LESSON NOTES

# Intro to Linux

## System Management

### 1.5.1 Network Interface Management

## Lesson Overview:

**Students will:**

- Understand the utilities used for monitoring and managing the network interface of a Linux system

**Guiding Question:** How can the network interface of a Linux system be navigated and configured to fit the needs of the users?

**Suggested Grade Levels:** 9 - 12

**Technology Needed:** None

## CompTIA Linux+ XK0-005 Objective:

1.5 - Given a scenario, use the appropriate networking tools or configuration files

- Interface Management
  - iproute2 tools
    - ip
    - ss
  - Network Manager
    - nmcli
  - net-tools
    - ifconfig
    - ifcfg
    - hostname
    - arp
    - route
  - /etc/sysconfig/network-scripts/

*This content is based upon work supported by the US Department of Homeland Security's Cybersecurity & Infrastructure Security Agency under the Cybersecurity Education Training and Assistance Program (CETAP).*

# Network Interface Management

Linux provides several command-line utilities to monitor and manage network interfaces. *iproute2* (intentionally lowercase) is a powerful and flexible command-line tool that allows you to configure and manage various aspects of network interfaces. It provides a comprehensive set of options for managing IP addresses, routes, tunnels, and more. With iproute2, you can create, update, and delete network interfaces, as well as manipulate routing tables and control traffic flow. Two common tools used in the iproute2 utility are the **`ss`** and **`ip`** commands. The **`ss`** command displays socket statistics. It provides information about various aspects of network connections such as sockets, ports, and protocols. It can show current network connections, listening ports, socket statistics, network interface statistics, and more. The **`ip`** command is used to display and manage the network configurations in the system. Adding a parameter after the **`ip`** command changes the settings and parameters that can be displayed and changed. The command **`ip address show`** will display current network connections as well as the system's current IP addresses. Here are some common parameters used with the iproute2 utility.

| Parameter | Description |
|---|---|
| **`address`** | Displays or change the IPv4 and/or Ipv6 address |
| **`link`** | Defines a network device and change its status |
| **`route`** | Manages the routing table |
| **`rule`** | Manage the routing policies in the current system |

*Network manager*, on the other hand, is a sophisticated network configuration tool that provides a user-friendly interface for managing network connections. It offers a graphical user interface (GUI) with the command **`nmtui`** that allows you to easily configure wired, wireless, and mobile broadband connections. Network manager also offers a command-line interface with the command **`nmcli`**, giving you the flexibility to manage network interfaces without a graphical environment but still have a more user-friendly view with displaying network related data.

If you are working with an older Linux system, ***net-tools***, a set of legacy network configuration utilities that have been widely used in Linux. Although net-tools are being phased out in favor of iproute2 and network manager, they still provide some useful functionalities, such as the commands **`ifconfig`**, which displays or sets the IP address and netmask values, and **`route`**, which sets the default router address. The **`ifcfg`** command stands for interface configuration. It is used to configure network interfaces in Linux. Network interfaces, such as Ethernet, wireless, or virtual interfaces, are responsible for communication between systems. The **`ifcfg`** command allows you to configure settings for these interfaces, including IP address, netmask, gateway, DNS servers, and more. The **`hostname`** command is used to view or set the hostname of a Linux system. The hostname is a word or phrase that identifies a particular system within a network. The **`arp`** command stands for "Address Resolution Protocol." It is used to view and manipulate the ARP cache, which is a table that maps IP addresses to MAC addresses on a local network. ARP is responsible for translating IP addresses into MAC addresses, enabling proper communication between devices.

Each of these utilities can be used to configure and view network settings. The file directory **`/etc/sysconfig/network-scripts/`**, sometimes located at **`/etc/network`**, in Linux is used for saving these network configurations. It contains scripts and configuration files that govern the network interfaces and settings on a Linux system. This directory typically includes multiple files, each representing a network interface on the system.

Network interface management is a critical aspect of managing a Linux system. It plays a crucial role in establishing and managing network connections, allowing machines to communicate and exchange data. With the knowledge of the aforementioned utilities and resources, a user can confidently navigate and manage network interfaces in a Linux system.