NATIONAL UNIVERSITY OF COMPUTER & EMERGING SCIENCE
Computer Networks Lab (CL307)
Lab Session 01

To get started with the lab activities, some basic terms to be familiarized with:

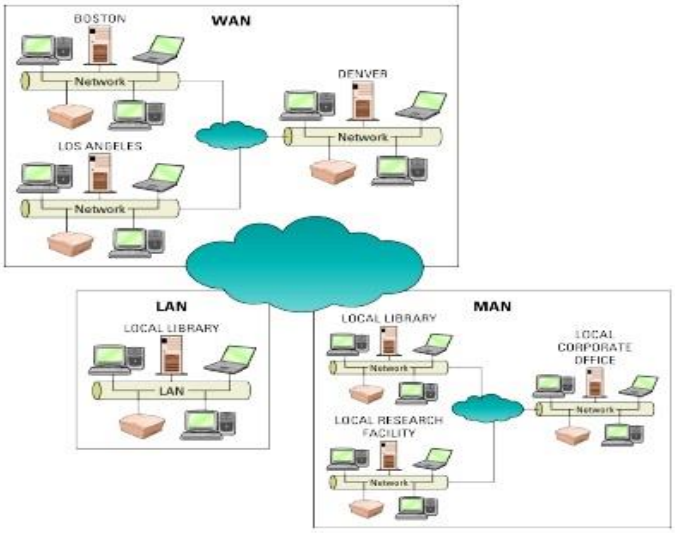
Network: a group or system of interconnected people or things.

Computer Network: A computer network or data network is a telecommunications network which allows nodes to share resources. In computer networks, networked computing devices exchange data with each other using a data link. The connections between nodes are established using either cable media or wireless media.

Types of Network: Some of the different networks based on size are LAN, MAN, WAN.

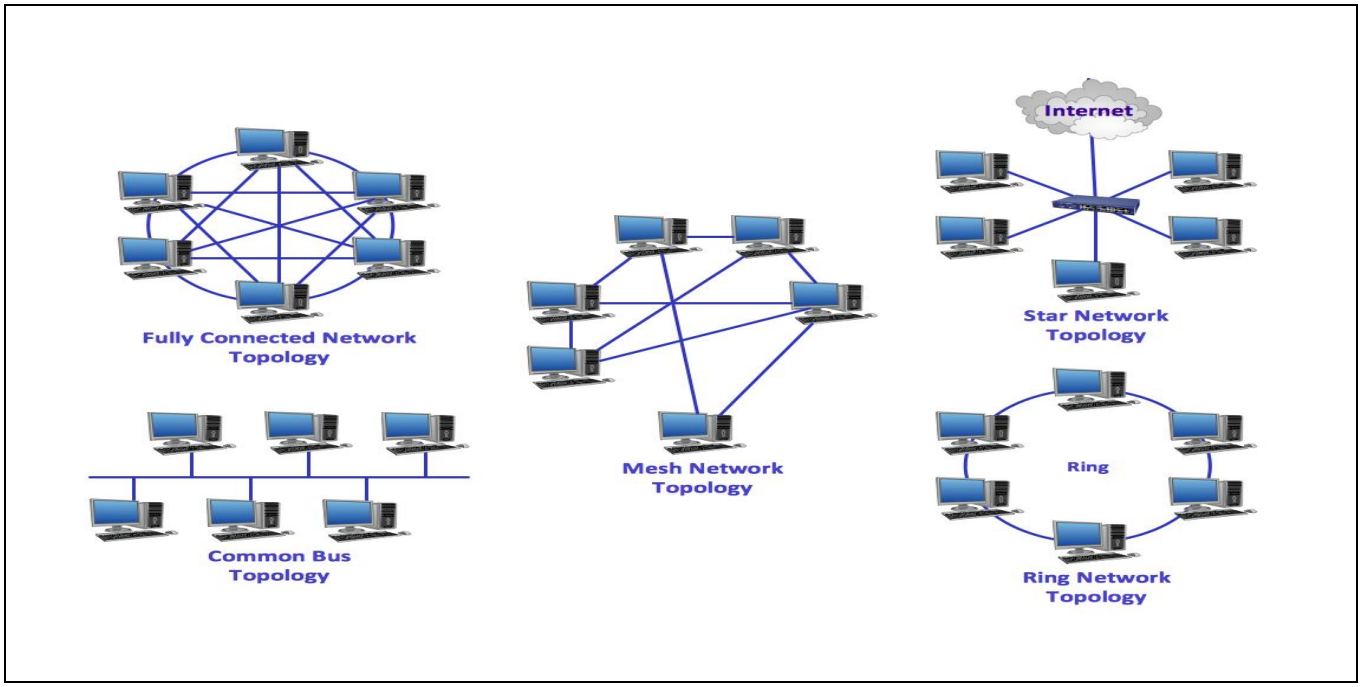
NETWORK TYPES

- ***The three types of networks include***:
  1. Local area network (LAN)
  3. Metropolitan area network (MAN)
  5. Wide area network (WAN)

