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**Welcome
To
OSI Open System
Interconnect Model**



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OSI Open Systems Interconnect Model:



- The OSI Reference model is a standard of the international Organization for Standardization (ISO).
- It is general purpose framework that characterizes and standardizes how PC's communicate with each other over a network.
- It is a Conceptual model.
- Its seven layered approach to data transmission divides the operations into specific related groups of actions at each layer.
- A layer serves the layer above it and is served by the layer below it.

Layer 7: Application

Layer 6: Presentation

Layer5: Session

Layer4: Transport (TCP/UDP, Port)

Layer3: Network (IP Address) Router

Layer2: Data-Link (Ethernet MAC address) Switches

Layer1: Physical

We are learning this model for understanding Networking.

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Application Layer(7):

- In this layer we will consider application like browsing, email, other software.
- Human-computer Interaction layer, where applications can access the network services.
- This is the only layer that directly interacts with data from the user.
- Software applications like web browsers and email clients rely on the application layer to initiate communications.

Presentation Layer(6):

- This layer is primarily responsible for preparing data so that it can be used by the application layer.
- In other words, layer 6 makes the data presentable for applications to consume.
- This layer is responsible for translation, encryption and compression of data.
- This layer is responsible for presentation data to application layer.
- In simple words we can say this layer will be responsible for data format etc. Like jpg or png for image etc.
- When we have two hosts communicating to each other, we need to make sure that the application layer on one side can read the data from the host on the other side.
- In short, the presentation layer here makes sure that application layer on both sides reads each other's data.

Session Layer(5):

- This layer is responsible for sessions it creates and maintains the sessions.
- Session is nothing but time frame between client and server.
- This is the layer responsible for opening and closing communication between the two devices.
- The time between when the communication is opened and closed is known as the session.
- The session layer ensures that the session stays open long enough to transfer all the data being exchanged and then promptly closes the session in order to avoid wasting resources.

Transport Layer(4):

- This layer is responsible for data delivery from source to destination.
- We use TCP or UDP protocol for transfer of data.
- TCP stands for Transmission Control Protocol.
- UDP stands for User datagram protocol.
- Layer 4 is responsible for End to End Communication between the two devices.



Network Layer(3):

- This layer is responsible for adding source and destination IP address.
- Network layer is responsible routing and delivering data.
- Data forwarding end to end.

Datalink Layer(2):

- This layer is responsible to adding source and destination MAC Address.
- This Data link layer is use to Data forwarding on the local link.
- In this Layer we have error correction.
- Data link we use Ethernet.

Physical Layer(1):

- This layer is nothing but as physical connection like cable or signal.
- It describes about stuff like voltages levels and physical data rates etc.
- Like everything what you touch as it is physical layer.

TCP/IP Model:

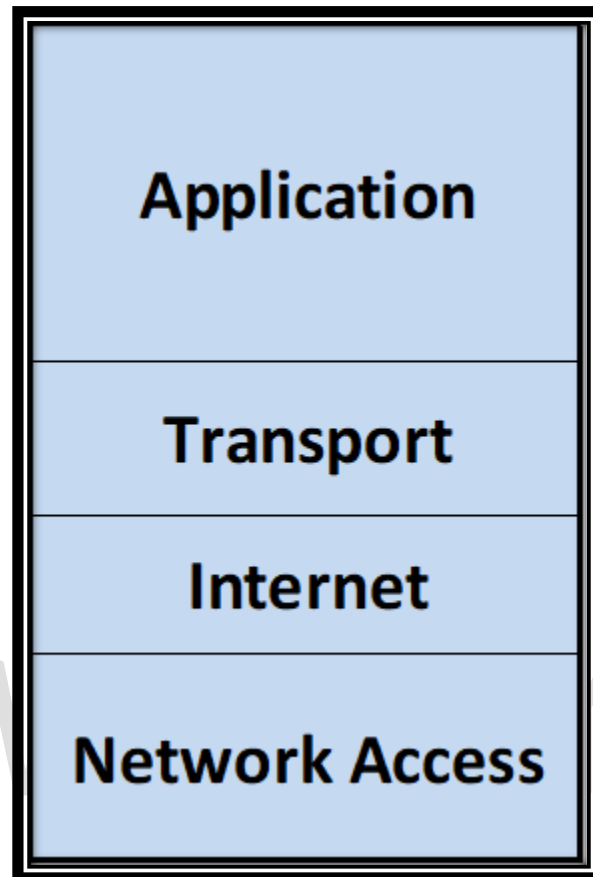
- It is a protocol which consists of multiple protocols include TCP (Transmission Control Protocol) and IP (Internet Protocol).
- It is the main protocol used in computer operations today.
- Whereas the OSI Reference Model is conceptual, the TCP/IP used to transfer data in production networks.
- TCP/IP is also have layered but does not use all of the OSI layers.

