



Network Configuration





CentOS 7 Network Settings





Table of content

1. Network parameters
2. Current network configuration on a computer
3. Configure the network parameters on a CentOS 7 server



1

Network parameters

What are the network parameters we need to know on a Linux server?

Network parameters

There are some parameters that we need to know when configuring the network settings on a system. We have:

- ◇ **The IP address**
- ◇ **The hostname**
- ◇ **The gateway**
- ◇ **The DNS**
- ◇ **The subnet mask**

Network parameters

- ◇ The **IP address** is a unique identifier of a computer or a device on the network
- ◇ The **hostname** is like the name of the server
- ◇ The **gateway** is the gate or route through which your server connects to the internet
- ◇ The **DNS** (Domain Name System/server) is a service whose main function is to translate a domain name into an IP address.
- ◇ The **subnet mask** helps to know the class of the IP address, thus to divide it into two parts: **the NetID and hostID**.



The IP address

Static and Dynamic assignment
of IP addresses



Network parameters: IP Address

There are two types of **IP addresses** depending on the way they are assigned to devices:

Static IP address

This is when the address is given manually to each device by the system administrator

Dynamic IP address

This address is given automatically to a device by the **DHCP(Dynamic Host Control Protocol) server**

Network parameters: IP Address

- ◇ In a company or in a data center, the network administrators usually set up the IP addresses manually to servers and devices. Thus, **devices have static addresses**
- ◇ If the addresses are managed by the DHCP, **they might be changing each time the device is re-connected to the network** (just as on a wifi network)
- ◇ The manual assignment of addresses is done to avoid those changes!

What happens when we connect a device on a wifi network to access the Internet ?

When you want to connect a device on a company or even a personal wifi network, **a DHCP automatically assigns an IP address to your device** as soon as you enter the password

After that, you have access to that network.



A series of hexagonal icons in various shades of blue and cyan are arranged along the left edge of the slide. The icons include a lightbulb, a thumbs-up, a network node, a smartphone, a magnifying glass, a gear, and a speech bubble. The central hexagon is the largest and contains the number '2'.

2

Current network configuration

How to check the current network parameters on a computer?



Check the network configuration on a **Windows** computer



Current network configuration: Windows

Let's check the current **Network configuration** of a windows computer:

NB: Here we are on Windows, we are going to explain how to do it with a Mac OS later on.

- ◇ Open a terminal (command prompt or Powershell terminal in VS code)
- ◇ Run **ipconfig /all** (Note this is not **ifconfig**!)
- ◇ Now, scroll down to check the following line: **Wireless LAN adapter wi-fi**



Wireless LAN adapter Wi-Fi:

```
Connection-specific DNS Suffix . : fios-router.home
Description . . . . . : Intel(R) Dual Band Wireless-AC 8260
Physical Address. . . . . : F4-8C-50-B6-93-8D
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes
Link-local IPv6 Address . . . . . : fe80::78a9:4fd2:3e63:7a4c%21(Preferred)
IPv4 Address. . . . . : 192.168.1.161(Preferred)
Subnet Mask . . . . . : 255.255.255.0
Lease Obtained. . . . . : Sunday, April 26, 2020 3:30:45 PM
Lease Expires . . . . . : Monday, April 27, 2020 5:15:35 PM
Default Gateway . . . . . : 192.168.1.1
DHCP Server . . . . . : 192.168.1.1
DHCPv6 IAID . . . . . : 133467216
DHCPv6 Client DUID. . . . . : 00-01-00-01-22-AA-4E-9E-F4-8C-50-B6-93-8D
DNS Servers . . . . . : 192.168.1.1
NetBIOS over Tcpip. . . . . : Enabled
Connection-specific DNS Suffix Search List :
                                     fios-router.home
```

Current network configuration: Windows

- ◇ Copy your **IP address (IPv4)**, the **subnet mask**, the **DNS address**, **gateway** somewhere
- ◇ Here my parameters are:
 - IP address: **192.168.1.161**
 - Subnet mask: **255.255.255.0**
 - Gateway: **192.168.1.1**
 - DNS servers: **192.168.1.1**

NB: Yours will not be the same with mine. Just take exactly what you see on your own computer.



