

# PROCESS TO PROCESS COMMUNICATION

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# TOPICS

- **User Datagram Protocol (UDP)**
- **Transmission Control Protocol (TCP)**
- **Addressing at Transport Layer**
- **Connection Oriented VS Connection Less Service**
- **Reliable Vs Un-reliable**

# **USER DATAGRAM PROTOCOL (UDP)**

# TABLE OF CONTENT FOR UDP

- WHAT IS UDP
- CHARACTERISTICS OF UDP
- WHAT IS DATA-GRAM
- DETAILED OVERVIEW
- HOW UDP WORKS
- APPLICATIONS OF UDP
- DIFFERENCE BETWEEN TCP AND UDP

# **USER DATA-GRAM PROTOCOL (UDP)**

- The protocol was designed by David P. Reed in 1980.
- UDP works in transport layer of OSI model and are used for data transfer
- UDP is not connection-oriented, so no connection needed to transfer data
- It speeds up transmissions by enabling the transfer of data before an agreement is provided by the receiving party.



# CHARACTERISTICS OF UDP

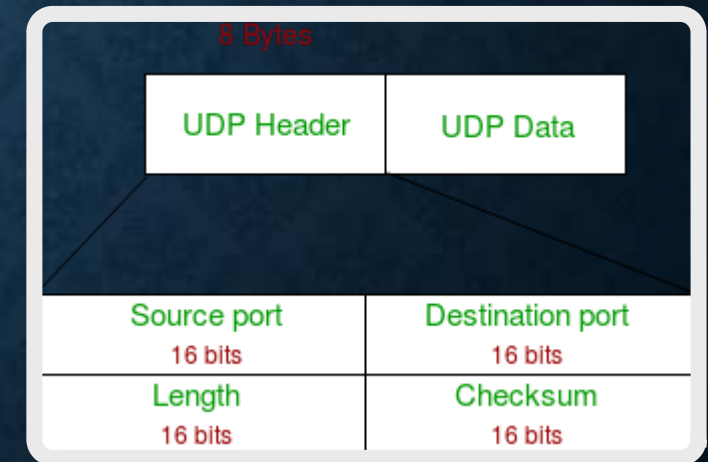
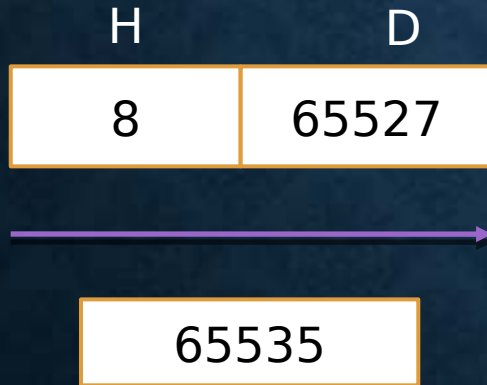
- It is a connectionless protocol.
- It is used for VoIP, video streaming, gaming and live broadcasts.
- It is faster and needs fewer resources.
- The packets don't necessarily arrive in order.
- It is better suited for applications that need fast, efficient transmission, such as games and video streaming.

# WHAT IS DATA-GRAM

- Datagram is a combination of the words data and telegram. Therefore, it is a message containing data that is sent from location to another.
- A datagram is similar to a packet, but does not require confirmation that it has been received
- This makes datagrams ideal for streaming services, where the constant flow of data is more important than 100% accuracy.

# DETAILED OVERVIEW

- With UDP, packets may take different paths between sender and receiver, and as a result, some packets may be lost or received out of order.
- Total length





# CONT....

- Range of ports



- Well-known ports 0 - 1023
- Registered ports 1024 - 49151
- Normal/ Dynamic ports 49152 - 65535

# HOW UDP WORKS

- UDP uses IP to get a datagram from one computer to another.
- UDP works by gathering data in a UDP packet and adding its own header information to the packet.
- This data consists of the source and destination ports to communicate on the packet length and a checksum.

Checksum = UDP-header + UDP-data + Pseduo-header of IP

- After UDP packets are encapsulated in an IP packet, they're sent off to their destinations.

# APPLICATION OF UDP

- Query response protocol (one question one reply)
- Speed (online games and video streaming)
- Broadcasting
- CONTINUOUS Streaming (skype and youtube)
- Stateless

# The differences between TCP and UDP

TRANSMISSION CONTROL PROTOCOL	USER DATAGRAM PROTOCOL
A connection-oriented protocol	A connectionless protocol
The most widely used protocol on the internet	Used for voice over IP, streaming video, gaming and live broadcasts
Guarantees that no packets are missing and all the data that's sent makes it to the intended recipient	Faster and needs fewer resources
Sends packets in order so they can be stitched back together easily	Packets don't necessarily arrive in order
Slower and requires more resources	Allows missing packets, but the sender is unable to know whether a packet has been received
Has a bigger header than UDP, best suited for apps that need high reliability and transmission time is relatively less critical	Better suited for applications that need fast, efficient transmission, such as games

# **TRANSMISSION CONTROL PROTOCOL(TCP)**



# TRANSMISSION CONTROL PROTOCOL (TCP)

- Connection-oriented
- Transport-layer protocol
- Break application data into packets
- Rate of data transmission.

