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CN LAB 5, 7-11-21

INTRODUCTION:

Demonstrating how a router acts as a DNS server:

First, I used the GNS3 software to connect two routers to each other using their fast ethernet ports. I assigned R1 an ip address of 10.0.0.1 with a mask = 255.255.255.0 and R2 with an ip address of 10.0.0.2 with an ip address of 255.255.255.0.

For R2, I created another loopback interface with an ip address of 2.2.2.2 255.255.255.255.

Pinged **10.0.0.2 from R1,** SUCCESSFUL
Pinged **2.2.2.2 from R1**, NOT SUCCESSFUL because we haven't mapped R2's loopback interface to R1 yet and R1 does not treat this interface as a neighbout and hence has no information regarding it's IP address.

So now, we have to configure R2 as a DNS server.
Commands used:
R2# ip dns server
R2# ip host loopback R2.com 2.2.2.2

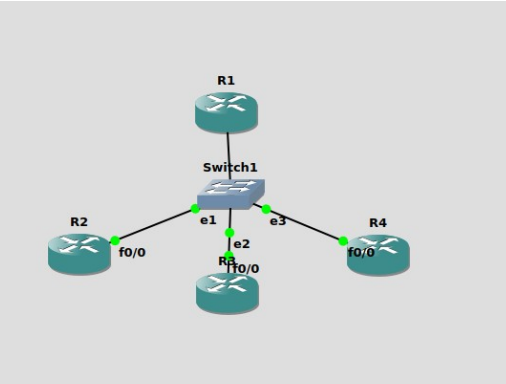
In R1, ping R2.com. UNSUCCESSFUL. Why? Even though we have mapped the hostname to the ip address in our DNS server, we haven't mentioned to R1 that it has to use R2 as its DNS server.

We establish this using
R1# ip domain lookup
R1# name-server 10.0.0.2

After this, **ping R2.com from R1**. SUCCESSFUL. It is successful because R1 knows that R2 is its DNS server and R2 mapped hostname R2.com with corresponding IP address 2.2.2.2

---end of solved example---

Question 1) Configure the below DNS Server and DNS Client. Test the setup. Analyze the Interaction.



Given: A topology consisting of 4 routers and one switch. R1 should be the DNS server and R2, R3, R4 are DNS clients.

First, I configured all the routers.
IP ADDRESSES:

R1: 10.0.10.1 255.255.255.0
R2: 10.0.10.2 255.255.255.0
R3: 10.0.10.3 255.255.255.0
R4: 10.0.10.3 255.255.255.0

In R1, I made a loopback interface with IP address 2.2.2.2 255.255.255.255.
Now, I tried pinging 10.0.10.1 from R4. SUCCESSFUL.
Ping 2.2.2.2 from R4. UNSUCCESSFUL because R4 treats R1's loopback interface as a separate entity, i.e, not a neighbour, and hence doesn't have information regarding its IP address.

I then use "ip route 0.0.0.0 0.0.0.0 10.0.10.1" in R1's console to direct packets to R1 in case there's no value in the forwarding table corresponding to the input IP address.

Now I have to make **R1 a DNS server.**
R2# ip dns server
R2# ip host loopback R1loop.com 2.2.2.2

If i try p**inging R1loop.com from R4,** R3 or R2, it won't work. This is because R4, R3 and R2 do not know that R1 is their DNS server and hence don't have any IP addresses to map the hostname to.

R2# ip domain lookup
R2# name-server 10.0.10.1

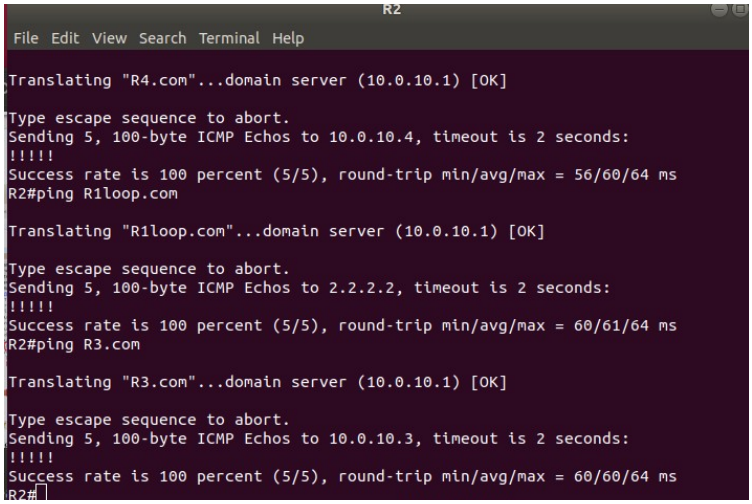
We follow the same 2 commands for R3 and R4.
Now, they know that they have to use R1 as their DNS server.
So if they try **pinging R1loop.com,** it is **SUCCESSFUL!!!**

Now, We create maps for all the routers in the DNS server.

