# Solution M4: Network. Software. Services (AlmaLinux)

There are many options and combinations to solve the tasks.

A picture containing chart

Description automatically generated

This solution is based on two **AlmaLinux** machines – one with two NICs, acting as server/router and a second one with one NIC, acting as client

*Both machines are imported from templates and the MAC addresses of their network adapters are reinitialized.*

## Machine #1 – Rila

One mandatory preliminary step – set the right host name:

[lsauser@almalinux ~]$ **sudo hostnamectl set-hostname rila.lsa.lab**

Reboot the machine:

[lsauser@almalinux ~]$ **sudo reboot**

Once back in, we can continue.

The remaining steps could vary. Here you can see one possible and working combination.

Get information about connections

[lsauser@rila ~]$ **ip a**

...

2: **enp0s3**: <BROADCAST,MULTICAST,UP,LOWER\_UP> mtu 1500 qdisc fq\_codel state UP group default qlen 1000

link/ether 08:00:27:1f:fb:bc brd ff:ff:ff:ff:ff:ff

inet **10.0.2.15/24** brd 10.0.2.255 scope global dynamic noprefixroute enp0s3

...

3: **enp0s8**: <BROADCAST,MULTICAST,UP,LOWER\_UP> mtu 1500 qdisc fq\_codel state UP group default qlen 1000

link/ether 08:00:27:c2:d2:23 brd ff:ff:ff:ff:ff:ff

...

Check the Network Manager connections:

[lsauser@rila ~]$ **sudo nmcli conn show**

NAME UUID TYPE DEVICE

enp0s3 6677cbda-e3c2-3113-a40c-0e0784ddaaa2 ethernet enp0s3

Wired connection 1 19eb741b-bae4-3e0b-9c51-b48572f2718c ethernet enp0s8

lo 59ab5ff6-2f89-4bd9-90a2-15404443b3c9 loopback lo

[lsauser@rila ~]$

Remove the extra ***Wired connection 1*** *if present*

[lsauser@rila ~]$ **sudo nmcli conn delete "Wired connection 1"**

Connection 'Wired connection 1' (19eb741b-bae4-3e0b-9c51-b48572f2718c) successfully deleted.

[lsauser@rila ~]$

Create a new connection for the second network adapter:

[lsauser@rila ~]$ **sudo nmcli connection add type ethernet ifname enp0s8 con-name enp0s8**

Connection 'enp0s8' (35752260-5b58-4dc5-a54c-af94db7ac684) successfully added.

[lsauser@rila ~]$

And set the static network settings:

[lsauser@rila ~]$ **sudo nmcli connection modify enp0s8 ipv4.addresses 192.168.148.1/24 ipv4.method manual**

Finally, bring the connection down and then back up:

[lsauser@rila ~]$ **sudo nmcli connection down enp0s8; sudo nmcli connection up enp0s8**

Connection 'enp0s8' successfully deactivated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/9)

Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/10)

[lsauser@rila ~]$

Check the resulting configuration:

[lsauser@rila ~]$ **ip address show enp0s8**

3: enp0s8: <BROADCAST,MULTICAST,UP,LOWER\_UP> mtu 1500 qdisc fq\_codel state UP group default qlen 1000

link/ether 08:00:27:c2:d2:23 brd ff:ff:ff:ff:ff:ff

inet **192.168.148.1/24** brd 192.168.148.255 scope global noprefixroute enp0s8

valid\_lft forever preferred\_lft forever

inet6 fe80::4f56:5e83:84f7:c6fe/64 scope link noprefixroute

valid\_lft forever preferred\_lft forever

[lsauser@rila ~]$

Install the **DHCP** service:

[lsauser@rila ~]$ **sudo dnf install -y dhcp-server**

...

Then we can modify the configuration of the service:

[lsauser@rila ~]$ **sudo vi /etc/dhcp/dhcpd.conf**

...

Enter in edit/insert mode and type the following:

option domain-name "lsa.lab";

option domain-name-servers 8.8.8.8;

subnet 192.168.148.0 netmask 255.255.255.0 {

range 192.168.148.50 192.168.148.59;

option routers 192.168.148.1;

option broadcast-address 192.168.148.255;

default-lease-time 600;

max-lease-time 7200;

}

Then test the configuration with:

[lsauser@rila ~]$ **sudo dhcpd -t**

...

Now, we must start and enable the service:

[lsauser@rila ~]$ **sudo systemctl start dhcpd**

[lsauser@rila ~]$ **sudo systemctl enable dhcpd**

Created symlink from /etc/systemd/system/multi-user.target.wants/dhcpd.service to /usr/lib/systemd/system/dhcpd.service.

[lsauser@rila ~]$ **systemctl status dhcpd**

...

