R1 IP configurations:
Enable
configure terminal
hostname R1
interface e0/0
ip address 10.10.10.1 255.255.255.0
no shut
do wr
end

R2 IP and Hostname Configurations:
enable
config t
hostname R2
int e0/0
ip address 10.10.10.2 255.255.255.0
no shut
do wr
end
Setting up R2 as DNS Server
config t
ip dns server
ip host loopback.R2.com 2.2.2.2

```
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 w
*Mar  1 00:04:44.939: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state t
o up
*Mar  1 00:04:45.939: %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
R1#
*Mar  1 00:04:53.203: %SYS-5-CONFIG_I: Configured from console by console
```

```
R2#enable
R2#config 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)#interface loopback 1
R2(config-if)#
*Mar  1 00:06:49.103: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1,
 changed state to up
R2(config-if)#ip address 2.2.2.2 255.255.255.255
R2(config-if)#end
R2#
*Mar  1 00:06:58.887: %SYS-5-CONFIG_I: Configured from console by console
R2#
```

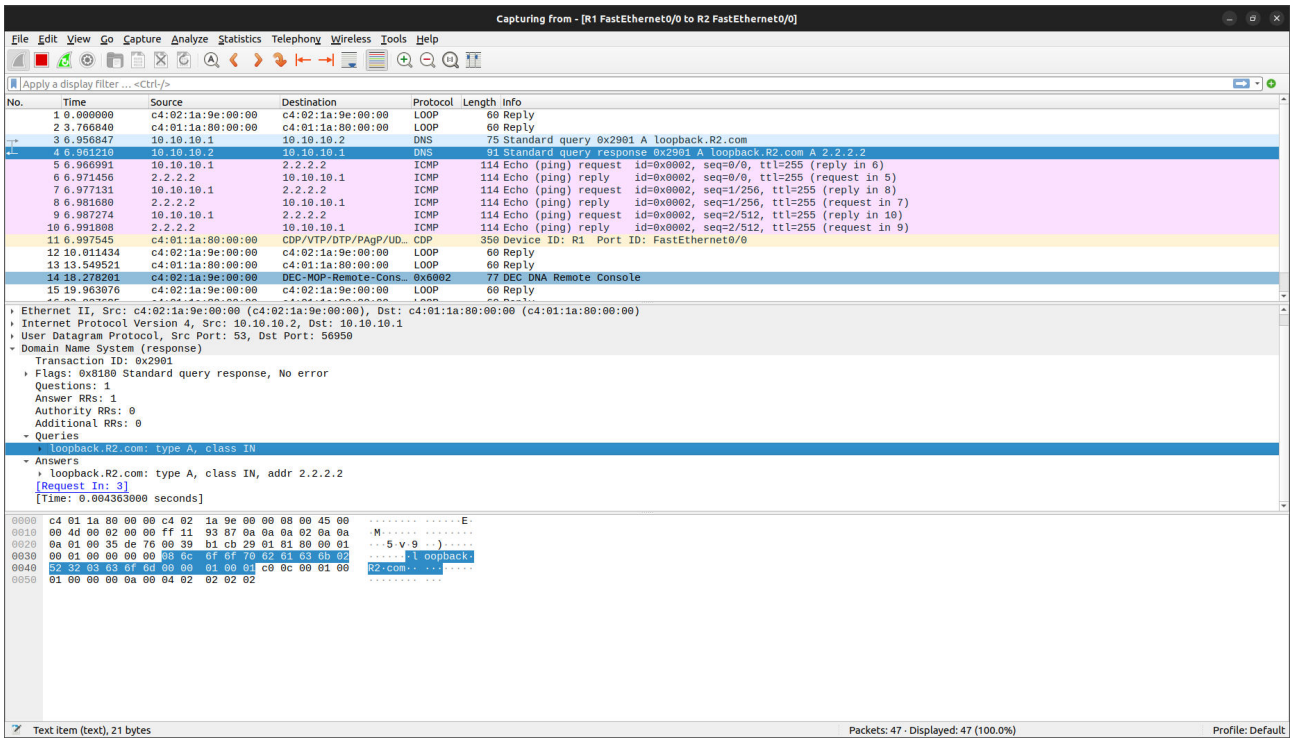
Let's verify that loopback interface we just created is working. This will show us that the hostname correctly setup locally on R2.
ping loopback.R2.com

```
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#
```

Now it's time to setup R1 to resolve hostnames using R2. On R1 type;
config terminal
ip domain lookup
ip name-server 10.10.10.2
Set R1 to use R2 as default gateway to get to loopback interface on R2. So that after R1 resolves loopback.R2.com, it can reach 2.2.2.2 through its default route (R2).
on R1 type:
config t
ip route 0.0.0.0 0.0.0.0 10.10.10.2
end
This tells our router that to get to any network not in it's routing table, it's next hop is 10.10.10.2 which is our router R2.
Now on R1, do a ping to loopback.R2.com and you should get a success message.
ping loopback.R2.com repeat 3