# CHARACTERISTICS OF TCP

- Host-to-host communication.
- It's the most widely used protocol on the internet.
- Flow of data packets
- Orderly delivery
- It's slower
- Best suited for apps

# USES OF TCP

- Organizing data
- It guarantees the integrity of data

## CONT....

- Establishes the rules
- It is the foundation for the internet
- It is flexible and highly scalable
- It is also non-proprietary

# SERVICES OF TCP

- Process to Process Communication
- Stream Delivery Service
- Sending and Receiving Buffers
- Segments
- Multiplexing and Demultiplexing
- Connection Oriented Services



# **ADDRESSING AT TRANSPORT LAYER**

# LAYER OF OSI MODEL

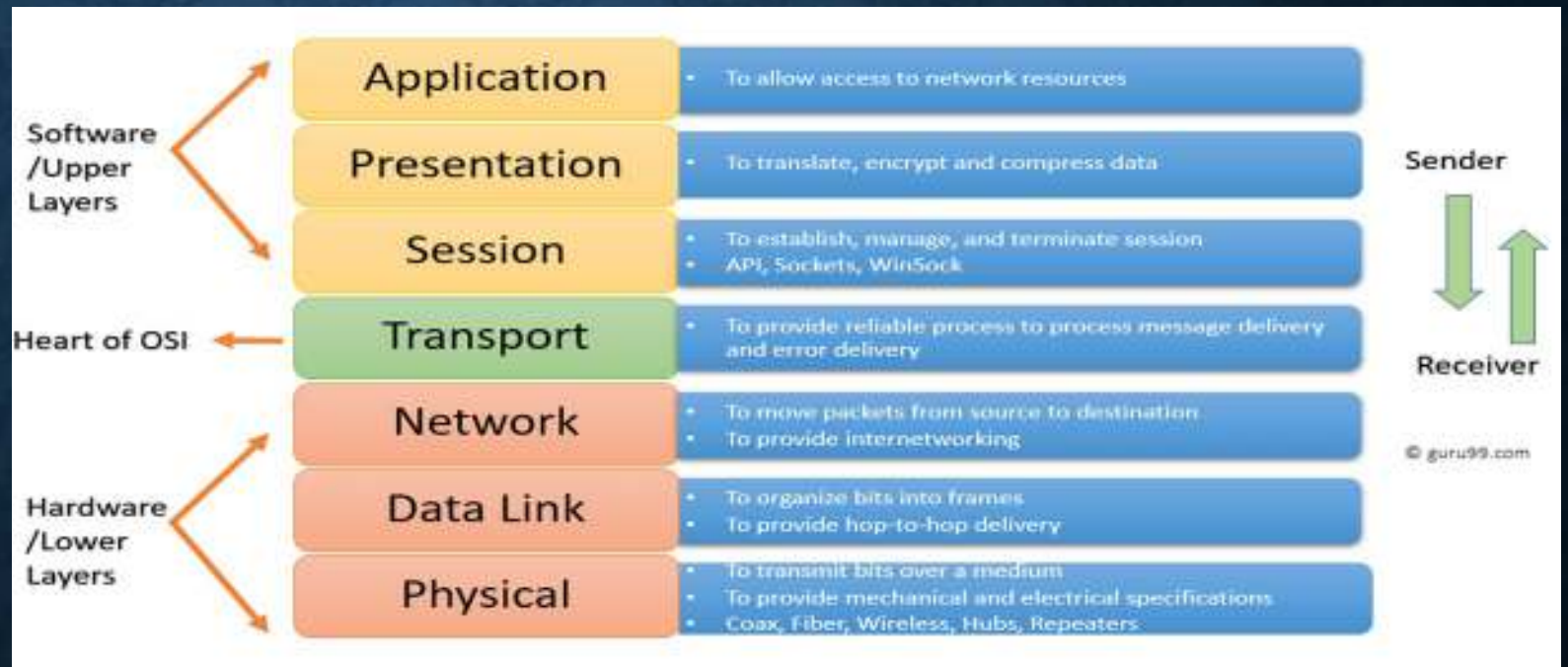
- OSI model is a layered server architecture system in which each layer is defined according to a specific function to perform. All these seven layers work collaboratively to transmit the data from one layer to another.

# CONT....

- The Upper Layers:
  - It deals with application issues and mostly implemented only in software. The highest is closest to the end system user. In this layer, communication from one end-user to another begins by using the interaction between the application layer. It will process all the way to end-user.
- The Lower Layers:
  - These layers handle activities related to data transport. The physical layer and data link layers also implemented in software and hardware.

