

## COMPUTER NETWORKING COURSE WORK

The transport layer in computer networking is responsible for delivering messages between applications and ensuring reliable communication. Key functions include:

1. Segmentation and Reassembly: Data is divided into smaller packets for transmission and reassembled at the destination.
2. Flow Control: Manages the rate of data transmission to prevent overwhelming the receiver.
3. Error Detection and Correction: Identifies and corrects errors in transmitted packets.

### Examples of Transport Layer Protocols:

#### 1. TCP (Transmission Control Protocol):

- Reliable Connection: Ensures data is delivered accurately and in order.
- Connection-Oriented: Establishes a connection before data transfer.

#### 2. UDP (User Datagram Protocol):

- Connectionless: Sends data without establishing a connection, leading to faster transmission.
- No Reliability Guarantees: Lacks error recovery features, suitable for applications like streaming.

#### 3. SCTP (Stream Control Transmission Protocol):

- Message-Oriented: Supports message-oriented communication, ideal for telecommunication.
- Multihoming Support: Can manage multiple IP addresses for redundancy.

### Here are the advantages of each transport layer protocol:

#### TCP (Transmission Control Protocol)

- Reliability: Guarantees data delivery with error checking and retransmission of lost packets.
- Order Preservation: Ensures packets are received in the correct sequence, crucial for applications like web browsing.

#### UDP (User Datagram Protocol)

- Speed: Offers low latency by skipping error recovery, making it ideal for real-time applications like video streaming and online gaming.
- Less Overhead: Minimal protocol overhead leads to efficient use of bandwidth, beneficial for applications that can tolerate some data loss.

### SCTP (Stream Control Transmission Protocol)

- Message Framing: Allows for message-oriented communication, making it suitable for applications like telephony.
- Multihoming Support: Enhances reliability by enabling multiple network paths, providing redundancy and load balancing.

### Here are some specific use cases for each transport layer protocol:

#### TCP (Transmission Control Protocol)

- Web Browsing: Used by HTTP/HTTPS for secure and reliable data transfer, ensuring complete web page loading.
- File Transfer: Employed by protocols like FTP to ensure files are transmitted without errors and in the correct order.

#### UDP (User Datagram Protocol)

- Streaming Media: Utilized in applications like Netflix or Spotify, where timely delivery is more critical than perfect accuracy.
- Online Gaming: Games often use UDP to reduce latency, allowing for real-time interactions even if some data is lost.

#### SCTP (Stream Control Transmission Protocol)

- Telephony: Used in Voice over IP (VoIP) applications, where it handles multiple streams of audio efficiently.
- Signaling: Employed in cellular networks for reliable transport of signaling messages between network nodes.