**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: 28 =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.