# CONT..

- Upper and Lower layers further divide network architecture into seven different layers as below
- Application
- Presentation
- Session
- Transport
- Network, Data-link
- Physical layers



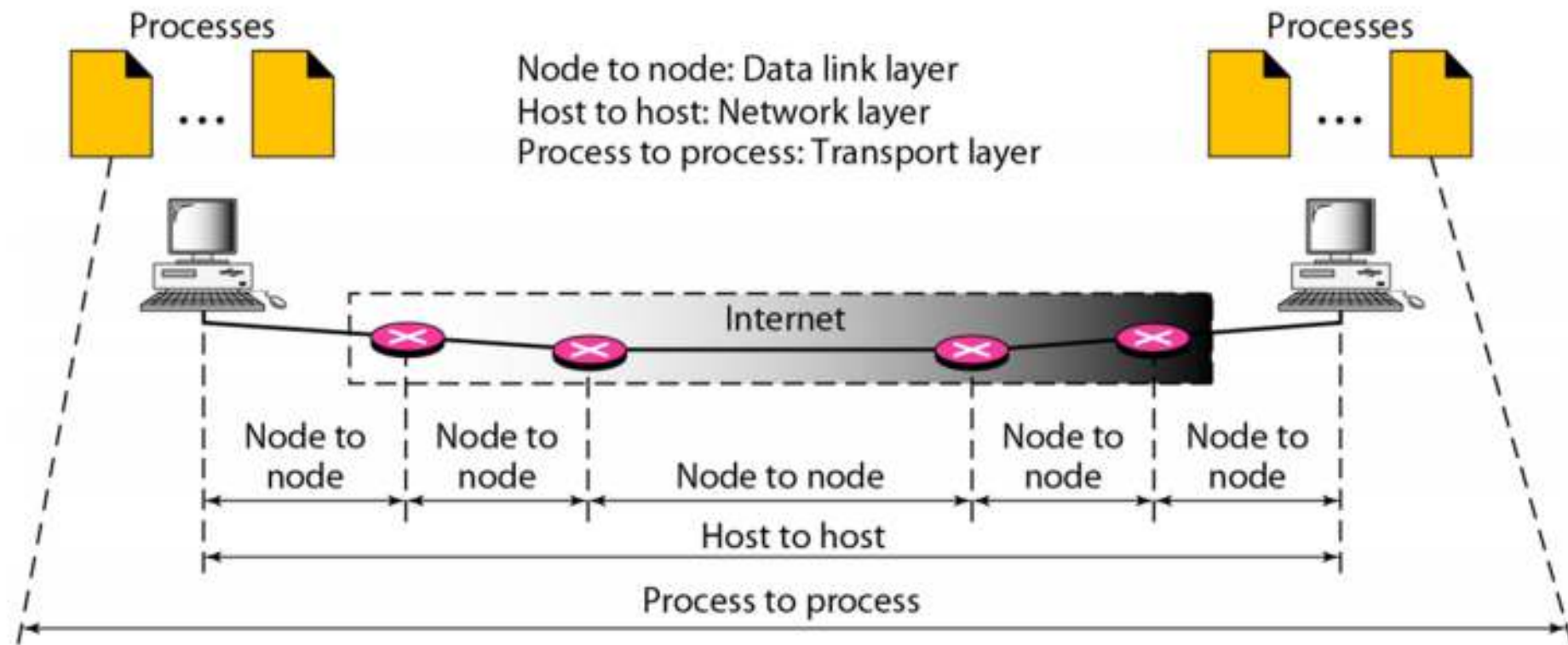


# TRANSPORT LAYER

- The transport layer is the fourth layer in the open system interconnection (OSI) model, and is responsible for end-to-end or process-to-process communication over a network.
- It provides logical communication between application processes running on different hosts within a layered architecture of protocols and other network components.

