

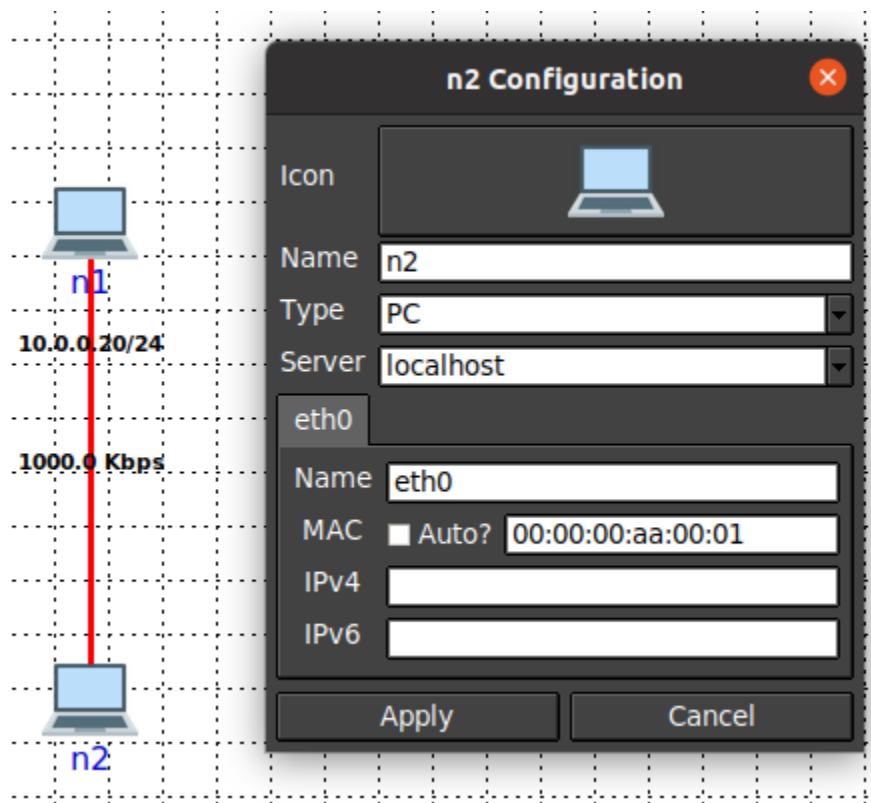
HW5 (6 points)

Tools:

- Dnsmasq: <https://linux.die.net/man/8/dnsmasq>,
https://www.tutorialspoint.com/unix_commands/dnsmasq.htm

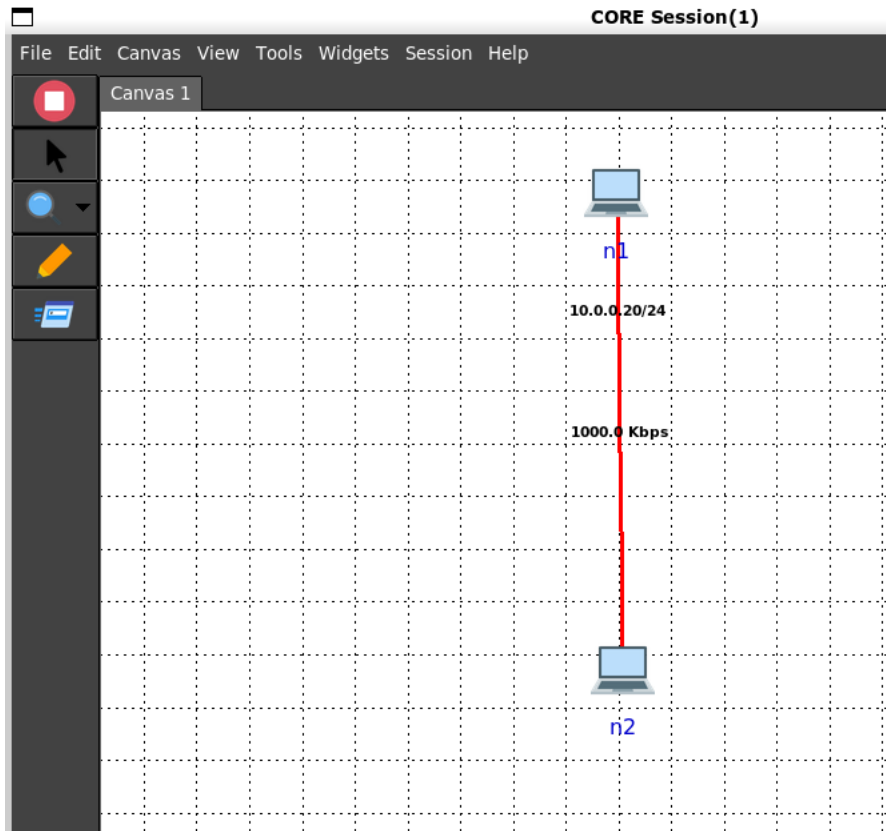
Setup:

- 1) Setup a CORE scenario as shown below. For node n2, I edited its configuration and removed the IPv4 and IPv6 addresses that were assigned to it automatically.



Part 1: Setting up DHCP server and obtaining an address (2 points)

- 1) Start the CORE scenario. Node n2 should not have an address.



