Competency Level- 6.8
Explores the role of transport protocols in the Internet

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Delivering data from an application process to another application process

- Application delivery is a mechanism to deliver application functionality quickly and efficiently to users.
- solutions provide application delivery optimization by allowing enterprises to create a highly scalable application delivery model which makes application services available when required
- Application delivery refers to the pool of services that combine to provide application functionality, usually web-based software applications, from the data centers or cloud environments where the required data processing and computing is executed to the application clients or end-users over the internet.
- Ports and ports numbers are used for sending and receiving data through the applications

List of TCP and UDP port numbers

- A port number is a way to identify a specific process to which an Internet or other network message is to be forwarded when it arrives at a server
- A port is identified for each transport protocol and address combination by a 16-bit unsigned number, known as the port number.
- The most common transport protocols that use port numbers are the Transmission Control Protocol (TCP) and the User Datagram Protocol (UDP).
- This port number is passed logically between client and server transport layers and physically between the transport layer and the Internet Protocol layer and forwarded on.
- For this handover to work, the operating system must create entrances and open them for the transfer. Every entrance has a specific code number.
- After the transfer, the receiving system knows where the data has to be delivered based on the port number.
- The data package always includes two port numbers: the sender's and the recipient's.

Label on Column	Service Name	UDP and TCP Port Numbers Included
DNS	Domain Name Service – UDP	UDP 53
DNS TCP	Domain Name Service – TCP	TCP 53
HTTP	Web	TCP 80
HTTPS	Secure Web (SSL)	TCP 443
SMTP	Simple Mail Transport	TCP 25
POP	Post Office Protocol	TCP 109, 110
SNMP	Simple Network Management	TCP 161,162 UDP 161,162
TELNET	Telnet Terminal	TCP 23
FTP	File Transfer Protocol	TCP 20,21
SSH	Secure Shell (terminal)	TCP 22
AFP IP	Apple File Protocol/IP	TCP 447, 548

- Ports have consecutive numbers – from 0 to 65536.
- Some of these code numbers are standardized, which means they are assigned to specific applications.
- These standard ports are also called well-known ports, as the code numbers are known to all and permanently assigned.
- There are also registered ports, which organizations or software producers have registered for their applications.

User Datagram Protocol (UDP)

- The User Datagram Protocol (UDP) is simplest Transport Layer communication protocol available of the TCP/IP protocol suite
- UDP, is a communication protocol used across the Internet for especially time-sensitive transmissions such as video playback or DNS lookups.
- It speeds up communications by not formally establishing a connection before data is transferred.
- In UDP, the receiver does not generate an acknowledgement of packet received and in turn, the sender does not wait for any acknowledgement of packet sent.

Features

- UDP is used when acknowledgement of data does not hold any significance.
- UDP is good protocol for data flowing in one direction.
- UDP is simple and suitable for query based communications.
- UDP is not connection oriented.
- UDP does not provide congestion control mechanism.
- UDP does not guarantee ordered delivery of data.
- UDP is stateless.
- UDP is suitable protocol for streaming applications such as VoIP, multimedia streaming.

UDP application

Applications where UDP is used to transmit data:

- Domain Name Services
- Simple Network Management Protocol
- Trivial File Transfer Protocol
- Routing Information Protocol

TCP(The Internet Protocol (IP)

- The Internet Protocol (IP) is the address system of the Internet and has the core function of delivering packets of information from a source device to a target device.
- IP is the primary way in which network connections are made, and it establishes the basis of the Internet
- IP is a connectionless protocol, which means that each unit of data is individually addressed and routed from the source device to the target device, and the target does not send an acknowledgement back to the source.
- That's where protocols such as the Transmission Control Protocol (TCP) come in.
- TCP is used in conjunction with IP in order to maintain a connection between the sender and the target and to ensure packet order
- Both TCP (Transmission Control Protocol) and UDP (User Datagram Protocol) are the most widely used Internet protocols among which TCP is connection oriented − once a connection is established, data can be sent bidirectional.
- UDP is a simpler, connectionless Internet protocol. Multiple messages are sent as packets in chunks using UDP.
- basis of features of attributes between TCP and UDP

	TCP (Transmission Control Protocol)	UDP (User Datagram Protocol)
Definition	It is a communications protocol, using which the data is transmitted between systems over the network. In this, the data is transmitted into the form of packets. It includes error-checking, guarantees the delivery and preserves the order of the data packets.	It is same as the TCP protocol except this doesn't guarantee the error-checking and data recovery. If you use this protocol, the data will be sent continuously, irrespective of the issues in the receiving end.
Design	TCP is a connection oriented protocol.	UDP is a connection less protocol.
Reliable	As TCP provides error checking support and also guarantees delivery of data to the destination router this make it more reliable as compared to UDP.	While on other hand UDP does provided only basic error checking support using checksum so the delivery of data to the destination cannot be guaranteed in UDP as compared to that in case of TCP.
Data transmission	In TCP the data is transmitted in a particular sequence which means that packets arrive in-order at the receiver.	On other hand there is no sequencing of data in UDP in order to implement ordering it has to be managed by the application layer.
Performance	TCP is slower and less efficient in performance as compared to UDP. Also TCP is heavy-weight as compared to UDP.	On other hand UDP is faster and more efficient than TCP.
Retransmission	Retransmission of data packets is possible in TCP in case packet get lost or need to resend.	On other hand retransmission of packets is not possible in UD

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