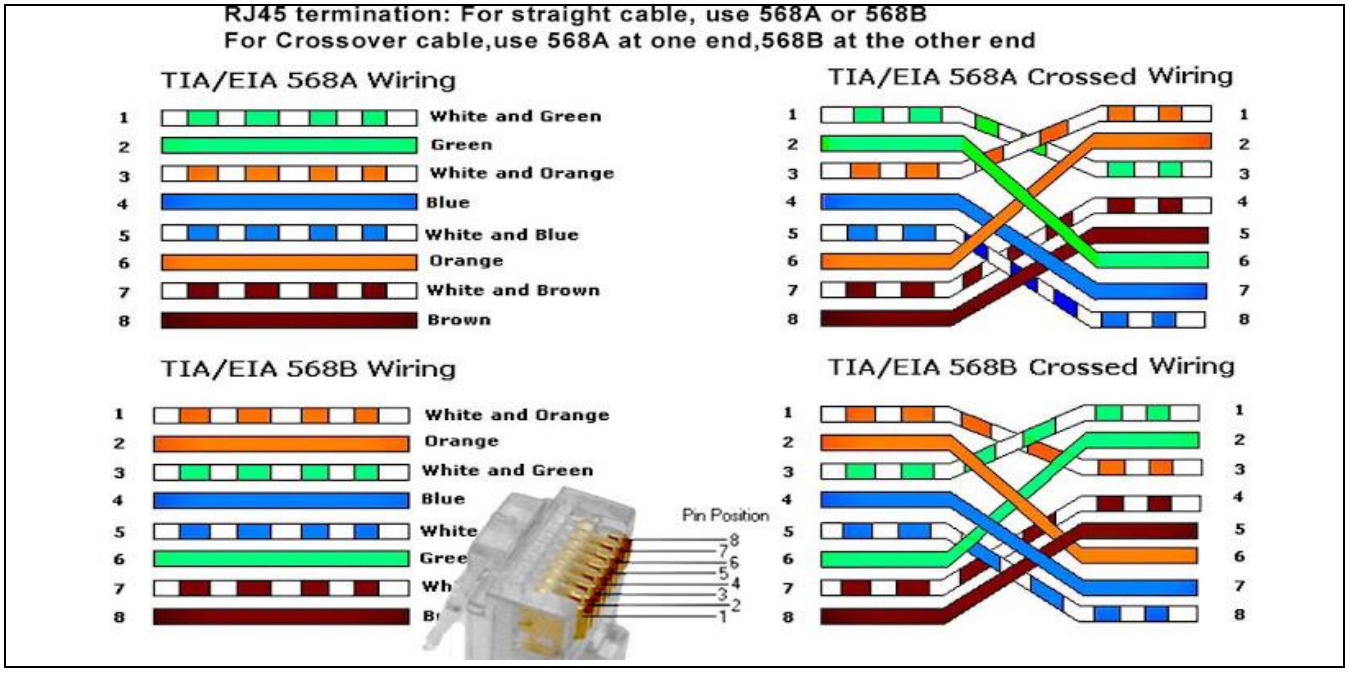


Host: computer to be connected to a network.

Topology: Network topology is the arrangement of the various elements (links, nodes, etc.) of a computer network. Essentially, it is the topological structure of a network and may be depicted physically or logically. The basic examples of network topologies used in local area networks include bus, ring, star, and tree and mesh topologies as shown below.



RJ45 Connector: An 8-pin/8-position plug or jack is commonly used to connect computers onto Ethernet-based local area networks (LAN). Two wiring schemes–T568A and T568B–are used to terminate the twisted-pair cable onto the connector interface as shown below.



NIC: Network Interface Card. The hardware interface from a host to the network.