Current network configuration: Windows

Looking at the **IP address** and the **subnet mask**, we can identify its **class** and the two parts (**Network id**: 192.168.1 and the **Host id**: 161)

192.168.1.161

Network part Host part

Class C





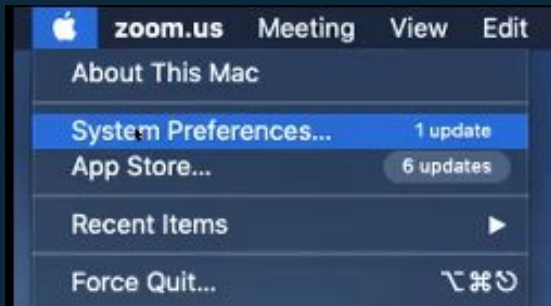
Check the network
configuration on a **Mac**
computer



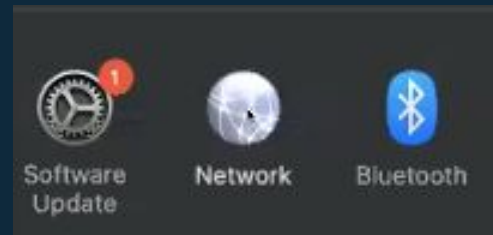
Current network configuration: Mac

To check the current network configuration on a MAC:

- ◇ Click on the **apple sign** on your desktop
- ◇ Click on **System Preferences**

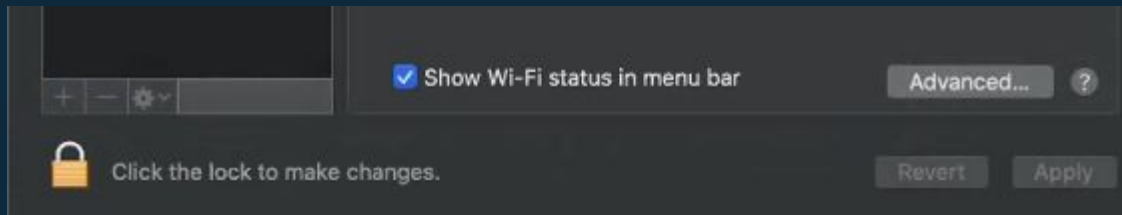


- ◇ Then click on **Network**



Current network configuration: Mac

- Click on the **Lock** under the page and **enter the password** to open the settings (for eventual changes)

