

Fundamentals of UNIX & Linux for System Administrators

FUL-02: Network Configuration Essentials

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Agenda

- Network Configuration Essentials
 - TCP/IP networking essentials
 - Configure network interfaces in Ubuntu
 - Network configuration, Troubleshooting and Debugging Tools
 - Command-Line Tools and utilities for Network Management in Linux (ifconfig, ethtool, ip, ifup, ifdown, ping, nslookup, dig)
 - Linux Network Monitoring Tools (Nload, Nethogs, Slurm, Iftop, Collectctl, Netstat, Nagios)

TCP/IP Refresher..

NETWORKING ESSENTIALS

Application Layer

| HTTP | FTP, SMTP | DNS | Ports (80, 21, 25) |
| Application Data |

Transport Layer

| TCP (Reliable, Sequence Numbers, |
| Acknowledgments) | UDP (Faster, Unreliable) |

Internet Layer

| IP (IPv4/IPv6) | IP Addresses |
| (Public/Private, Static/Dynamic) |
| Routing, IP Header | ICMP |

Network Layer

| Ethernet | MAC Address | Switches |

Physical Hardware

| Computers | Routers | Firewalls | LANs |

Network Configuration Files.. *The heart of Ubuntu networking*

- The core components in which an Ubuntu system connects to and interacts with other network entities.
- Contain settings for network interfaces, DNS resolution, and other network parameters.

Network Configuration Files..

The heart of Ubuntu networking

- **Location and Structure of Network Configuration Files**
- In Ubuntu, network configuration files are primarily located in the **/etc/network** and **/etc/Netplan** directories.
- The traditional method of network configuration involves the **/etc/network/interfaces** file, which has been the standard for many years. However, recent versions of Ubuntu have adopted Netplan, a YAML-based network configuration system that uses files in the **/etc/netplan** directory.

Traditional vs Modern Interface Configuration

- Traditional `/etc/network/interfaces`

Defined network interface settings. This file allows for the configuration of network interfaces, both IPv4 and IPv6, static IP addresses, DHCP configuration, and advanced networking features like bonding and bridging.

- Modern `/etc/netplan`

Netplan is a newer, simpler & more streamlined approach to network configuration in Ubuntu. It uses YAML files, which are more human-readable and support modern features like networkd and NetworkManager backends.

Creating and Editing Netplan Configuration File

- To configure network settings using Netplan, you create or edit a YAML file in the `/etc/netplan` directory.
- The file name can be anything, but it must have a `.yaml` extension. For example, a common file name is `01-netcfg.yaml`. The file should contain the necessary configuration for your network interfaces.

Sample Netplan Configuration File

simple Netplan configuration file that sets up a static IP address for an Ethernet interface named **eth0**:

- network:

version: 2

renderer: networkd

ethernets:

eth0:

dhcp4: no

addresses: [192.168.1.10/24]

gateway4: 192.168.1.1

nameservers:

addresses: [8.8.8.8, 8.8.4.4]

- This configuration disables DHCP for **eth0**, sets a static IP address, defines a gateway, and specifies DNS servers.

Sample Netplan Configuration File

- After editing or creating a Netplan configuration file, you must apply the changes for them to take effect.
- This is done using the **netplan apply** command. Netplan will parse the YAML file and apply the configuration to the system's network interfaces.

Managing DNS Configuration

- Within a Netplan configuration file, you can specify DNS servers that your system should use for name resolution. This is done under the **nameservers** key, as shown in the earlier static IP address example.

Troubleshooting and Debugging Tools

Linux Network Commands

ifup / ifdown : used to enable or disable interfaces

nslookup : used also for dns query.

route : to check the ip routing table.

tcpdump : used for analyzing and capturing.

traceroute : lists the hosts on the way to a destination.

nmap : to check open ports on any device.

ss : to get detailed information about the sockets.

nload : used for bandwidth monitoring.



IpCisco.com

Your troubleshooting & debugging cheat sheet..

- <https://phoenixnap.com/kb/linux-network-commands>
- <https://www.linkedin.com/pulse/linux-networking-commands-cheat-sheet-your-quick-guide-kshirsagar/>
- <https://cheatography.com/zappmax/cheat-sheets/linux-troubleshooting/>

ACTIVITY



- Check ip address
- Copy netplan yaml file into a new file
- Check DNS server configured on the Ubuntu instance
- Ping your instance gateway and any other class instance IP
- Ping your host machine from your Ubuntu instance
- Check open ports on Ubuntu instance
- Check configured gateway



Q & A

References

- <https://www.cyberithub.com/network-troubleshooting-tools/>
- <https://tech.sadaalomma.com/ubuntu/network-configuration-file-in-ubuntu/>

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