MAC: Medium Access Control is a six hexit number that uniquely defines the NIC in the entire world. For example: 00:C0:9F:9B:D5:46

Hub: a hub is the most basic networking device that connects multiple computers or other network devices together. Unlike a network switch or router, a network hub has no routing tables or intelligence on where to send information and broadcasts all network data across each connection.

Switch: is a computer networking device that connects devices together on a computer network, by using packet switching to receive, process and forward data to the destination device.

Router: A device that decides where a packet should be sent in order to get to a destination outside a network. Routers range from simple gateways between your home PC and backbone routers of the Internet proper.

IP address: All hosts and routers have an IP address consisting of four decimal numbers. For example: 192.168.0.1 and 131.170.40.33

Port address: every host has 65,535 ports each of which can be connected to a specific application that sends and receives data packets from the network.

Gateway address: every host needs to know the address of the router which connects a network to other networks and the Internet.

Domain name: hosts may have a domain name which maps onto an IP address. For example, www.google.com is mapped to IP address 66.102.7.104.

DNS Server: Domain Name System Server. Every host needs access to a DNS server so it can convert between IP address and domain name.

DHCP: Dynamic Host Configuration Protocol. A DHCP can give a host a unique IP address whenever the host restarts thus saving IP addresses. A DNS address is also provided.

Network Command

OBJECTIVES

1. To learn how to use Windows/Linux networking commands.
2. To test networking commands.
3. To solve networking problems using networking commands.

INTRODUCTION

Most computers will be running Linux or MS Windows operating systems (OS).

LINUX is an excellent vehicle to understand and play with networks for several reasons:

- Free and open source. Open source lessens the likelihood of deliberate security weaknesses.
- Dominates the web server market and it is the basis of many networking boxes such as routers.
- More powerful command line than Windows thus making script file operations more powerful and flexible.

WINDOWS:

- Dominates the desktop market.
- More users are familiar with Windows. (95% of desktop PCs run on Windows)
- Has GUI which provides easier usage. However, recent KDE and GNOME desktops under Linux have been shown to be equivalently easy to use.

Notes – Every engineer with networking knowledge should be familiar with both OS.

In LINUX:

There are a number of simple commands that can be used to examine, debug and play with a network. To see all, use the manual pages (eg man ping) of the info pages (info ping).

ROOT PRIVILEGES – many commands require root privileges, or the programs reside in paths that root knows about but not users. It may be easier to log onto Linux as a user and open a root terminal.

In Windows:

Windows has a number of command line programs and GUI programs that can be used to view and alter network configuration. To see all, type hh ntcmds.chm in your terminal window, and to see all options for a command line, type –h, /?, -help, or ?

Some common commands used in Linux and Windows:

Linux Command	Windows Command	Usage / Effect
ifconfig	ipconfig	to find ip address of the computer
hostname	hostname	to display host name
nmap	nmap	To scan what hosts are available on a network and what ports they have open.
nslookup	nslookup	to list variety of info about DNS and the computers that have joined the domain
ping	ping	to check if a host can be accessed (by IP or name)
traceroute	tracert	to trace route from a host through internet router to a destination. Useful to discover why a network cannot get access to internet, and internet routing problems.
netstat	netstat	to print status of network ports, routing tables and more

TASKS

Use the appropriate networking commands to solve these networking problems.

1. **Find the IP address of the computer you are currently using.**

   Command: _____

   IP address: _____

2. **Find the IP address of the computer you are currently using, plus MAC address, plus whether DHCP is turned on.**

   Command: _____

   Answer: _____

3. **Display the host name of the computer.**

   Command: _____

   Hostname: _____

4. **Check for basic IP connectivity between two computers by name and IP address. How can basic IP connectivity be checked? What are the reasons why there is no connectivity?**

   Command: _____

   Reason: _____

5. **Show the MAC address of the host.**

   Command: _____

   MAC address: _____

6. **Show what shared resources are available on the host.**

   Command: _____

   Answer: _____

7. **Find out which ports on your host are connected to applications. Connect the browser to some external web page before running the appropriate command.**

   Command: _____

   Answer: _____

8. **Find all other hosts available on the network.**

   Command: _____

   Answer: _____

9. **Show the address of the gateway.**

   Command: _____

   Answer: _____

10. **Find the path of routers to www.google.com.What is its IP address? How many hops involved in the path?**

    Command: _____

    Answer: _____

11. **A ping to 192.168.0.2 works but a ping to the machine's name "blue_machine" fails. What could be wrong?**

Reason:

_____

_____