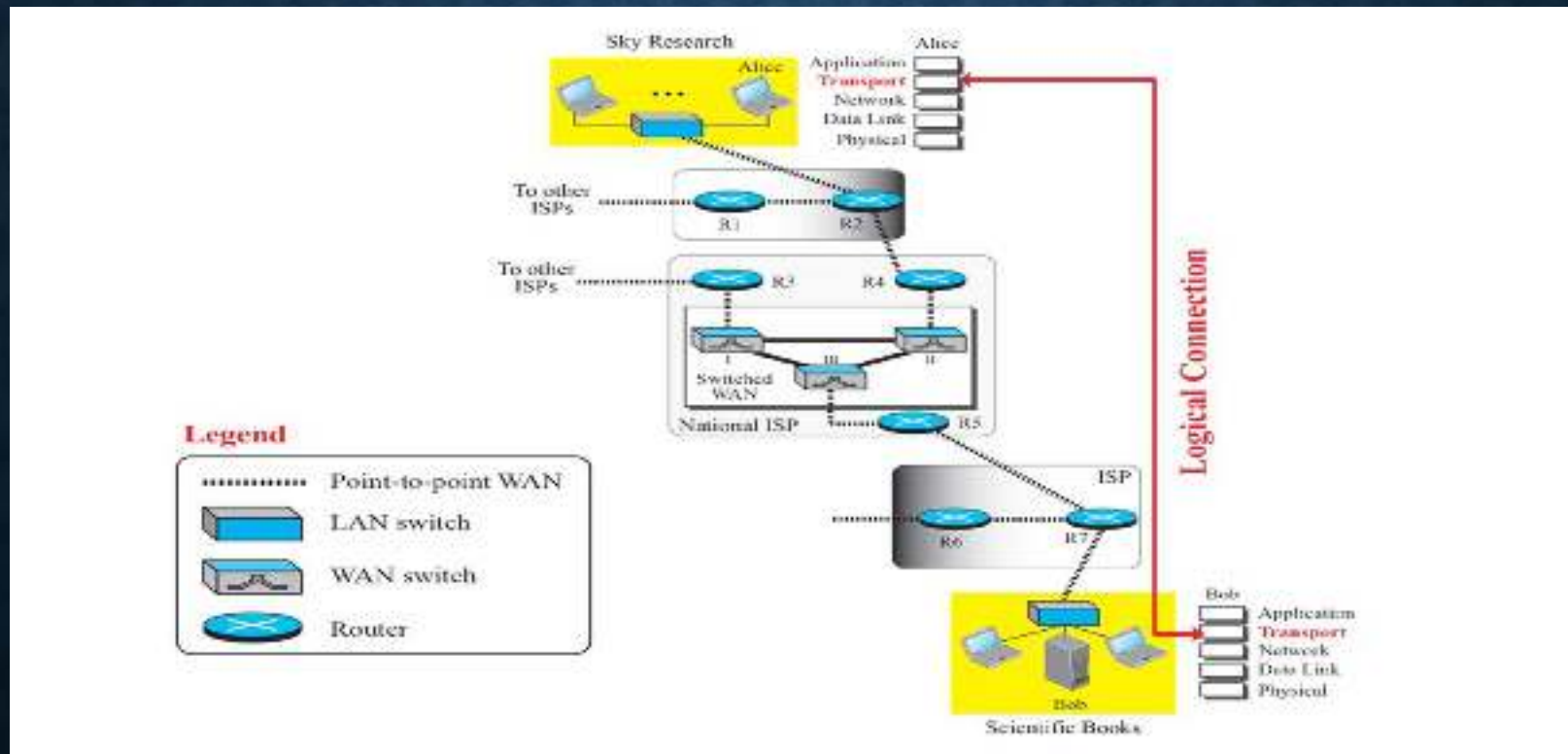


**LET'S STUDY THE TRANSPORT LAYER IN  
DETAIL**



Transport Layer

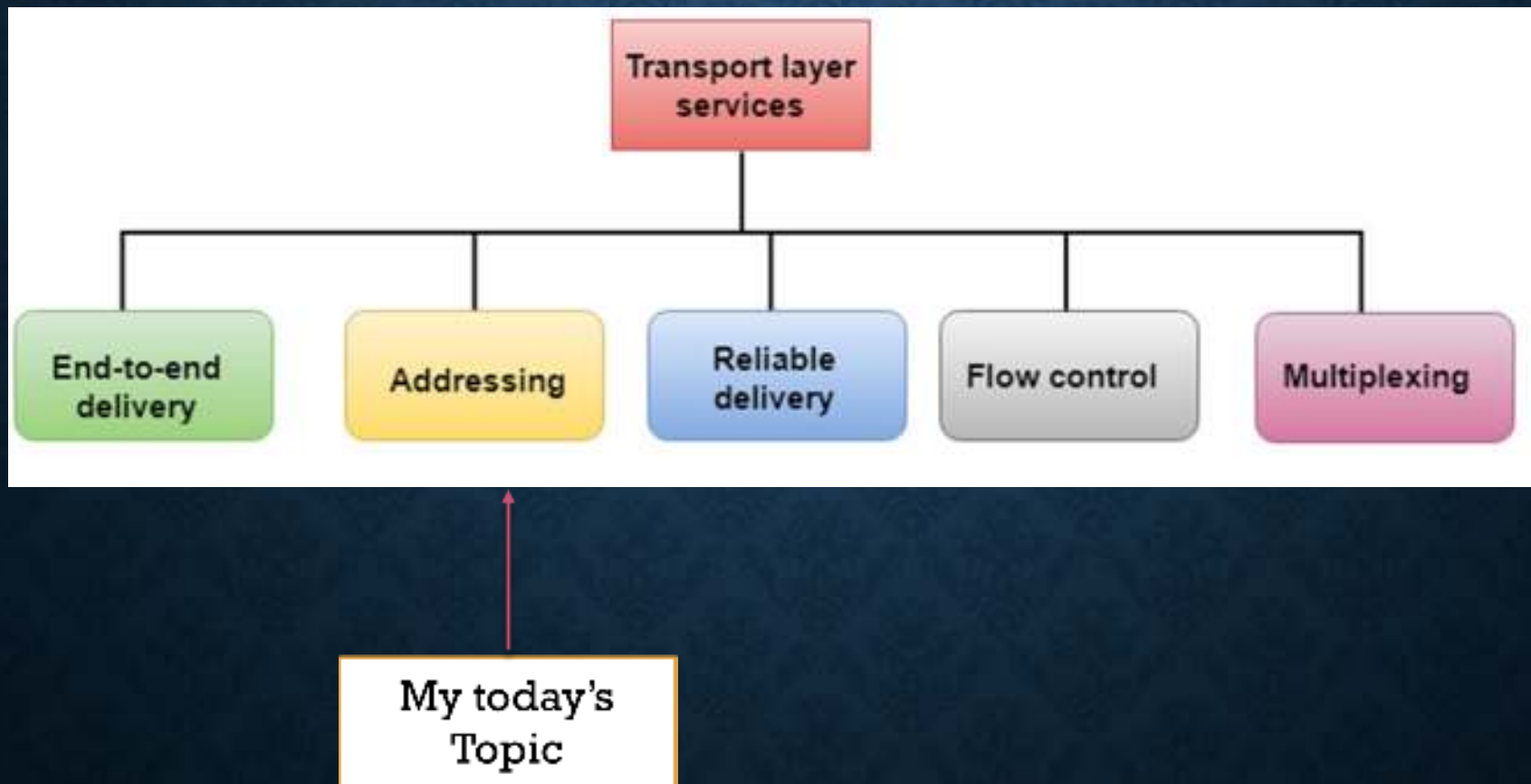
# LOGICAL CONNECTION OF TRANSPORT LAYER



# IMPORTANT FUNCTIONS OF TRANSPORT LAYER

- It divides the message received from the session layer into segments and numbers them to make a sequence.
- Transport layer makes sure that the message is delivered to the correct process on the destination machine.
- It also makes sure that the entire message arrives without any error else it should be retransmitted.