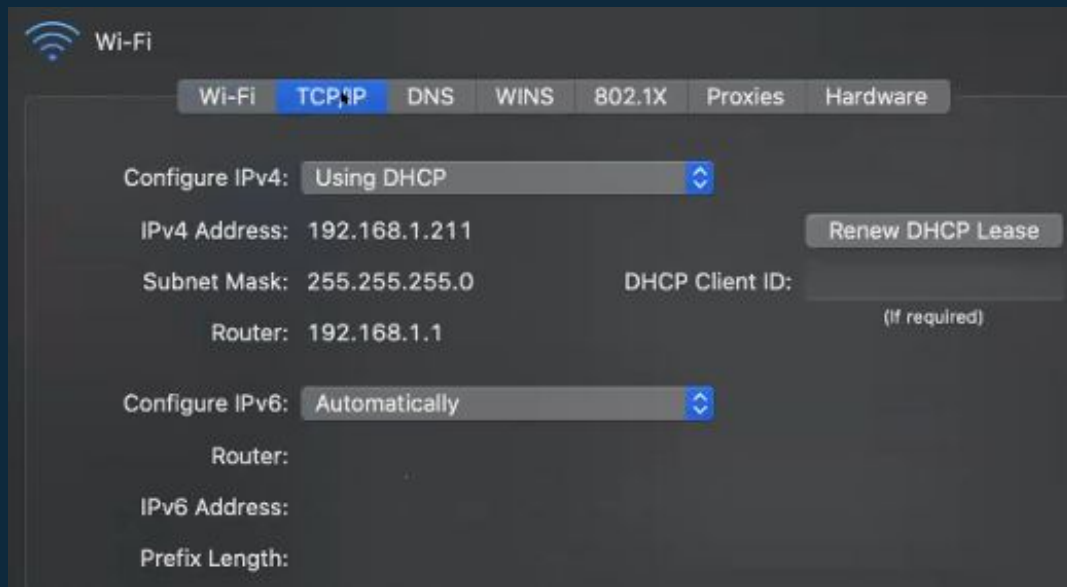


- Click on **Advanced** to see the full map of our network informations



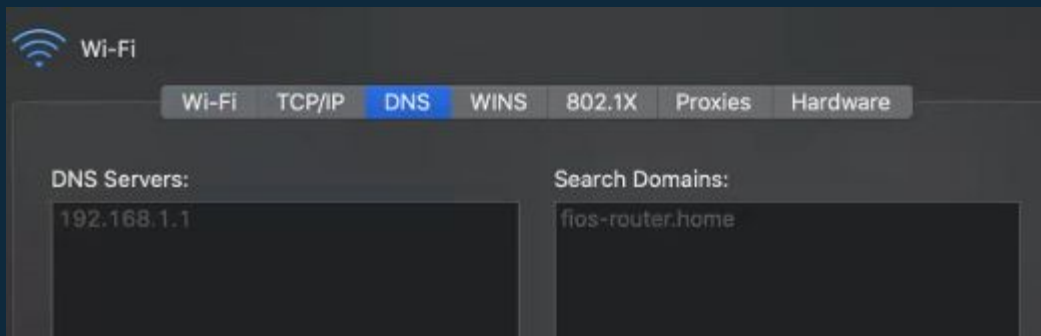
Current network configuration: Mac

Click on **TCP/IP** menu. **Router** here is for the **Gateway**



Current network configuration: Windows

- ◇ Click on **DNS** menu to see the DNS parameter



- ◇ You can also check the IP address in a Terminal using the command **ifconfig** (as usual)





We know how to check the current network configuration on Windows and even on Mac

Now let's see how to set up our IP address manually on a linux server!

3

Configure the network parameters

How to configure the network parameters on a Centos server?

Network configuration

- ◇ If a server is not configured and connected on the company network, it won't be able **to communicate with other devices and servers in the company**
- ◇ There are **two methods** you can use to do the network configuration:
 - Using the **nmcli (Network Manager Command Line Interface)**
 - Using the **nmtui (Network Manager Tool Utility)** which has a **graphical user interface (GUI)**





The **nmtui** method is simpler, more friendly and safe for beginners.
We are going to use that method for now!



In this part, we will install a **new centos 7 server** with a **customized Vagrantfile**
[Click here to download](#) the Vagrantfile

Network configuration

- ◇ Run the following commands (in your **Visual studio code** terminal) to initialize a centos 7 server using vagrant :
 - **mkdir network-Centos7**
 - **cd network-Centos7**
 - **vagrant init centos/7**
 - **ls**
- ◇ Now, let's modify the content of the Vagrantfile created
 - **code Vagrantfile**





Network configuration

- ◇ The Vagrantfile is opened in the **Visual Studio code editor**
- ◇ Now, delete the content (all the lines) in your **Vagrantfile**
- ◇ **Copy the content** of the file you downloaded earlier and **paste it in there**
- ◇ Save the file and go to the terminal
- ◇ Start the server with **vagrant up**



Network configuration

- ◇ Login and connect remotely to your **Centos 7** server from your Visual studio code:
 - **ssh vagrant@192.168.50.20**
- ◇ Enter the password of the user vagrant if necessary : **vagrant**
- ◇ Switch to the **root user** account (\$ **sudo su** and enter the password if necessary)
- ◇ Before configuring the network parameters, let's check the current configuration





Current parameters
on Centos 7 server





Install the network tools to be able to run some network commands. Use the command: # **yum install net-tools**

If this command still fails, run \$ **yum clean all** and try again.

