In this task we will use the microtic router, the image of which is given for free from the manufacturer. Search the gns3 marketplace (https://gns3.com/marketplace/appliances) for the MikroTik CHR.

where you first download **mikrotik-chr.gns3a** and then the image: **chr-7.11.2.img** (new version and can there may be slight differences in the commands from older versions).

To import, select File-> Import Appliance and first import the file: mikrotik-chr.gns3a .

Then it will find the image on its own, import it, and follow the instructions.

In this task we will connect the mikrotic router and gain access to the internet

the PC1 and Debian computers. The topology is shown in the figure below. The purpose is to:

- Check if ether1 has been assigned IP settings.

- Implement dhcp-server on ether2 and ether3 and set all settings for each

All settings for each subnet i.e. gateway, IP range, dns server.

- Test if PC1 and Debian communicate with each other and with all interfaces

but also with the external internet (e.g. 8.8.8.8).
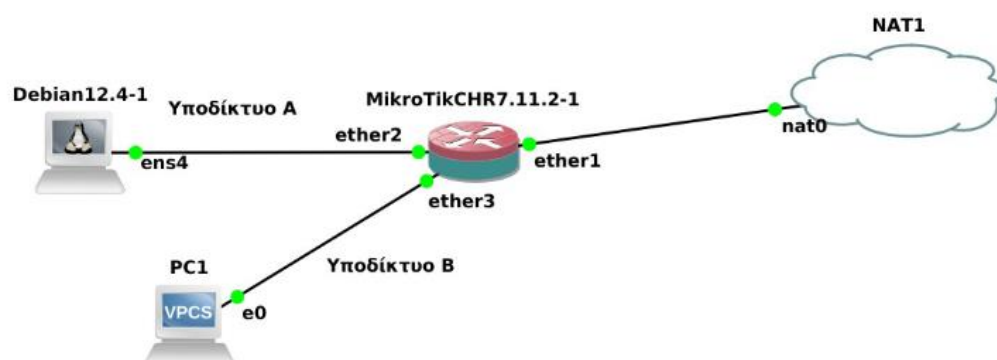
The ether1 interface runs dhcp-client and gets its IP and configuration from dhcp-server (nat).

The ether2 and ether3 interfaces run dhc-server and define different subnets. They configure the

clients that connect. The clients run dhcp-client and receive the settings. All clients that

connected to an interface e.g. ether1 belong to the same subnet so the IP addresses have the same

mask (CIDR: Classless Inter-Domain Routing).

A. Configuration microtik router

We log in to the mikrotic router with login: admin and without passwd (press enter). The first time

login it will ask to change the passwd. Select for passwd: **admin**

To microtic runs its own version of linux with its own commands. The basic commands are:

interface/print: prints all interfaces (note the numbering in old versions is e0 instead of

ether1.

```
[admin@MikroTik] > interface/print
Flags: R - RUNNING
Columns:  NAME,  TYPE,  ACTUAL-MTU,  MAC-
ADDRESS
#  NAME   TYPE  ACTUAL-MTU MAC-ADDRESS
0 R ether1 ether    1500 0C:77:8C:70:00:00
1 R ether2 ether    1500 0C:77:8C:70:00:01
2 R ether3 ether    1500 0C:77:8C:70:00:02
3 R ether4 ether    1500 0C:77:8C:70:00:03
```

/ip/address/print: prints all addresses per interface. Logically, ether1 will already have an IP address

```
[admin@MikroTik] > ip/address/print
Flags: D - DYNAMIC
Columns: ADDRESS, NETWORK, INTERFACE
#  ADDRESS         NETWORK      INTERFACE
0 D 192.168.122.67/24  192.168.122.0  ether1
```

For example, interface ether1 has already been assigned an IP address of 192.168.122.67, belongs to subnet /24 with subnet number 192.168.122.0.

This is because mikrotik by default activates dhcp-client on this interface

/ip/dhcp-client/print: prints all dhcp-client running on the router.

```
[admin@MikroTik] > ip/dhcp-client/print
Columns: INTERFACE, USE-PEER-DNS, ADD-DEFAULT-ROUTE, STATUS, ADDRESS
# INTERFACE USE-PEER-DNS ADD-DEFAULT-ROUTE STATUS ADDRESS
0 ether1  yes     yes       bound  192.168.122.67/24
```

I.e. the interface ether1 is assigned an IP address and settings by a dhcp-server. If not

there is no dhcp-client we implement it with the following command:

ip/dhcp-client/add interface=etherX, where XX is the interface number

/ip/route/print: prints the route table. E.g.

```
[admin@MikroTik] > ip/route/print
Flags: D - DYNAMIC; A - ACTIVE; c, d, y - COPY
Columns: DST-ADDRESS, GATEWAY, DISTANCE
DST-ADDRESS      GATEWAY      DISTANCE
DAd 0.0.0.0/0      192.168.122.1      1
DAc 192.168.122.0/24 ether1          0
```

I.e. for all IP addresses on the subnet 192.168.122.0/24 the communication is through ether1

(gateway with IP:192.168.122.67), i.e. this is where it will forward the packets.

