# Configure the Network Manually | Command Lines | Linux

**Display Current Network Configuration**

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| **Command** | **Purpose** |
| ip address show | To display the IP address setup of all devices. |
| ip link show | If you are only interested in the device attributes and not in the IP address setup. The device attributes are displayed in brackets right after the device name. |
| ip -s link show + device name (ex: eth0) | You can use the option **-s** with the command ip to display additional statistics information about the devices. |

**Change Current Network Configuration**

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| **Command** | **Purpose** |
| ip address add **10.0.0.2/24** brd + dev **eth0**  (your ip) (device) | Assign an IP address to a device.  The network mask is **24** bits long, as determined by the **/24** after the IP address.  The **brd +** option sets the broadcast address automatically as determined by the network mask. |
| ip address show dev **eth0**  (device) | To verify the assigned IP address |
| ip address del **10.0.0.2** dev **eth0**  (your ip) (device) | To delete the IP address from a device |
| ip link set ***device attribute***  ip link set eth0 up  ip link set eth0 down | Change device attributes with the ip tool  The most important attributes *up* and *down*. By setting these attributes, you can enable or disable a network device. |

**Save Device Settings to a Configuration File**

For Ethernet devices, the filenames consist of **ifcfg-eth-id**- and the **hardware** **address** of the device.

For a device with the hardware address 00:30:05:4b:98:85, the filename would be

**ifcfg-eth-id-00:30:05:4b:98:85**

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| **Command / Directory** | **Purpose** |
| /etc/sysconfig/network. | The configuration files for network devices are in this directory. |
| ip link show | Display the hardware **address** for each Ethernet device. Because the hardware address is part of the **file** **name**, you can identify the right configuration file. |

**Configure a Device Statically (NANO)**

The content of a configuration file of a statically configured device is similar to the following **(use nano to get into the configuration file?)**

The configuration file includes several lines.

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| **Directory & File Entries** | **Purpose** |
| BOOTPROTO='static' | Determines the way the device is configured:   1. Static: configured with static IP address 2. DHCP: automatically |
| MTU='' | To specify a value for the MTU (Maximum Transmission Unit). Default value is used when you don’t specify. |
| REMOTE\_IPADDR='' | You need to set the value for the REMOTE\_IPADDR option only if you are setting up a point-to-point connection. |
| STARTMODE='onboot' | Determines **how** the device is started:   1. Onboot: The device is started at boot time. 2. Manual: manually 3. Hotplug: Is started when it is plugged in if your system offers PCI hotplugging. |
| UNIQUE='oxTw.AKbXsqnOlA9'\_nm\_name='bus-pci-0000:02:08.0' | These 2 lines contain options added by YaST when the device is configured. |
| BROADCAST='149.44.171.255'  IPADDR='10.0.0.2'  NETMASK='255.255.255.0'  NETWORK='10.0.0.0' | **BROADCAST.** The broadcast address of the network.  **IPADDR.** The IP address of the device.  **NETMASK.** The network mask.  **NETWORK.** The address of the network itself. |

The *file* **/etc/sysconfig/network/ifcfg.template** contains a template that you can use as a base for device configuration files.

**Configure a Device Dynamically with DHCP (NANO)**

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| **File Entries & Commands** | **Purpose** |
| BOOTPROTO='dhcp' | Determines the way the device is configured:   1. Static: configured with static IP address 2. DHCP: automatically |
| ifdown eth0 | To apply changes to a configuration file, you need to stop and restart the corresponding devic.  command **disables** the device eth0 |
| ifup eth0 | command **enables** eth0 again |

**Set Up Routing with IP Tool (YaST?)**

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| **Commands** | **Purpose** |
| Ip route show | view the current routing table |
| ip route add **10.0.0.0/24** dev **eth0** | sets a route to the locally **connected** network |
| ip route add **149.44.171.0/24** via **10.0.0.100** | sets a route to **different** network.  All packets for the network **149.44.171.0** are sent through the gateway **10.0.0.100**. |
| ip route add default via 10.0.0.1 | sets a default route |
| ip route delete 149.44.171.0/24 dev eth0 | delete an entry from the routing table |

**Save Routing Settings to a Configuration File (NANO)**

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| **Directories & File Entries** | **Purpose** |
| /etc/sysconfig/network/routes. | All other routes are saved in the configuration file |
| 149.44.171.0 10.0.0.100 255.255.255.0 eth-id-00:30:05:4b:98:85 | All packets sent to the network **149.44.171.0** with the network mask **255.255.255.0** are sent through the gateway **10.0.0.100** through the device with the id **eth-id-00:30:05:4b:98:85**. The id is the same as used for the device configuration file. |
| Default 10.0.0.8 - - | This entry represents a default route. |

**Configure Hostname and Name Resolution (NANO)**

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| **Directory & File Entries** | **Purpose** |
| /etc/HOSTNAME | The host name is configured in the file |
| search | The domain name in this option is **used to complete incomplete host names** |
| nameserver | Every entry starting with nameserver is followed by an IP address of a name server.  You can configure up to 3 name servers. If the first name server fails, the next one is used. |

**Testing Network Connection & Troubleshooting with PING command**

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| **Command Lines** | **Purpose** |
| Ping ***+ IP address or Hostname*** | Ping – press Ctrl+C to terminate sending packets |
| Ping *-c (count)* | The number of packets to be sent. After this number has been reached, ping is terminated. |
| -I *device\_addr* | Specifies the network device to be used on a computer with several network devices |
| -i *seconds* | Specify seconds to wait between individual packet shipments. The default setting is 1 second. |
| -f | (Flood ping) Packets are sent one after another at the same rate as the respective replies arrive. |
| -l *preload (it is a lowercase L)* | Sends packets without waiting for a reply. |
| -n | The numerical output of the IP address. |
| -t *ttl* | Sets the Time To Live for packets to be sent. |
| -w *maxwait* | Specifies a timeout in seconds, before ping exits regardless of how many packets have been sent or received. |
| -b | Sends packets to the broadcast address of the network. |

**Use Traceroute to Trace Network Packets**

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| **Command** | **Purpose** |
| **traceroute pluto.example.com** | used to check the routing between different networks |