# Network Fundamentals

## What is a Computer Network?

Computer network comprises two or more computers either connected together by wired or wireless in order to transmit, receive, communicate, share data and resources. Computer network is build using hardware (e.g. Routers, Switches, Hub, Cables)

## Computer Network Types

### Local Area Network

Local Area Network connects computers over a short distance, allowing them to share resources, data and files. For example - Office Building, School, Hospital etc.

### Wireless Local Area Network

Wireless Local Area Network is the same as Local Area Network but they are connected wirelessly to each other.

### Wide Area Network

Wide Area Network connects region to region or continent to continent. The Internet is a single major example of a wide area network.

### Metropolitan Area Network

The Metropolitan Area Network is larger than LAN but smaller than WAN. Cities and Government entities typically own and manage MAN.

### Personal Area Network

Personal Area Network serves one person.

### Storage Area Network

Storage Area Network is a specialized network that provides access to block-level storage—shared network or cloud storage that, to the user, looks and works like a storage drive that’s physically attached to a computer.

### Campus Area Network

Campus Area Network is also known as a corporate area network. A CAN is larger than a LAN but smaller than a WAN. CANs serve sites such as colleges, universities, and business campuses.

### Virtual Private Network

Virtual Private Network is a secure, point-to-point connection between two network endpoints. A VPN establishes an encrypted channel that keeps a user’s identity and access credentials, as well as any data transferred, inaccessible to hackers.

## Important Terms and Concept

### IP address

An IP address is a unique number assigned to every device connected to a network that uses the Internet Protocol for communication.

### Nodes

A node is a connection point inside a network that can receive, send, create, or store data. Each node requires you to provide some form of identification to receive access, like an IP address.

### Routers

A router is a physical or virtual device that sends information contained in data packets between networks. Routers analyze data within the packets to determine the best way for the information to reach its ultimate destination. Routers forward data packets until they reach their destination node.

### Switches

A switch is a device that connects other devices and manages node-to-node communication within a network, ensuring data packets reach their ultimate destination.

### Ports

A port identifies a specific connection between network devices. Each port is identified by a number.

### Network cable types

The most common network cable types are Ethernet twisted pair, coaxial, and fiber optic.

## Network topology

Network topology refers to how the nodes and links in a network are arranged.

### Bus Topology

A bus topology is when every network node is directly connected to a main cable.

### Ring Topology

In a ring topology, nodes are connected in a loop, so each device has exactly two neighbors. Adjacent pairs are connected directly; non-adjacent pairs are connected indirectly through multiple nodes.

### Star Topology

In a star network topology, all nodes are connected to a single, central hub and each node is indirectly connected through that hub.

### Mesh Topology

A mesh topology is defined by overlapping connections between nodes in which nodes are connected to each other.

## Load balancers and networks

Load balancers efficiently distribute tasks, workloads, and network traffic across available servers. The load balancer observes all traffic coming into a network and directs it toward the router or server best equipped to manage it. The objectives of load balancing are to avoid resource overload, optimize available resources, improve response times, and maximize throughput.

## Content delivery networks

A content delivery network (CDN) is a distributed server network that delivers temporarily stored, or cached, copies of website content to users based on the user’s geographic location.

## IP Classes

### Class A → 1.0.0.0 to 127.255.255.255

### Class B → 128.0.0.0 to 191.255.255.255

### Class C → 192.0.0.0 to 223.255.255.255

### Class D → 224.0.0.0 to 239.255.255.255

### Class E → 240.0.0.0 to 255.255.255.255