OSI Model: The Foundation of Computer Networking

This presentation provides an overview of the Open Systems Interconnection (OSI) model, a conceptual framework for understanding how computer networks operate.

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Introduction to the OSI Model

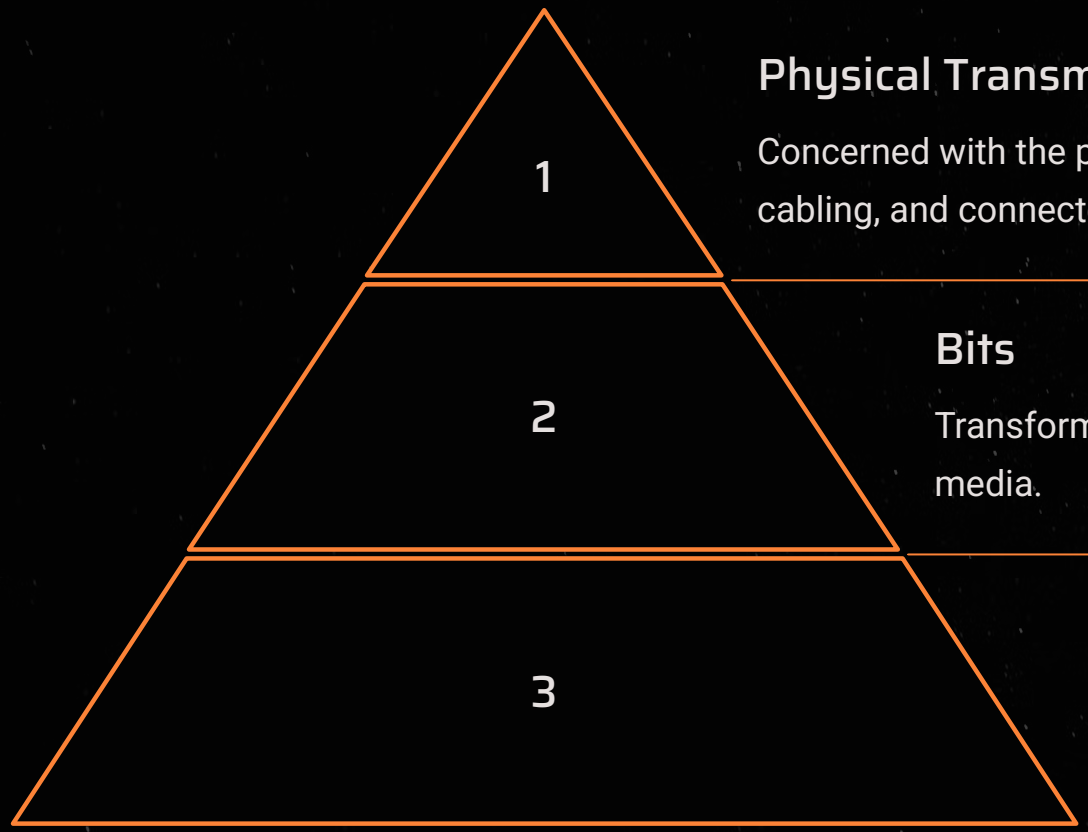
Layered Architecture

The OSI model is a layered architecture, consisting of 7 layers that define the different functions involved in data communication.

Modular Design

Each layer has a specific responsibility, creating a modular design that simplifies the process of developing and maintaining network systems.

Layer 1: Physical Layer



Physical Transmission

Concerned with the physical transmission of data, including electrical signals, cabling, and connectors.

Bits

Transforms data into electrical signals for transmission over physical media.

Media

Defines the type of physical media used, such as copper cables, fiber optics, or wireless signals.

Layer 2: Data Link Layer

1

Frame Format

Defines the format of data frames, which are packets of data that contain information about the source and destination.

2

Error Detection

Ensures reliable data transmission by detecting and correcting errors that may occur during transmission.

3

MAC Addresses

Uses unique Media Access Control (MAC) addresses to identify devices on a network.

