

Introduction to Computer Networking

1. **Definition**: Computer networking is the practice of connecting computers and other devices to share resources and information.

2. **Types of Networks**:

- **LAN (Local Area Network)**: A network that covers a small geographic area, like a home or office.
- **WAN (Wide Area Network)**: A network that covers a large geographic area, such as a city, country, or the world.
- **MAN (Metropolitan Area Network)**: A network that spans a city or a large campus.
- **PAN (Personal Area Network)**: A network for personal devices, typically within a range of a few meters.

3. **Network Topologies**:

- **Bus Topology**: All devices share a single communication line.
- **Star Topology**: All devices are connected to a central hub.
- **Ring Topology**: Devices are connected in a circular fashion.
- **Mesh Topology**: Devices are interconnected, providing multiple paths for data.

4. **Network Protocols**:

- **TCP/IP (Transmission Control Protocol/Internet Protocol)**: The foundational protocols for the internet.
- **HTTP/HTTPS (HyperText Transfer Protocol/Secure)**: Protocols for web browsing.
- **FTP (File Transfer Protocol)**: Used for transferring files.
- **SMTP (Simple Mail Transfer Protocol)**: Used for email transmission.

5. **Network Devices**:

- **Router**: Directs data packets between networks.
- **Switch**: Connects devices within a LAN and filters traffic.
- **Modem**: Modulates and demodulates signals for internet access.
- **Access Point**: Allows wireless devices to connect to a network.

6. **Network Security**:

- **Firewalls**: Monitor and control incoming and outgoing network traffic.

- **Encryption**: Protects data by converting it into a secure format.
- **VPN (Virtual Private Network)**: Provides a secure connection over the internet.
- **Antivirus Software**: Protects against malware and other threats.

7. **Wireless Networking**:

- **Wi-Fi**: A technology for wireless local area networking.
- **Bluetooth**: A technology for short-range wireless communication.
- **Cellular Networks**: Networks for mobile phone communication.

8. **Future Trends**:

- **5G Technology**: The next generation of mobile networks.
- **IoT (Internet of Things)**: Connecting everyday objects to the internet.
- **SDN (Software-Defined Networking)**: An approach to network management that enables dynamic, programmatically efficient network configuration.