For all the others (0.0.0.0/0) it forwards packets to 192.168.122.1 (which has

created by vmware internally) and from there to the external internet

➢ To interface PC1 and Debian we first need to assign addresses/subnets to the

ether2 ether3 and then implement dhcp-server on both interfaces.

➢ For the ether2 and ether3 interfaces assign IP addresses based on your SI as follows: e.g. registry 1074545 => ether2 (PC) = 107.45.45.1/24 and ether3 (debian) = 107.45.45+1.1/24 and

Commands to add IP addresses:

/ip address add address=107.45.45.1/24 interface=ether2

/ip address add address=107.45.46.1/24 interface=ether3

Confirm with ip/address/print.

Command to implement dhcp-server on interfaces ether2 and ether3:

ip/dhcp-server/setup

provide the requested interface e.g. ether2 and view and select the (standard) suggested settings, i.e.

dhcp address space: 107.45.45.1/24 (because we had already assigned IP and subnet to that interface),

automatically considers ether2 as gateway, i.e. IP: 107.45.45.1 ..... enter in all other parameters.

Attention if a DNS server is defined/provided. If not we have to define it ourselves.

Run /ip/dhcp-server/print and confirm.

Repeat for ether3.

Questions : Run the following commands and show the results.

1. ip/address/print

2. ip/route/print

3. ip/dhcp-client/print.

4. ip/dhcp-server/print

5. ping 8.8.8.8

6. /tool/traceroute 8.8.8.8

(in case the vmware NAT filters UDP packets run /tool/traceroute 8.8.8.8 protocol-icmp)

PC1 configuration

Run show ip. PC1 has NOT yet been assigned an address. Run "dhcp". We observe the

DORA messages exchanged: Discover, Offer, Request, Acknowledgement.

Execute save so that on every subsequent reboot it executes the dhcp command and gets IP

automatically.

(in case the mikrotik / dhcp server does not work at startup no IP address is assigned and

you have to run the dhcp command again).
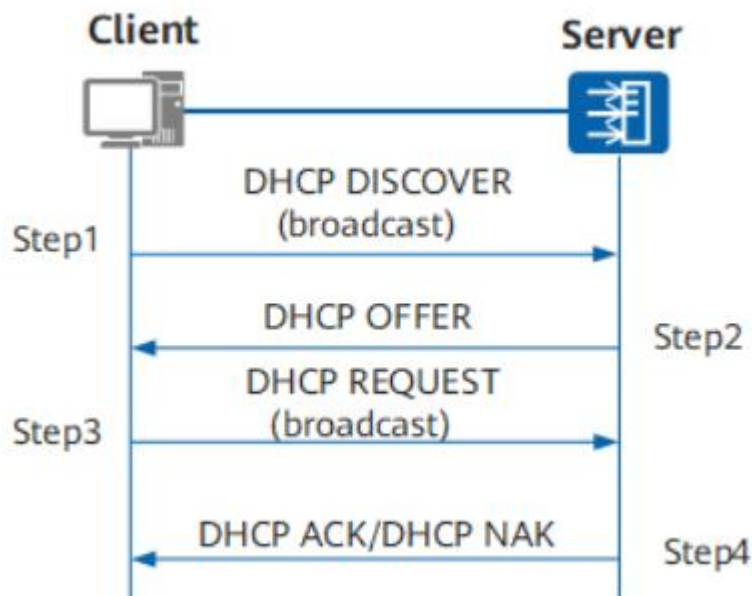
The messages exchanged between client and DHCP server for IP address assignment

Questions:

7. Run show ip again and show the IP assigned to PC1

8. Show with ping that PC1 is communicating with a) Gateway its own 107.45.46.1, b) 107.45.45.1

c) mikrotik's ether1 interface (here: 192.168.122.67) and show the results.

9. Test whether or not it communicates with 8.8.8.8 or your router 192.168.2.1 and explain why and what

should be implemented in ether1.

Find the solution in the examples (basic examples - source NAT) here:

https://wiki.mikrotik.com/wiki/Manual:IP/Firewall/NAT

Questions in Debian

10. Run ip a and show the IP assigned to it.

11. Run ping 8.8.8.8.8 and show the results

12. Run sudo traceroute -n 8.8.8.8 and show the results.

(The traceroute command requires elevated administrator (sudo) permissions and in the case of

vmware NAT filters UDP packets run sudo traceroute -n -I 8.8.8.8).

13. Log in to the mikrotic router and confirm the passwords (you must first update

and install telnet gcc).

- Run telnet <IP address mikrotik> (with quit you return)

- You can also connect with ssh (secure shell). Run: ssh admin@<IP address

mikrotik> and confirm your passwords again.

PART:

All commands for microtic routers:

https://wiki.mikrotik.com/wiki/Manual:IP/Address

https://wiki.mikrotik.com/wiki/Manual:IP/DHCP_Client

https://wiki.mikrotik.com/wiki/Manual:IP/Firewall/NAT

https://wiki.mikrotik.com/wiki/Testwiki/IP_routing