# SERVICE PROVIDED BY TRANSPORT LAYER





# BASIC WORK OF SERVICES

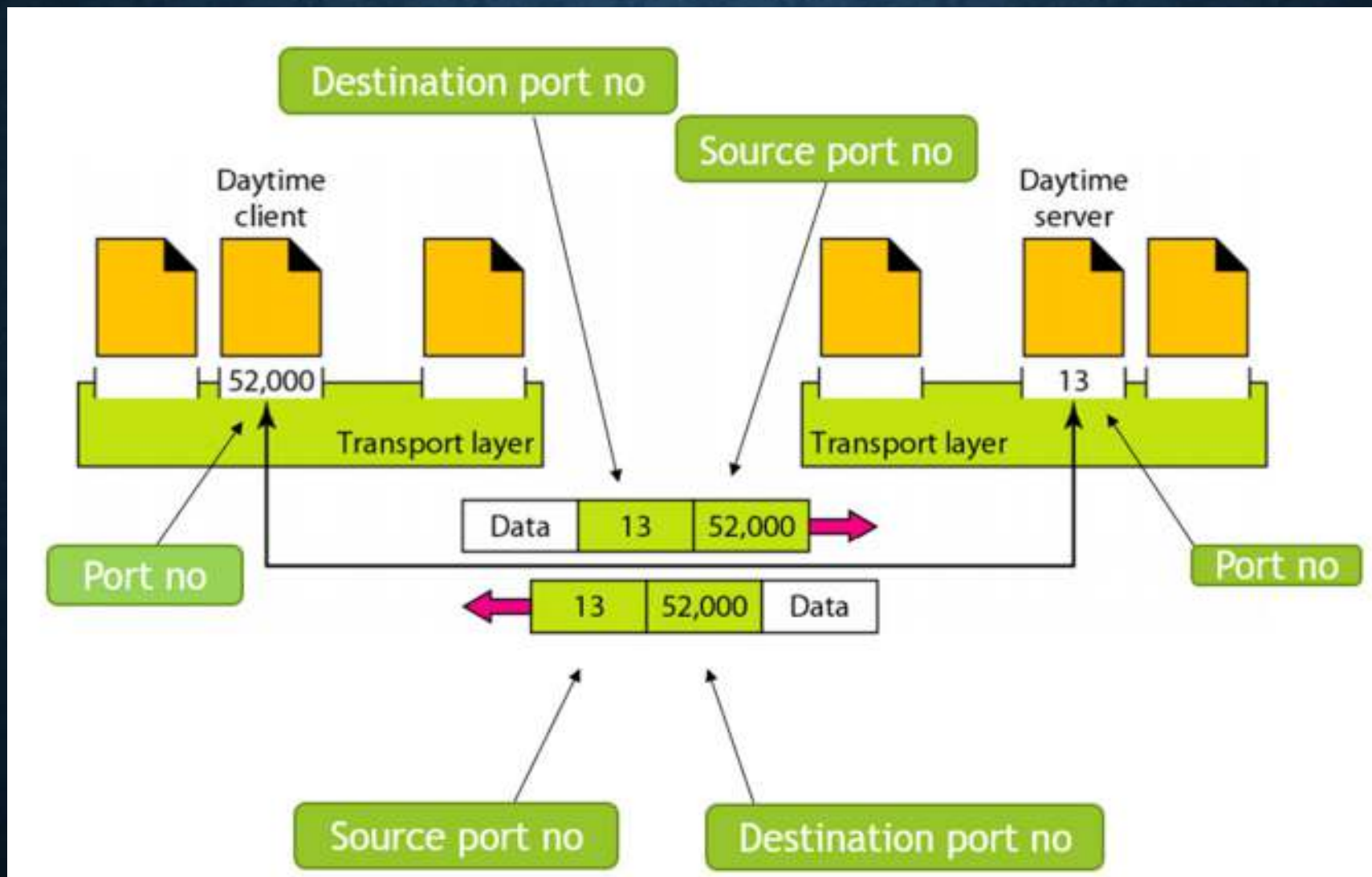
- End-to-end delivery :it ensures the end-to-end delivery of an entire message from a source to the destination.
- Addressing : explain in next slides.
- Reliable delivery :The reliable delivery has four aspects Error control , Sequence control, Loss control, Duplication control.
- Flow control :Flow control is used to prevent the sender from overwhelming the receiver.
- Multiplexing :The transport layer uses the multiplexing to improve transmission efficiency.