R1(config)#ip host R1loop.com 2.2.2.2
R1(config)#ip host R2.com 10.0.10.2
R1(config)#ip host R3.com 10.0.10.3
R1(config)#ip host R4.com 10.0.10.4

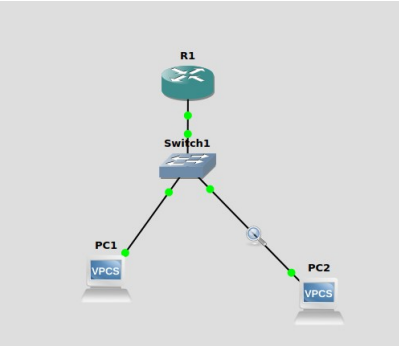
After this, if we ping R4.com from R2, it works. This is because R2 first contacts its DNS server, R1, to tell it which IP address corresponds to R4.com. It then pings 10.0.10.4 and gets all the packets required.

SAMPLE SCREENSHOT TO SHOW PINGING OF DIFFERENT HOSTNAMES FROM ROUTER R2:



DHCP SERVER:

In this sample question, we have to configure R1 as a DHCP server so that it can assign IP addresses automatically to PC1 and PC2 which are two computers on the same network.



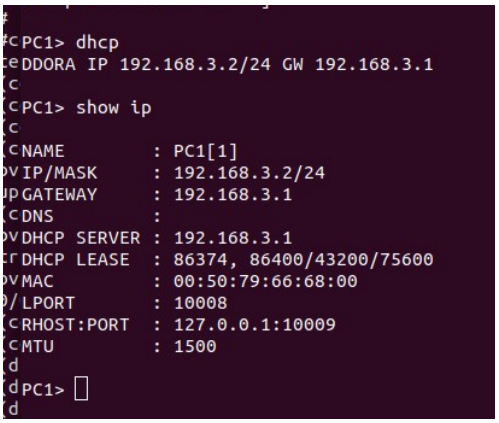
is built on a client/server model, where designated DHCP server hosts allocate network addresses and deliver configuration parameters to dynamically configured hosts. In this question, our DHCP server is R1.

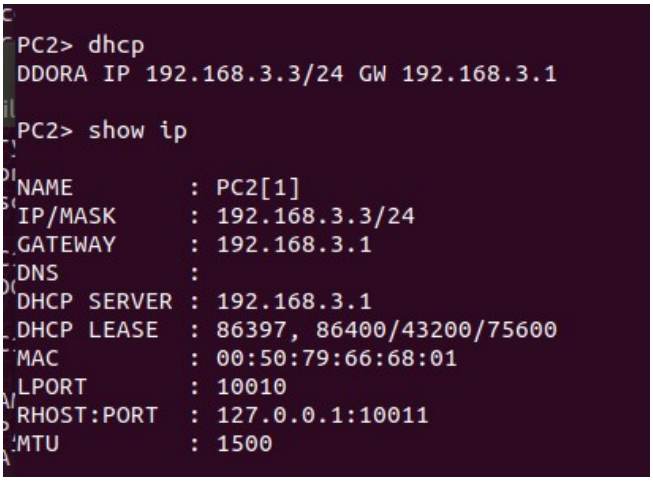
First, i configured R1 with an ip address of **192.168.3.1 255.255.255.0** (using first address according to the convention)

Then, I used the following commands to make it a DHCP server.

```
R1(config)#ip dhcp pool network1
R1(dhcp-config)#network 192.168.3.0 255.255.255.0
R1(dhcp-config)#Default-router 192.168.3.1
```

In the console of PC1, using the command “dhcp”, I managed to get R1 to assign an IP address to PC1. It chose the successive address, 192.168.3.2 255.255.255.0
Similarly for PC2. **(SHOWN IN SCREENSHOTS BELOW)**





ANALYSING TRAFFIC PATTERNS IN WIRESHARK:

In Wireshark we see the following information with regards to DHCP: (while using dhcp command in either PC1’s or PC2’s console)
We see a discover message followed by an offer, request, and an acknowledgement. This is the process that clients go through in order to obtain an IP address via DHCP.