Basics of Computer Networks:

a. **Nodes**: The devices that are participating in the network. e.g. Computers, servers, printers, routers, switches, etc.
b. **Links**: The cables or the medium that lets the devices communicate with each other.
c. **Protocol**: A protocol is a set of rules and standards that govern how data is transmitted over a network. Examples of protocols include TCP/IP, HTTP, and FTP.
d. **Topology**: Network topology refers to the physical and logical arrangement of nodes on a network. The common network topologies include bus, star, ring, mesh, and tree.
e. **IP Address**: An IP address is a unique numerical identifier that is assigned to every device on a network. IP addresses are used to identify devices and enable communication between them.
f. **DNS**: The Domain Name System (DNS) is a protocol that is used to translate human-readable domain names (such as www.google.com) into IP addresses that computers can understand.
g. **Firewall**: A firewall is a security device that is used to monitor and control incoming and outgoing network traffic. Firewalls are used to protect networks from unauthorized access and other security threats.

Unique Identifiers of Network

- **Hostname**: Each device in the network is associated with a unique device name known as Hostname. Type "hostname" in the command prompt(Administrator Mode) and press 'Enter', this displays the hostname of your machine.

- **IP Address (Internet Protocol address):** Also known as the Logical Address, the IP Address is the network address of the system across the network. To identify each device in the world-wide-web, the Internet Assigned Numbers Authority (IANA) assigns an IPV4 (Version 4) address as a unique identifier to each device on the Internet. The length of an IPv4 address is 32 bits, hence, we have 232 IP addresses available. The length of an IPv6 address is 128 bits.

  In Windows Type "ipconfig" in the command prompt and press 'Enter', this gives us the IP address of the device. For Linux, Type "ifconfig" in the terminal and press 'Enter' this gives us the IP address of the device.

- **MAC Address (Media Access Control address):** Also known as physical address, the MAC Address is the unique identifier of each host and is associated with its NIC (Network Interface Card). A MAC address is assigned to the NIC at the time of manufacturing. The length of the MAC address is: 12-nibble/ 6 bytes/ 48 bits Type "ipconfig/all" in the command prompt and press 'Enter', this gives us the MAC address.

- **Port:** A port can be referred to as a logical channel through which data can be sent/received to an application. Any host may have multiple applications running, and each of these applications is identified using the port number on which they are running.

  A port number is a 16-bit integer, hence, we have 216 ports available. Type "netstat -a" in the command prompt and press 'Enter', this lists all the ports being used.

- **Socket:** The unique combination of IP address and Port number together is termed a Socket.

What is a firewall?

A firewall is a network security device or software that monitors and controls incoming and outgoing network traffic based on predefined security rules. It acts as a barrier between a trusted internal network and untrusted external networks like the internet.