Layer 3: Network Layer

Routing

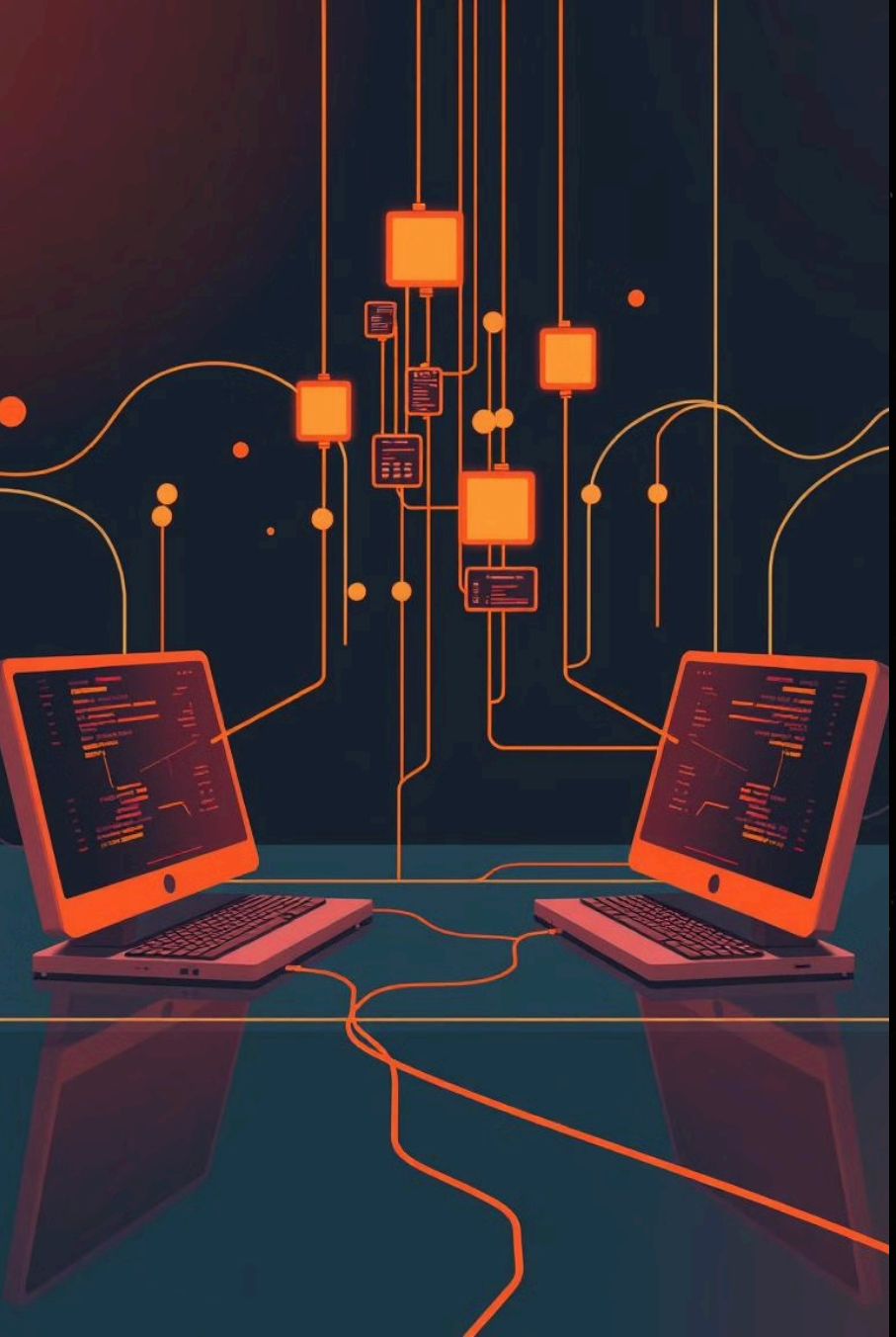
Determines the best path for data packets to travel from source to destination.

Addressing

Uses logical addresses, such as IP addresses, to identify devices on a network.

Packet Segmentation

Breaks large data packets into smaller packets for efficient transmission.



Layer 4: Transport Layer

Segmenting

Divides data into segments, which are smaller units of data that can be transmitted independently.

Connection Management

Provides reliable data transmission by establishing, maintaining, and terminating connections between devices.

Flow Control

Manages the flow of data to prevent congestion and ensure efficient communication.

Layer 5: Session Layer

1

Session Establishment

Establishes, manages, and terminates communication sessions between applications on different devices.

2

Dialog Control

Manages the flow of data within a communication session and ensures that data is transmitted in the correct order.

3

Synchronization

Provides synchronization points for communication sessions, allowing devices to recover from errors or interruptions.

Layer 6: Presentation Layer

Data Encoding

Converts data into a format that can be understood by both the sending and receiving applications.

Data Encryption

Encrypts data to protect it from unauthorized access during transmission.