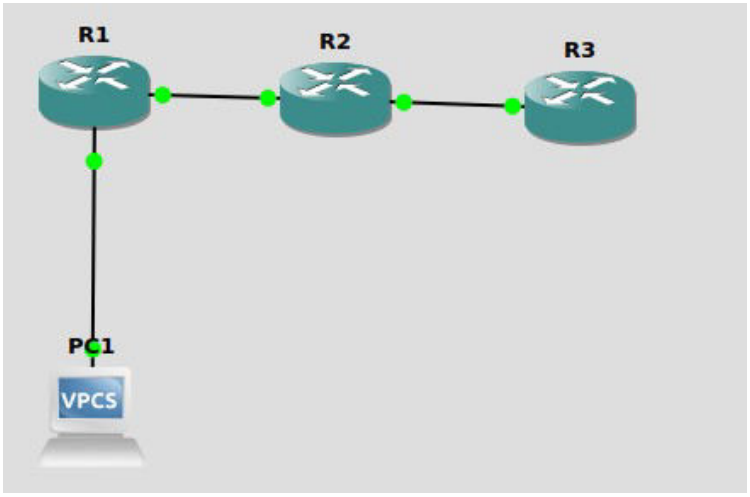
```
R1#ping loopback.R2.com repeat 3

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

Type escape sequence to abort.
Sending 3, 100-byte ICMP Echos to 2.2.2.2, timeout is 2 seconds:
!!!
Success rate is 100 percent (3/3), round-trip min/avg/max = 60/61/64 ms
R1#
```

If you captured the traffic, you'll see DNS query and Answer as shown in Wireshark capture screen shot below.



III. LAB EXERCISE

Suppose you are connecting to www.mycsemit.com to read a page, you are a user sitting at a client's machine. You can access the www.mycsemit.com web server. The server machine finds the page you requested and sends it to you. Build a scenario using GNS3 to demonstrate the interaction of the DNS Server and DNS Client. Place DNS Server behind two routers.



```
R2#config t
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#ip dns server
R2(config)#ip host www.mycsemit.com 10.10.10.3
R2(config)#ip route10.10.10.0 255.255.255.0 10.10.10.2
                   ^
% Invalid input detected at '^' marker.

R2(config)#ip route 10.10.10.0 255.255.255.0 10.10.10.2
%Invalid next hop address (it's this router)
R2(config)#ip route 10.10.10.0 255.255.255.0 10.10.10.1
R2(config)#end
R2#
*Mar  1 01:16:40.863: %SYS-5-CONFIG_I: Configured from console by console
R2#
```

```
R1#ping www.mycsemit.com

Translating "www.mycsemit.com"...domain server (10.10.10.2) [OK]

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.10.10.3, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
```

No.	Time	Source	Destination	Protocol	Length	Info
567	2396.412869	c4:01:1a:80:00:00	c4:01:1a:80:00:00	LOOP	60	Reply
568	2404.376191	c4:02:1a:9e:00:00	c4:02:1a:9e:00:00	LOOP	60	Reply
569	2406.116064	c4:01:1a:80:00:00	c4:01:1a:80:00:00	LOOP	60	Reply
570	2409.412283	10.10.10.1	10.10.10.2	DNS	76	Standard query 0x5b3e A www.mycsemit.com
571	2409.420931	10.10.10.2	10.10.10.1	DNS	92	Standard query response 0x5b3e A www.mycsemit.com A 10.10.10.3
572	2409.422542	c4:01:1a:80:00:00	Broadcast	ARP	60	Who has 10.10.10.3? Tell 10.10.10.1
573	2411.327753	c4:01:1a:80:00:00	Broadcast	ARP	60	Who has 10.10.10.3? Tell 10.10.10.1
574	2413.312902	c4:01:1a:80:00:00	Broadcast	ARP	60	Who has 10.10.10.3? Tell 10.10.10.1
575	2414.442694	c4:02:1a:9e:00:00	c4:02:1a:9e:00:00	LOOP	60	Reply
576	2415.355946	c4:01:1a:80:00:00	Broadcast	ARP	60	Who has 10.10.10.3? Tell 10.10.10.1
577	2415.671395	c4:01:1a:80:00:00	c4:01:1a:80:00:00	LOOP	60	Reply
578	2417.290132	c4:01:1a:80:00:00	Broadcast	ARP	60	Who has 10.10.10.3? Tell 10.10.10.1
579	2424.694811	c4:02:1a:9e:00:00	c4:02:1a:9e:00:00	LOOP	60	Reply
580	2425.604201	c4:01:1a:80:00:00	c4:01:1a:80:00:00	LOOP	60	Reply
581	2428.410625	c4:02:1a:9e:00:00	CDP/VTP/DTP/PAgP/UD…	CDP	359	Device ID: R2 Port ID: FastEthernet0/0

```
▸ Frame 571: 92 bytes on wire (736 bits), 92 bytes captured (736 bits) on interface -, id 0
▸ Ethernet II, Src: c4:02:1a:9e:00:00 (c4:02:1a:9e:00:00), Dst: c4:01:1a:80:00:00 (c4:01:1a:80:00:00)
▸ Internet Protocol Version 4, Src: 10.10.10.2, Dst: 10.10.10.1
▸ User Datagram Protocol, Src Port: 53, Dst Port: 65466
▾ Domain Name System (response)
    Transaction ID: 0x5b3e
  ▸ Flags: 0x8180 Standard query response, No error
    Questions: 1
    Answer RRs: 1
    Authority RRs: 0
    Additional RRs: 0
  ▾ Queries
    ▾ www.mycsemit.com: type A, class IN
        Name: www.mycsemit.com
        [Name Length: 16]
        [Label Count: 3]
        Type: A (Host Address) (1)
        Class: IN (0x0001)
  ▾ Answers
    ▾ www.mycsemit.com: type A, class IN, addr 10.10.10.3
        Name: www.mycsemit.com
        Type: A (Host Address) (1)
        Class: IN (0x0001)
        Time to live: 10 (10 seconds)
        Data length: 4
        Address: 10.10.10.3
    [Request In: 570]
    [Time: 0.008648000 seconds]
```