Network configuration

- ◇ Let's check the **Host name** on our server: **# hostname**

```
[root@localhost vagrant]# hostname  
localhost.localdomain
```

- ◇ To check the **gateway address** you can use the following commands: **# route -n**

- ◇ Here we will concentrate on the **eth1** interface

```
[root@localhost vagrant]# route -n  
Kernel IP routing table  
Destination      Gateway          Genmask          Flags Metric Ref    Use Iface  
0.0.0.0          10.0.2.2        0.0.0.0          UG    100    0      0 eth0  
10.0.2.0        0.0.0.0        255.255.255.0    U     100    0      0 eth0  
192.168.50.0    0.0.0.0        255.255.255.0    U     101    0      0 eth1
```


Network configuration

- ◇ Now, let's check the IP address with the command: `# ifconfig`
- ◇ Check the parameters in the eth1 interface

```
eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.50.20 netmask 255.255.255.0 broadcast 192.168.50.255
    inet6 fe80::a00:27ff:fe03:dd93 prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:03:dd:93 txqueuelen 1000 (Ethernet)
    RX packets 200 bytes 16068 (15.6 KiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 170 bytes 27593 (26.9 KiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

Network configuration

- ◇ The current network parameters of my server are:
 - IP address: **192.168.50.20**
 - Subnet mask: **255.255.255.0**
 - Gateway: **0.0.0.0**
 - Hostname: **localhost.localdomain**
- ◇ Now, let's modify some network parameters manually on our server



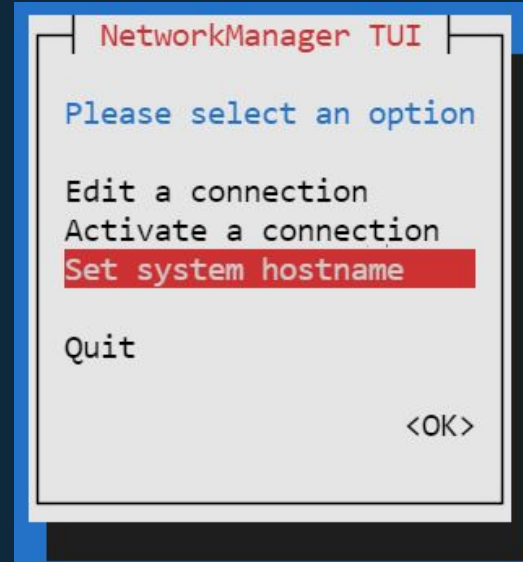


Hostname configuration



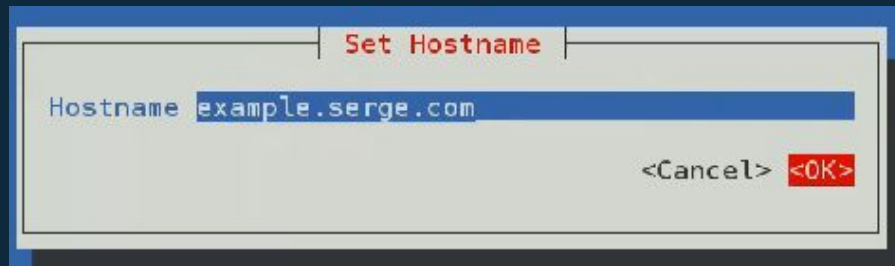
Hostname configuration: nmtui

- ◇ Now, let's make our configuration with **nmtui**
- ◇ Run the command **# nmtui**
- ◇ It opens a **GUI Dialog window** for you **to interact with the system**
- ◇ Use the **arrows or the Tabulation keys** to move from one option to the other



Hostname configuration: nmtui

- ◇ Move to **Set System hostname** and hit **Enter**
- ◇ Enter the **Hostname** from our network parameters list



- ◇ Move to **OK** and press **Enter**

You can check your host name again with **# hostname**. It has changed



Hostname configuration: nmtui

- ◇ Another way to change the host name is by using the command:

```
# hostnamectl set-hostname yourHostname
```

- ◇ Example: If we want to change the previous host name (example.serge.com) to **example.serge.org**, we need to run:

```
# hostnamectl set-hostname example.serge.org
```

- ◇ So there are two ways to change the host name. You can either use the **nmtui** or use the **# hostnamectl** command





IP address: manual
configuration

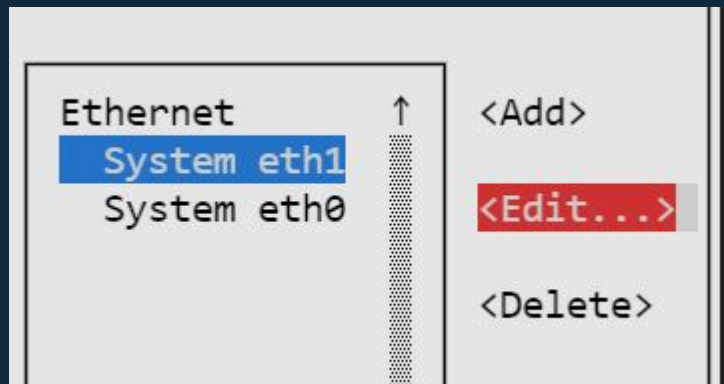


Network configuration: (IP address)

- ◇ To change our IP address, run
 - **# nmtui**
- ◇ Then move to **Edit a connection**
- ◇ Press **Enter**

It is pointing at your NIC card (eth1 interface)

- ◇ Use the Tabulation key to move to **<Edit>**
- ◇ Press **Enter**



Network configuration: (IP address)

Now, use the down arrow key to move to **IPv4 CONFIGURATION <Manual>**

- ◇ Use the **Down arrow** key to move to **Addresses 192.168.50.20/24**
- ◇ Use the **left or right arrow key** to move in the IP,
- ◇ To modify the IP address, we just need to change the HostID that is the last octet of the address

NB: We will not modify the IP address here for now, this is just for you to know where to go if you ever need to change a server's IP in the company.



Network configuration: (IP address)

- ◇ Use the **Down arrow** key to move to the **Gateway**, enter **192.168.1.1**
- ◇ Also move to the **DNS** and press Enter on **<Add...>**
- ◇ Enter **192.168.1.1** and also add **8.8.8.8** as second DNS

NB: 8.8.8.8 is a public free DNS from Google. You can use it for free if you don't have a DNS

Edit Connection

Profile name System eth1
Device eth1 (08:00:27:03:DD:93)

= ETHERNET <Show>

= IPv4 CONFIGURATION <Manual> <Hide>

Addresses 192.168.50.20/24 <Remove>
<Add...>

Gateway 192.168.1.1

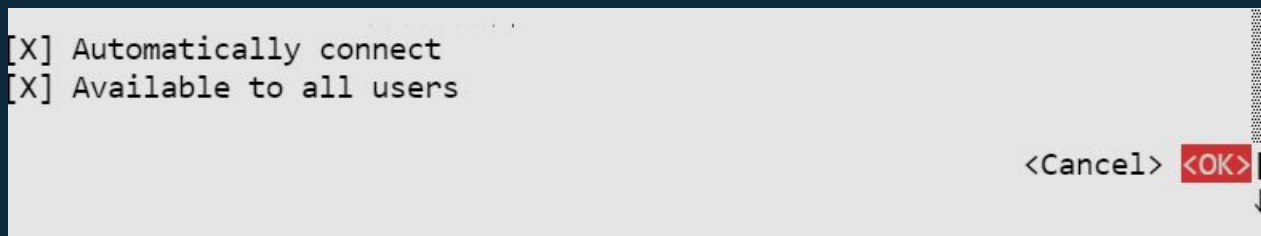
DNS servers 192.168.1.1 <Remove>
8.8.8.8 <Remove>
<Add...>

Search domains <Add...>

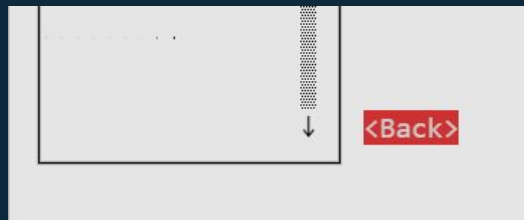


Network configuration: (IP address)

- ◇ Now, move with the down arrow key to **OK** at the end of the page and hit **Enter**

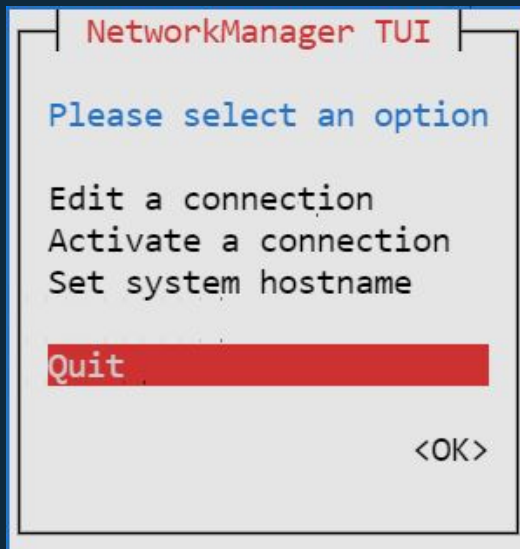


- ◇ In the page that displays, move to **<Back>** and press **Enter**



Network configuration: (IP address)

- ◇ Now, move to **Quit** and press **Enter**



The screenshot shows a terminal window titled "NetworkManager TUI". Inside, it prompts the user to "Please select an option" and lists four choices: "Edit a connection", "Activate a connection", "Set system hostname", and "Quit". The "Quit" option is highlighted with a red background bar. At the bottom right of the menu, there is a "<OK>" prompt.

