Assignment 3

Prepare a detailed report demonstrating the following with proper illustrations and screen shots as applicable.

A) CAT-5/CAT-6 cable preparation with RJ-45 connector; both straight and cross cabling.

B) IP address configuration (both Static and DHCP) on Linux and Windows systems.

C) Introduction to the following important network related tools and commands with appropriate examples,

1. ipconfig (Windows)
2. ifconfig (Linux)
3. ip
4. hostname
5. ping
6. netstat
7. route
8. traceroute or tracert
9. tcpdump
10. Wireshark

Answer:

Ans A: Preparing CAT-5/CAT-6 cables with RJ-45 connectors involves a few standard steps.

Tools Required:
- CAT-5/CAT-6 cable
- RJ-45 connectors
- Crimping tool
- Cable cutter/stripper
- Optional: Cable tester (for verifying connections)

Steps:
For **Straight-Through Cable**:
➢ Strip the Cable: Use a cable cutter/stripper to carefully remove about 1.5 inches (38 mm) of the outer insulation from the end of the cable. Inside, you will find four twisted pairs of wires.
➢ Untwist the Pairs: Gently untwist the pairs and straighten each wire.
➢ Arrange the Wires: Arrange the wires according to the T568B wiring standard. The order from left to right should be:
  - Orange Stripe
  - Orange
  - Green Stripe
  - Blue
  - Blue Stripe
  - Green

- Brown Stripe
- Brown
- Trim Excess: Trim the wires to a uniform length, leaving approximately 1/2 inch (12 mm) extending past the jacket.
- Insert Wires into RJ-45 Connector: Carefully insert the wires into the RJ-45 connector, ensuring they go all the way to the end and are in the correct order.
- Crimp the Connector: Use a crimping tool to crimp the connector onto the cable securely. Apply enough pressure to ensure a good connection without damaging the cable.
- Repeat for the Other End: Repeat the above steps for the other end of the cable.
- Test the Cable: Optional but recommended, use a cable tester to ensure the connections are correct and there are no faults.

For *Crossover Cable*:
A crossover cable is used to connect two similar devices directly, such as two computers without a switch in between. The wiring pattern for a crossover cable is slightly different from a straight-through cable.

The only difference in the process is the wiring arrangement:

Instead of following T568B on both ends, follow this wiring pattern on one end and T568A on the other:

- End 1 (T568B):
  - Orange Stripe
  - Orange
  - Green Stripe
  - Blue
  - Blue Stripe
  - Green
  - Brown Stripe
  - Brown
- End 2 (T568A):
  - Green Stripe
  - Green
  - Orange Stripe
  - Blue
  - Blue Stripe
  - Orange
  - Brown Stripe
  - Brown

This arrangement effectively swaps the transmit and receive lines, creating a crossover connection.

Repeat all other steps as described for a straight-through cable. By following these steps, you should be able to prepare both straight-through and crossover CAT-5/CAT-6 cables with RJ-45 connectors.

Ans B: Linux:

Static IP Configuration:
- ✓ Open the terminal.
- ✓ Edit the network configuration file using a text editor like nano or vi:

sudo nano /etc/network/interfaces

- ✓ Find the line for your network interface (e.g., eth0).
- ✓ Modify it to include the static IP address, netmask, gateway, and DNS servers:

> **iface eth0 inet static**
> **address 192.168.1.100**
> **netmask 255.255.255.0**
> **gateway 192.168.1.1**
> **dns-nameservers 8.8.8.8 8.8.4.4**

- ✓ Save the file and exit the text editor.
- ✓ Restart the network service:

sudo systemctl restart networking

DHCP IP Configuration:
- ✓ Open the terminal.
- ✓ Edit the DHCP configuration file:

sudo nano /etc/network/interfaces

- ✓ Find the line for your network interface (e.g., eth0).
- ✓ Modify it to use DHCP:

iface eth0 inet dhcp

- ✓ Save the file and exit the text editor.
- ✓ Restart the network service:

sudo systemctl restart networking

Windows:

Static IP Configuration:
- ✓ Right-click on the network icon in the system tray and select "Open Network & Internet settings."
- ✓ Click on "Change adapter options."
- ✓ Right-click on the network adapter you want to configure and select "Properties."
- ✓ Select "Internet Protocol Version 4 (TCP/IPv4)" and click "Properties."
- ✓ Choose "Use the following IP address" and enter the IP address, subnet mask, default gateway, and DNS server addresses.
- ✓ Click "OK" to save the settings.

DHCP IP Configuration:
- ✓ Follow steps 1-3 from the Static IP Configuration section.

✓ Select "Obtain an IP address automatically" and "Obtain DNS server address automatically." Click "OK" to save the settings.

That's it! You've configured both cable connections with RJ-45 connectors and IP addresses on Linux and Windows systems.

Ans C: Here's an introduction to each of the mentioned network-related tools and commands with appropriate examples:

1. ipconfig (Windows):
   - ipconfig is a command-line utility in Windows used to display and manage network configurations of the local system.
   - Example: ***ipconfig /all*** displays detailed information about all network interfaces.
2. ifconfig (Linux):
   - ifconfig is a command-line utility in Linux used to configure and display information about network interfaces.
   - Example: ***ifconfig eth0*** displays information about the Ethernet interface eth0.
3. ip:
   - The ip command is a powerful utility for network configuration in Linux. It is more versatile than ifconfig and route.
   - Example: ***ip*** address show displays IP addresses assigned to all network interfaces.
4. hostname:
   - hostname is a command that displays or sets the hostname of the system.
   - Example: ***hostname*** displays the current hostname of the system.
5. ping:
   - ping is a utility used to test the reachability of a host on an Internet Protocol (IP) network.
   - Example: ***ping google.com*** sends ICMP echo requests to google.com to check connectivity.
6. netstat:
   - netstat is a command-line tool used for displaying network connections, routing tables, interface statistics, masquerade connections, and multicast memberships.
   - Example: ***netstat -an*** displays all active network connections.
7. route:
   - route is a command-line utility in Linux used to view and manipulate the IP routing table.
   - Example: ***route -n*** displays the kernel routing table in numerical format.
8. traceroute or tracert:
   - traceroute (Linux) or tracert (Windows) is used to trace the route that packets take from the local host to a destination host.
   - Example: ***traceroute google.com*** traces the route to google.com displaying the IP addresses of routers along the path.
9. tcpdump:
   - tcpdump is a command-line packet analyzer. It allows the user to display TCP/IP and other packets being transmitted or received over a network.
   - Example: ***tcpdump -i eth0*** captures packets on the eth0 interface.
10. Wireshark:

- Wireshark is a GUI-based packet analyzer that allows the user to capture and interactively browse the traffic running on a computer network.
- Example: Launch *Wireshark*, select the network interface, and start capturing packets for analysis.

These tools and commands are essential for network troubleshooting, monitoring, and configuration in both Windows and Linux environments.