- a.
- 2) Create a configuration for dnsmasq.conf for dnsmasq that allows you to give DHCP addresses in the range from 10.0.0.40 to 10.0.0.60.
- 3) You can run the dnsmasq server on n1 as follows: dnsmasq -C yourconfigfile -d
 - a. -d for debug mode

- 4) (1pts) Show the content of your dnsmasq config file

```
root@n2:/tmp/pycore.1/n2.conf# cat /etc/core-work/d.conf
port=0
dhcp-range=10.0.0.40,10.0.0.60,12h
```

- 5) Use dhclient to run a DHCP client on n2
 - a. dhclient -i eth0

- 6) (0.5pts) Show the dnsmasq debug messages shown at the n1

```
root@n1:/tmp/pycore.1/n1.conf# dnsmasq -C /etc/core-work/d.conf -d
dnsmasq: started, version 2.80 DNS disabled
dnsmasq: compile time options: IPv6 GNU-getopt DBus i18n IDN DHCP DHCPv6 no-Lua
TFTP conntrack ipset auth nettlehash DNSSEC loop-detect inotify dumpfile
dnsmasq-dhcp: DHCP, IP range 10.0.0.40 -- 10.0.0.60, lease time 12h
dnsmasq-dhcp: DHCPDISCOVER(eth0) 00:00:00:aa:00:01
dnsmasq-dhcp: DHCPOFFER(eth0) 10.0.0.41 00:00:00:aa:00:01
dnsmasq-dhcp: DHCPREQUEST(eth0) 10.0.0.41 00:00:00:aa:00:01
dnsmasq-dhcp: DHCPACK(eth0) 10.0.0.41 00:00:00:aa:00:01 n2
```

- 7) (0.5pts) Show the address given to eth0 on n2.

```
root@n2:/tmp/pycore.1/n2.conf# ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
66: eth0@if67: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP group default qlen 1000
    link/ether 00:00:00:aa:00:01 brd ff:ff:ff:ff:ff:ff link-netnsid 0
    inet 10.0.0.41/24 brd 10.0.0.255 scope global dynamic eth0
        valid_lft 43188sec preferred_lft 43188sec
    inet6 fe80::200:ff:feaa:1/64 scope link
        valid_lft forever preferred_lft forever
```

- 8) Release the address given to n2 using dhclient -r

a.

Part 2: Addition DHCP services (4 points)

- 1) Repeat part 1 but this time add the appropriate configuration to the dnsmasq file to:
 - a. Always assign interface eth0 on node n2 the address 10.0.0.52.
 - b. Set default route to 10.0.0.100
 - c. Set default dns-server to 10.0.0.101
 - d. Hint: look at the dhcp-host and dns-option configuration in the dnsmasq config.

- 2) (1pts) Show the content of your dnsmasq config file

```
root@n2:/tmp/pycore,1/n2.conf# cat /etc/core-work/d.conf
dhcp-host=00:00:00:aa:00:01,10.0.0.52
dhcp-option=3,10.0.0.100
dhcp-option=6,10.0.0.101
dhcp-range=10.0.0.40,10.0.0.60,12h
```

a.

- 3) Start Wireshark on the node n2 interface

- 4) (1pts) Describe the exchange between the client (n2) and the server (n1)

- a. What is the purpose of the each DHCP message?
 - i. DHCP Discover is sent from n2 to discover if a DHCP server is with in this subnet.
 - ii. DHCP Offer is sent from n1 to n2 to provide basic information of the subnet and a free ip address
 - iii. DHCP Request is sent from n2 to n1 to request this ip address.
 - iv. DHCP Ack is sent from n1 to n2 to confirm successful registration of ip address.
- b. Justify the source IP address used in each message?
 - i. DHCP discover is sent from n2:0.0.0.0 to broadcast:255.255.255.255.
 - ii. DHCP offer is sent from n1:10.0.0.20 to n2:10.0.0.52
 - iii. DHCP Request is sent from n2:0.0.0.0 to broadcast:255.255.255.255
 - iv. DCHP ACK is sent from n1:10.0.0.20 to n2:10.0.0.52

- 5) (0.5pts) Show where in the exchange the “default router” information is passed to the client

- a. default router is passed in DHCP Offer, user datagram protocol section.

```
Option: (6) Domain Name Server
Length: 4
Domain Name Server: 10.0.0.101
Option: (3) Router
Length: 4
Router: 10.0.0.100
```

i.

- b. Show a screenshot of the command: ip route show, on n2. Do you see the default router added to the host?

```
root@n2:/tmp/pycore,1/n2.conf# ip route show
default via 10.0.0.100 dev eth0
10.0.0.0/24 dev eth0 proto kernel scope link src 10.0.0.52
```

i.

- ii. Yes, it's added

- 6) (0.5pts) Show where the DNS server information is passed to the client

- a. The same as default router, in the DHCP offer

```
Option: (6) Domain Name Server
Length: 4
Domain Name Server: 10.0.0.101
Option: (3) Router
Length: 4
Router: 10.0.0.100
```

b.

7) (0.5pts) Show where the duration of the DHCP lease is in the exchange

a. Duration of lease is in the DHCP ACK packet

```
▼ Option: (51) IP Address Lease Time
  Length: 4
  IP Address Lease Time: (43200s) 12 hours
```

b.

8) (0.5pts) Show the message where the address is assigned to the client. Show the address value

a.

```
seconds elapsed: 0
▶ Bootp flags: 0x0000 (Unicast)
Client IP address: 0.0.0.0
Your (client) IP address: 10.0.0.52
```

```
root@n2:/tmp/pycore,1/n2,conf# ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
66: eth0@if67: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP group default qlen 1000
    link/ether 00:00:00:aa:00:01 brd ff:ff:ff:ff:ff:ff link-netnsid 0
    inet 10.0.0.52/24 brd 10.0.0.255 scope global dynamic eth0
        valid_lft 42504sec preferred_lft 42504sec
    inet6 fe80::200:ff:feaa:1/64 scope link
        valid_lft forever preferred_lft forever
```

b.

c. Ip addr: 10.0.0.52