```
NetworkManager TUI

Please select an option

Edit a connection
Activate a connection
Set system hostname
Quit

<OK>
```



Network configuration: (IP address)

- ◇ Now we can restart the network with the following command:
 - **# systemctl restart network**
- ◇ You can run the **# ifconfig** and **# route -n** to check the new network configuration.

```
[root@localhost vagrant]# route -n
Kernel IP routing table
Destination    Gateway         Genmask         Flags Metric Ref    Use Iface
0.0.0.0        10.0.2.2        0.0.0.0         UG    100    0      0 eth0
0.0.0.0        192.168.1.1     0.0.0.0         UG    101    0      0 eth1
10.0.2.0       0.0.0.0         255.255.255.0   U     100    0      0 eth0
192.168.1.1    0.0.0.0         255.255.255.255 UH    101    0      0 eth1
192.168.50.0   0.0.0.0         255.255.255.0   U     101    0      0 eth1
```



“

There is a file on the system which contains all the DNS configuration: [/etc/resolv.conf](#)
You can list the content of that file with the **cat** command



If you want the dynamic configuration (DHCP), you can go back to nmtui, edit the connection and change **Manual** to **Automatic**

That's all!

Network configuration: (IP address)

- ◇ There is another way to make this configurations using a specific file:
 - `# cd /etc/sysconfig/network-scripts/`
 - `# ls`
- ◇ You can check and modify the configurations in the file `ifcfg-eth1` with:
 - `# cat ifcfg-eth1`

NB: For beginners, nmtui method is simpler and safe.



Important Note

- ◇ The **Manual** IP configuration is best when the devices are **stable** (static or on the same place). **Example**: a company, a data center etc.
- ◇ When the devices are **mobile** (can be displaced all the time), it is better to allow the configuration to the DHCP ie **Automatic**.
- ◇ To make sure everything is OK after the configurations, run the command: **# ping google.com**
- ◇ The IP address we have assign manually to our server can be use for remote connection with our ssh tools as usual.





Play around with nmtui and if you encounter any issue, feel free to post your question in the Telegram group

See you guys in the next lesson!



Thanks!

Any questions?

You can find us at:

website: <http://utrains.org/>

Phone: +1 (302) 689 3440

Email: contact@utrains.org





Click on the link below to
contact the support team
for any issue!

utrains.org/support/

Create a ticket for your problem and we will get back to you soon!