Let see

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- As we can see the upper three layers are now combined to the **"Application Layer"**. The network layer is called the **"Internet" layer** and the bottom 2 layers are combined into the **"Network Access layer"**.



Let compare this two.

OSI Model		TCP/IP Stack
Application	Data	Application
Presentation	Data	
Session	Data	
Transport	Segments	Transport
Network	Packets	Internet
Data Link	Bits and Frames	Network Access
Physical	Bits and Frames	

- Basically, it is the same idea for this both only some layers combined and different names.
- The physical and data link layer is combined into the network Access.
- The network layer is now the internet layer and the session, presentation and application layer are combined into a single application layer.

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Compare TCP to UDP:

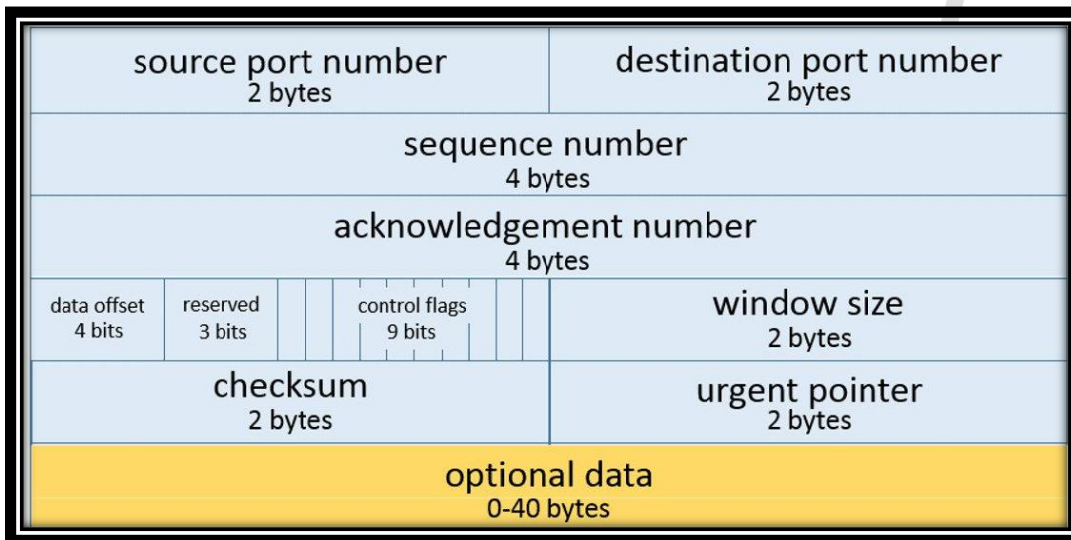
As we know that we require a transport protocol to send our IP packets.

Transport Protocols that are used Most of the time to send our IP Packets are TCP or UDP

- TCP (Transmission Control Protocol)
- UDP (User Datagram Protocol)

	TCP	UDP
Connection Types:	Connection Oriented	Connectionless
Sequencing	Yes	No
Usage	Downloads	VOIP
Data Sending	Slower	Faster

TCP Header (20 or 60 Bytes):



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Let discuss about all fields:

Source Port: This is 2 bytes (16 Bit) field that specifies the port number of the sender.

Destination Port: This is 2 bytes (16 Bit) field that specifies that port number of the receiver.

Sequence Number: It is 4 Bytes (32 Bit) and it indicates how much data is sent during the TCP session.

Acknowledgment Number: It is 4 Bytes (32 Bit) it is used by the receiver to request the next TCP segments. This value will be the sequence number incremented by 1.

Do (data offset): It is 4-bit data offset field, also known as the header length. It indicates the length of the TCP header so with this we know from where our actual data begins.

Reserved Field (RSV): It is 3 bits for the reserved field. It is unused and are always set to 0.

Flags: It is 9 bits we also call them control bits. Generally, we use to establish connections, send data and terminate connection.

Window: It is 2 Bytes (16 bit) Window field specifies how many bytes the receiver is willing to receive.

Checksum: It is 2 Bytes (16 bits) used for a checksum to check if the TCP header is ok or not.

Urgent Pointer: It is 2 Bytes (16 bits) used for setting Urgent bit.

Options: This field is optional and can be anywhere between 0 and 320 bits.

UDP Header (8 Bytes):

