Transport-Layer Protocols

ICNE532C - Computer Networks

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Transport Layer Services

- Process-to-Process Communication
- Addressing-Port Numbers
- Encapsulation and Decapsulation
- Multiplexing and Demultiplexing
- Pushing or Pulling
- Flow Control at Transport layer

Port Numbers

- Well-known ports
- Registered Ports
- Dynamic Ports

Transport Layer Services

- Buffers
- Error Control
- Sequence Numbers
- Acknowledgment
- Sliding Window
- Congestion Control

Protocols

- Connectionless
- Connection Oriented

Transport Layer

- UDP
- TCP
- SCTP

User Datagram Protocol

- It has a fixed-size header of 8 bytes made of four fields, each of 2 bytes.
- Fields - Source Port number, Destination Port number, Total length and Checksum

User Datagram Protocol - Services

- Process-to-Process communication - using socket address
- Connection-less service- datagrams are not with numbers, no establishment or termination of connection.
- No flow control
- No error control
- Checksum - Optional
- No congestion control

Transport Layer Protocol

- Process-to-Process communication - using port address.
- Stream Delivery Service.
- Sending and Receiving Buffers
- Segment
- Sequence number and acknowledgment number

Transport Layer Protocol - Header

- Sender Port
- Receiver Port
- HLEN — Reserved Bits — Flags — Window Size
- Checksum — Urgent Pointer
- Options and Padding

Windows in TCP

- Sender and Receiver Window
- Opening and Closing Window
- Cumulative Acknowledgment
- Window Shutdown
- Silly window syndrome
- Syndrome Created by the sender(Nagle's algorithm)
- Syndrome Created by the receiver (Clark's algorithm and delay acknowledgment)

References

[1] Behrouz A. Forouzan *Data Communications and Networking*. McGraw-Hill fifth edition.