# ADDRESSING AT TRANSPORT LAYER

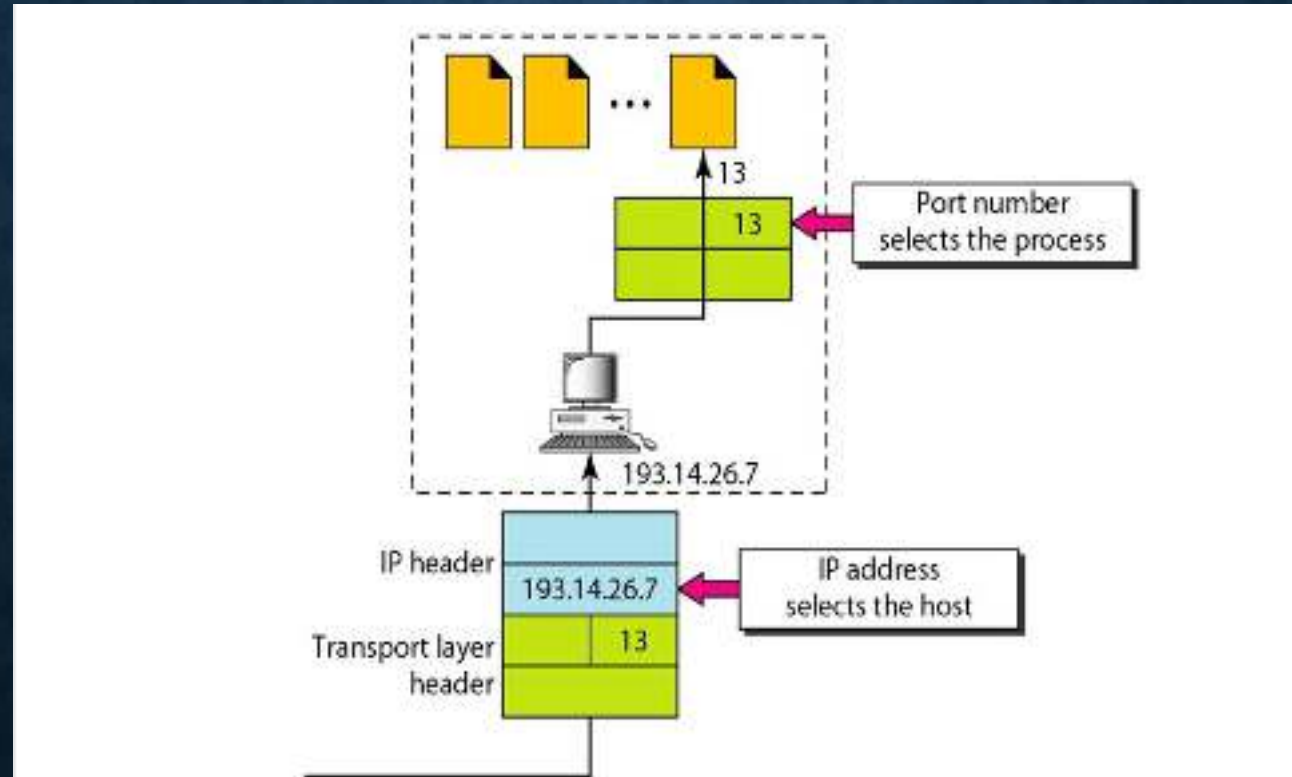
- At the transport layer, we need a transport layer address, called a port number, to choose among multiple processes running on the destination host.
- The destination port number is needed for delivery; the source port number is needed for the reply.

# PORT NUMBER

- Although there are a few ways to achieve process-to-process communication, the most common is through the client-server paradigm. A process usually on the remote host, called a server.



# IP ADDRESSING VS PORT NUMBER





# CONT....

- Destination IP addresses defines the host among the different hosts in the world.
- After the host has been selected , port number defines one of the processes on the particular host.

## ICCAN RANGES:

- ICCAN stands for Internet Corporation for Assigned Names and Numbers
- ICCAN has divided the port numbers into three ranges.
- Well-Known
- Registered
- Dynamic

# CONT....

Well known port:

- The well-known ports cover the range of possible port numbers from 0 through 1023.

Registered port:

- The registered ports are numbered from 1024 through 49151.

Dynamic port:

- Dynamic ports or private ports, are numbered from 49152 through 65535.