Data Compression

Compresses data to reduce the amount of data that needs to be transmitted, improving efficiency.

Layer 7: Application Layer

1

User Interface

Provides the interface that users interact with when using network applications.

2

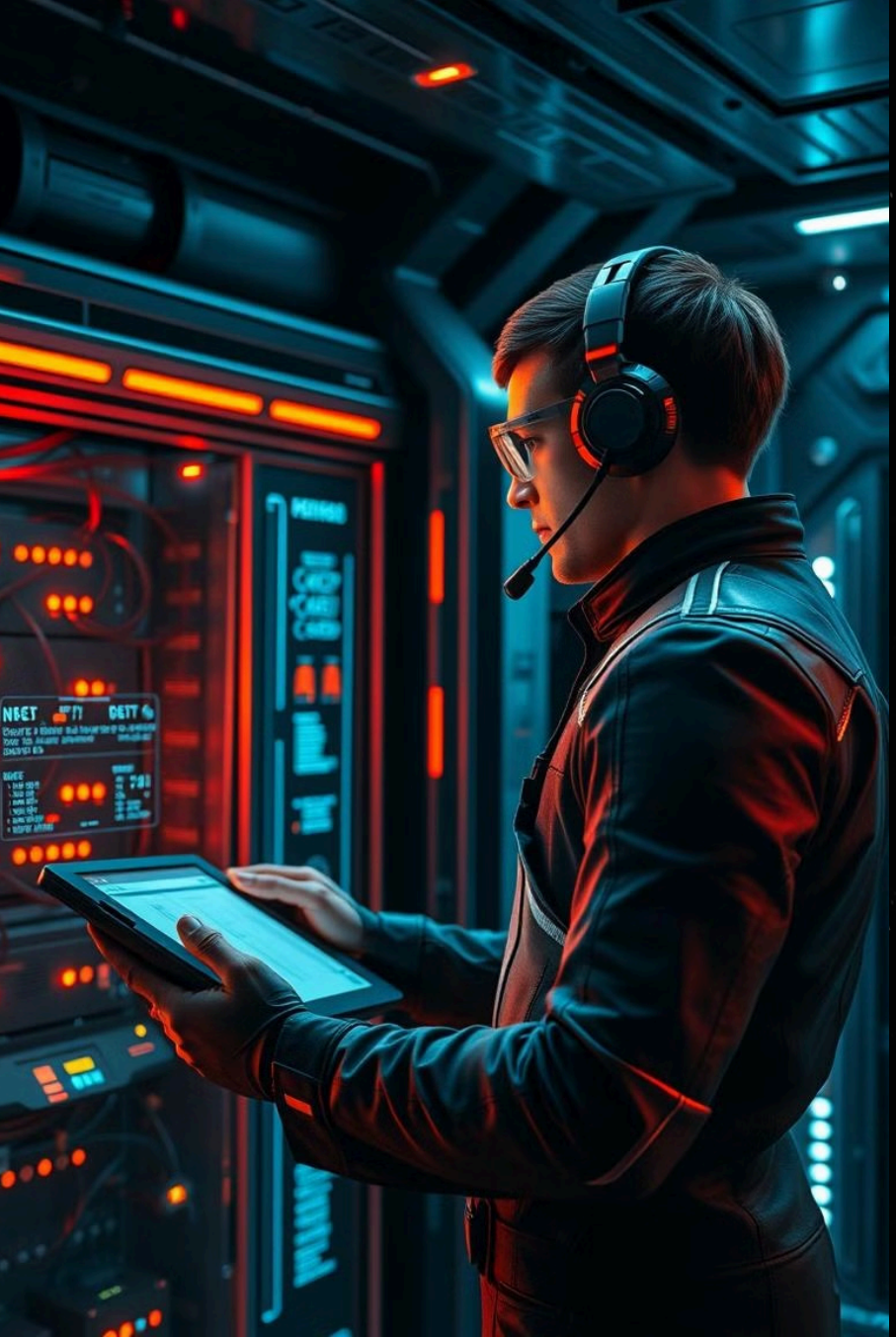
Application Protocols

Defines the rules and procedures for communication between applications, such as HTTP, FTP, and SMTP.

3

Network Services

Provides network services to applications, such as file sharing, email, and web browsing.



Importance of Understanding the OSI Model

Understanding the OSI model is essential for network professionals, as it provides a framework for troubleshooting network problems, designing network systems, and understanding how data communication works.