**SSH** is usually installed during the installation process of **AlmaLinux**. We can check if indeed it is there and running:

[lsauser@rila ~]$ **systemctl status sshd**

● sshd.service - OpenSSH server daemon

Loaded: loaded (/usr/lib/systemd/system/sshd.service; enabled; preset: enabled)

Active: active (running) since Fri 2024-10-04 12:07:39 EEST; 18min ago

Docs: man:sshd(8)

man:sshd\_config(5)

Main PID: 708 (sshd)

Tasks: 1 (limit: 12328)

Memory: 6.2M

CPU: 77ms

CGroup: /system.slice/sshd.service

└─708 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"

Oct 04 12:07:39 rila.lsa.lab systemd[1]: Starting OpenSSH server daemon...

Oct 04 12:07:39 rila.lsa.lab sshd[708]: Server listening on 0.0.0.0 port 22.

Oct 04 12:07:39 rila.lsa.lab sshd[708]: Server listening on :: port 22.

Oct 04 12:07:39 rila.lsa.lab systemd[1]: Started OpenSSH server daemon.

Oct 04 12:08:12 rila.lsa.lab sshd[772]: Accepted password for lsauser from 10.0.2.2 port 53926 ssh2

Oct 04 12:08:12 rila.lsa.lab sshd[772]: pam\_unix(sshd:session): session opened for user lsauser(uid=1000) by lsauser(ui>

[lsauser@rila ~]$

*If we do not see something like this, then we must install it and start it (we should know by now how to do it).*

Check the status of the firewall:

[lsauser@rila ~]$ **systemctl status firewalld**

If it is stopped, start it. Then list the active zones with:

[lsauser@rila ~]$ **sudo** **firewall-cmd --get-active-zones**

public

interfaces: enp0s3 enp0s8

[lsauser@rila ~]$

Put the first network adapter, the one that will act as an external, in the **external** zone:

[lsauser@rila ~]$ **sudo nmcli connection modify enp0s3 connection.zone external**

And put the second network adapter, the one connected with the other two stations, in the internal zone:

[lsauser@rila ~]$ **sudo nmcli connection modify enp0s8 connection.zone trusted**

If we ask again for zones of the interfaces:

[lsauser@rila ~]$ **sudo firewall-cmd --get-active-zones**

external

interfaces: enp0s3

trusted

interfaces: enp0s8

[lsauser@rila ~]$

We will see that now everything is how it should be.

Now, the NAT/forwarding functionality should be enabled. Let’s check with:

[lsauser@rila ~]$ **cat /proc/sys/net/ipv4/ip\_forward**

**1**

[lsauser@rila ~]$

If the above command returned **1**, we are fine.

Let’s see what services are allowed in the **external** zone:

[lsauser@rila ~]$ **sudo firewall-cmd --list-services --zone external**

**ssh**

[lsauser@rila ~]$

The SSH service is usually enabled by default.

By now, we should be done with the networking part. Our client station should already have its IP address and should have access to the Internet.

Let’s continue with the rest of the steps.

Check the instructions at **repos.zahariev.pro** and register the repository. Let’s use the first option

[lsauser@rila ~]$ **sudo dnf config-manager --add-repo https://repos.zahariev.pro/dnf/zahariev-repo.repo**

Adding repo from: https://repos.zahariev.pro/dnf/zahariev-repo.repo

[lsauser@rila ~]$

Install the required package (without GPG check):

[lsauser@rila ~]$ **sudo dnf install --nogpgcheck hello-lsa**

...

Check that the package is installed and working

[lsauser@rila ~]$ **hello-lsa**

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[lsauser@rila ~]$

That is, it. We are done here.

## Machine #2 – Pirin

One preliminary step – set the right host name and reboot the machine:

[lsauser@almalinux ~]$ **sudo hostnamectl set-hostname pirin.lsa.lab**

...

[lsauser@almalinux ~]$ **sudo reboot**

Other steps may vary. In the next few lines, you can find one possible working solution.

By default, the network is set up to acquire IP address via **DHCP**.

If we check, now we will see that there is an address acquired via **DHCP**:

[lsauser@pirin ~]$ **ip a**

...

inet **192.168.148.50/24**

...

Let’s test that we can reach resources on the local network and Internet

[lsauser@pirin ~]$ **ping -c 4 192.168.148.1**

...

[lsauser@pirin ~]$ **ping -c 4 8.8.8.8**

...

Create a new user with the required attributes

[lsauser@pirin ~]$ **sudo useradd -m -c 'Homework User' homework**

...

Set the requested password

[lsauser@pirin ~]$ **sudo passwd homework**

...

Finally, make it part of the **sudoers** users by adding it to the **wheel** group:

[lsauser@pirin ~]$ **sudo usermod -aG wheel homework**

We are done with this.

**SSH** is usually installed during the installation process of **AlmaLinux**.

Then, we must change the default configuration and switch to port **50022**

[lsauser@pirin ~]$ **sudo vi /etc/ssh/sshd\_config**

...

**Port 50022**

...

Once done, we must restart the service and check its status

[lsauser@pirin ~]$ **sudo systemctl restart sshd**

[lsauser@pirin ~]$ **systemctl status sshd**

...

Modify the firewall configuration

[lsauser@pirin ~]$ **sudo firewall-cmd --add-port 50022/tcp --permanent**

[lsauser@pirin ~]$ **sudo firewall-cmd --reload**

That is, it. We are done here as well.