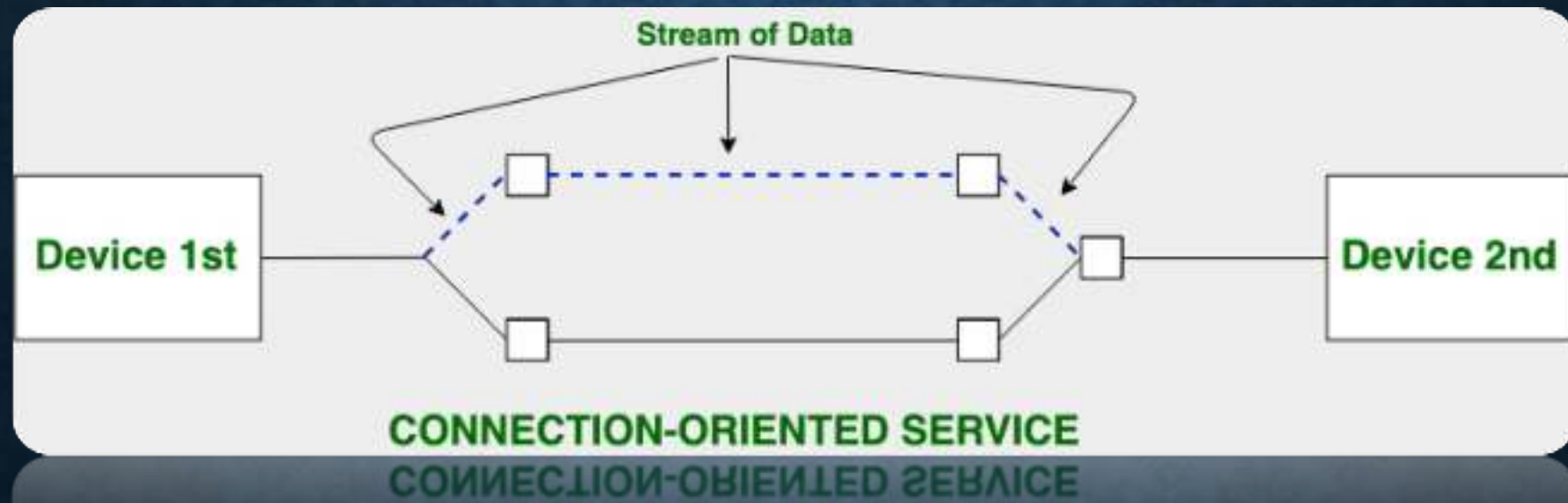
**CONNECTION-ORIENTED SERVICE**

**VS**

**CONNECTION-LESS SERVICE**

# CONNECTION ORIENTED SERVICE

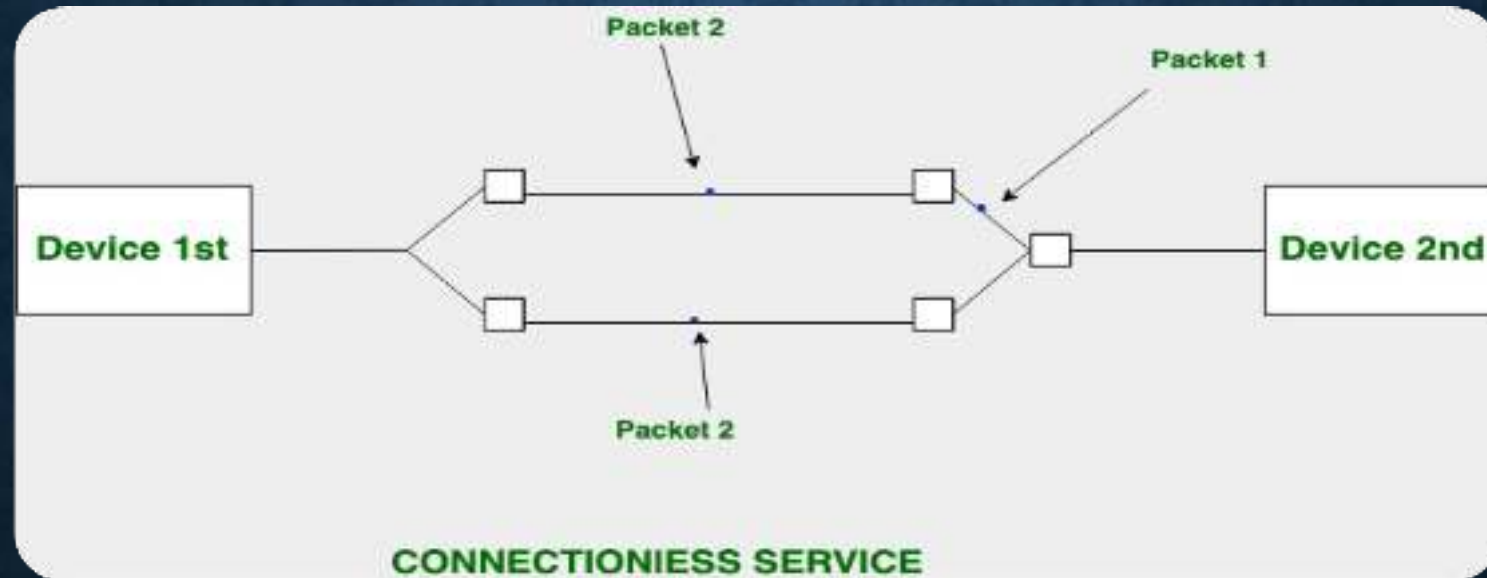
- In connection oriented service we have to establish a connection before starting the communication. When connection is established, we send the message or the information and then we release the connection.
- Example of connection oriented is TCP (Transmission Control Protocol) protocol.





