Network

Protocols

- The internet operates using protocols, which are standardized rules defined by the **International Organization for Standardization (ISO)**.

OSI Model (Open Systems Interconnection Reference Model)

- **7 Layers**:
    1. **Application**
    2. **Presentation**
    3. **Session**
    4. **Transport**
    5. **Network**
    6. **Data Link**
    7. **Physical**
- **Mnemonic**: *All People Seem To Need Data Processing*
- **Encapsulation**: Each layer adds information (headers/trailers) as data passes through it.

TCP/IP Model

- A **4-layer protocol** that simplifies the OSI model:
    1. **Application Layer**: Connects the user and the application.
        - Protocols: HTTP, HTTPS, DNS, SMTP.
    2. **Transport Layer**: Locates the application by binding a port number.
        - Data is called a **segment** here.
        - Protocols: **TCP** (connection-oriented) and **UDP** (connectionless).
    3. **Internet Layer**: Encapsulates transport layer data into **packets** (or datagrams).
        - Protocol: IP (Internet Protocol).
        - Data is broken into smaller pieces (packets) for transmission.
    4. **Network Interface Layer**: Handles data transfer using **Ethernet/Wi-Fi**.
        - Uses **MAC (Media Access Control) Address**: Similar to IP but bound to hardware.
- **Mnemonic**: *A Tiny Insect Nibbles*

IPv4 and Subnet Mask

1. **IPv4**:
    - Format: xxx.xxx.xxx.xxx
    - Composed of four 8-bit binary numbers represented in decimal.
    - Range: 2^8 =256 values per block.

2. **Subnet Mask**:
    - Composed of four 8-bit binary numbers of only 1s and 0s.
    - **Purpose**: Identifies the host by performing a bitwise AND operation with the IP address.