The OSI Model:

1. Introduction The Open Systems Interconnection (OSI) model is a conceptual framework that standardizes the functions of a communication system into seven distinct layers. Developed by the International Organization for Standardization (ISO) in 1984, the OSI model provides a structured approach to networking, enabling interoperability between different systems and technologies.

2. The Seven Layers of the OSI Model The OSI model is divided into the following seven layers, each with specific functions:

2.1. Physical Layer (Layer 1)

- Responsible for transmitting raw data bits over a physical medium.
- Includes hardware components such as cables, switches, and network interface cards.
- Ensures data encoding, modulation, and signal transmission.

2.2. Data Link Layer (Layer 2)

- Manages node-to-node data transfer and error detection/correction.
- Divided into two sublayers: Logical Link Control (LLC) and Media Access Control (MAC).
- Uses MAC addresses to identify devices on a network.

2.3. Network Layer (Layer 3)

- Handles logical addressing and routing of data packets.
- Uses IP addresses and routing protocols like RIP, OSPF, and BGP.
- Determines the best path for data transmission between networks.

2.4. Transport Layer (Layer 4)

- Ensures reliable data transfer and flow control.
- Uses protocols such as Transmission Control Protocol (TCP) and User Datagram Protocol (UDP).
- Provides segmentation, sequencing, and error correction mechanisms.

2.5. Session Layer (Layer 5)

- Establishes, manages, and terminates communication sessions between applications.
- Facilitates authentication and security features.
- Supports session synchronization and checkpointing.

2.6. Presentation Layer (Layer 6)

- Translates, encrypts, and compresses data for proper interpretation.

- Converts data between different formats such as ASCII, EBCDIC, JPEG, and MP3.
- Ensures data is readable by the receiving system.

2.7. Application Layer (Layer 7)

- Provides end-user services and network interfaces.
- Includes protocols such as HTTP, FTP, SMTP, and DNS.
- Facilitates communication between software applications and the network.