# CONNECTION LESS SERVICE

- It is similar to the postal services, as it carries the full address where the message (letter) is to be carried. Each message is routed independently from source to destination. The order of message sent can be different from the order received.
- Example of Connectionless service is UDP (User Datagram Protocol) protocol



CONNECTIONLESS SERVICE

CONNECTIONLESS SERVICE



Connection oriented

Connection less



Criteria	Connection-oriented	Connection-Less
Connection	Prior connection needs to be establish	No prior connection is establish
Resource Allocation	Resources need to be Allocated	No prior allocation of resource is required
Reliability	It ensures reliable transfer of data	Reliability is not guaranteed as it is best effort services
Congestion	Congestion is not at all possible	Congestion can occur likely
Transfer mode	It can be implemented by using circuit switching	It is implemented using Packet switchig

Criteria	Connection-Oriented	Connection-Less
Retransmission	It is possible to retransmit the lost data bits	It is not possible
Suitability	It is suitable for long and steady connection	It is suitable for bursty transmission
Signaling	Connection is Establish through process of signaling	There is no concept of signaling
Packet Travel	In this packet travel to their destination node in sequential manner	In this packet reach the destination in a random manner
Delay	There is more delay in transfer ,but once connection establish faster delivery	There is no delay due to absence of connection establishment phase



# **RELIABLE VS UNRELIABLE**

# RELIABLE & UNRELIABLE

- The terms reliable and unreliable don't refer to whether it works or not. It refers to whether something is done to guarantee or not.

# WHAT IS RELIABLE DATA TRANSMISSION?

- A reliable data transmission will verify that; all data transmitted is controlled in an orderly fashion, is received in the correct order and is intact.
- Upon detecting an error or loss of packet during transmission, the source recover by retransmitting the packet without the involvement of use application.
- A reliable service is one that also notifies the user if delivery fails.

# RELAIBLE PROTOCOL

- Transmission Control Protocol (TCP) is a typical reliable protocol.
- TCP is the reliable unicast protocol.
- A reliable unicast protocol is connection-oriented also.

# WHAT IS UNRELIABLE DATA TRANSMISSION?

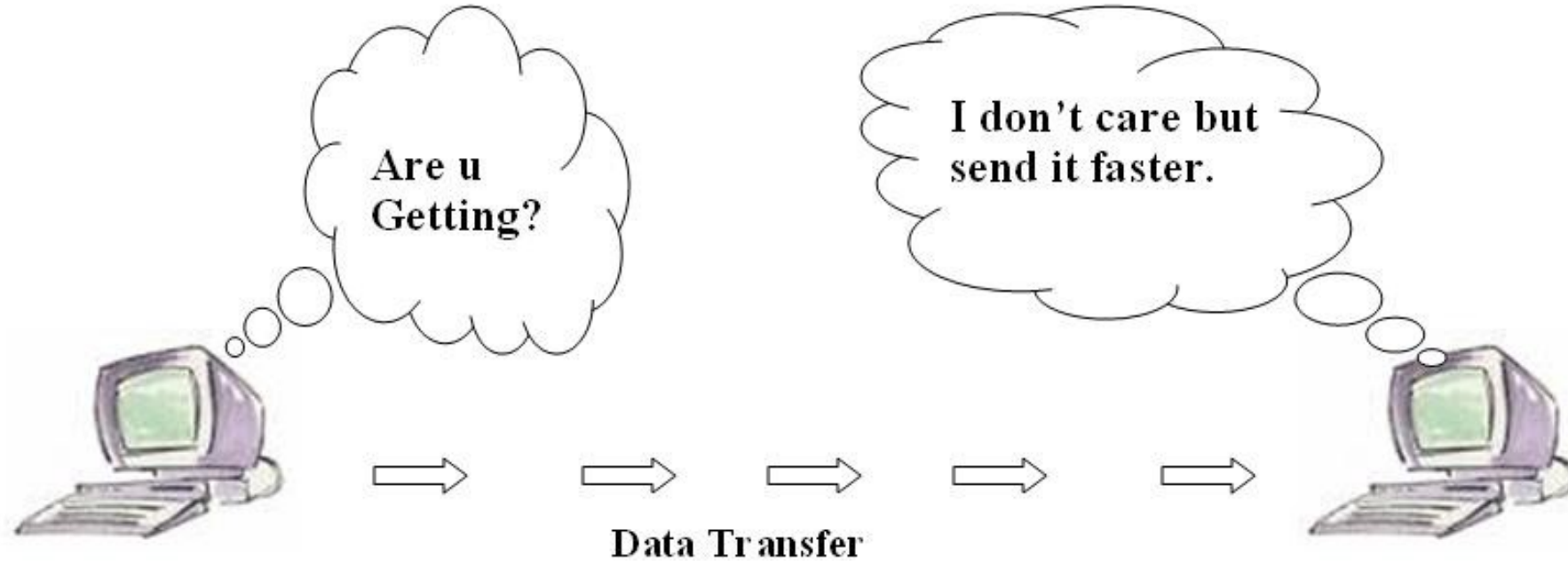
- It does not provide message if transmission is failed.
- Unreliable protocols work best over physical network with low loss and error rate.



# UNRELIABLE PROTOCOL

- UDP is connectionless and unreliable transport protocol.
- It is often used in computer games and streaming media.
- There is no flow control in unreliable protocol.
- UDP is only concerned with speed.

# UDP





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You!!!**

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