Do it now

Activity:
What is a protocol?
List any you can remember

Stretch it:
Why is it important to have protocols?
Name a protocol and describe what it does.

KNOW THE RULES!

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Complete in Silence Please

Features of the OSI 7 Layer Model

- The **Open Systems Interconnection** (OSI) **model is set of standards and rules (protocols) for how applications communicate over a network**.

- the OSI model is a conceptual model which **describes the communication between two endpoints in a network (node to node)**

- The OSI model is **separated into 7 layers**

- **Each layer has a certain purpose and uses different protocols**
  a layer serves the layer above it and is served by the layer below it

- in a given message between users, there will be a flow of data down through the layers in the sending computer then

- data is sent across the network, and then up through the layers in the receiving computer.

Networking standards
Rules that allow computer systems to communication across networks.

Protocol
A set of rules that determine how data is transmitted between different network devices.

https://www.youtube.com/watch?v=VGGmBhARuiY

Remember the layer order

You need to know the name, order and purpose of each layer in the 7 Layer model:

7. Application Layer
6. Presentation Layer
5. Session Layer
4. Transport Layer
3. Network Layer
2. Data link Layer
1. Physical Layer

Application	**A**
Presentation	**P**
Session	S
Transport	T
Network	N
Data Link	D
Physical	P

7 – Application Layer

- This is the topmost layer of the OSI model.

- Allows humans and software applications to use the network.

- This layer provides an **interface** between **application programs** running in system and **network**.

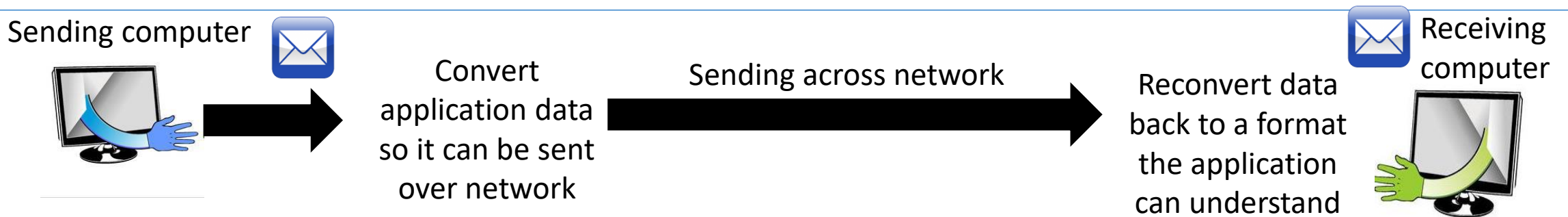- Example programs at this layer – **Internet Explorer, Outlook, Chrome etc.**

This layer uses **protocols which enable applications to connect with the network**.

FTP, POP3, SMTP and HTTP are the few examples of standards and protocols used in this layer.

6 – Presentation Layer

- Applications running in local system **may not** understand the format that is used to transmit the data across the network.

- The **presentation** layer works as the **translator** in OSI model.

- It defines how two devices should encode, encrypt, and compress data so it is received correctly on the other end

- Displays data in a standard format that other devices can accept and understand.

Sending computer

Convert application data so it can be sent over network

Sending across network

Reconvert data back to a format the application can understand

Receiving computer

Standards/protocols used in this layer: **ASCII, BMP, GIF, JPEG, WAV, AVI**, **and MPEG**

5 – Session Layer

1. The session layer creates a session between the source and the destination nodes and terminates sessions on completion of the communication process.

2. Establishes a connection between computers allowing data to be sent between them.

3. Data can be synchronised in each session to allow for efficient data transfer

The session layer is responsible establishing, managing, and terminating communications between two computers.

4 – Transport Layer

- The Transport Layer deals with the coordination of the data transfer.

- Data is split into segments.

- This layer makes sure the data is sent and received in the correct order and reassembled at the destination without errors

- This layer establishes a logical connection between sending system and receiving system and mainly uses two protocols; **TCP and UDP.**
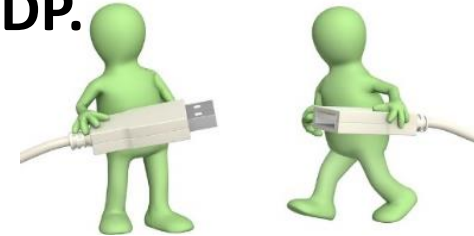
- **TCP** protocol is used for reliable data transportation.
- **UDP** protocol is used for unreliable data transportation.

Message segment   Message segment   Message segment
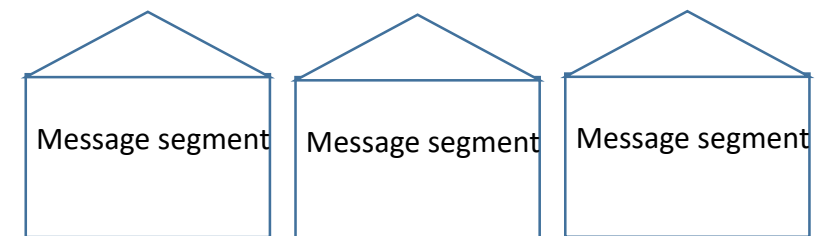
3 – Network Layer

- This layer Transfers data from nodes to nodes.

- This layer takes the **data segment** from transport layer and adds **logical address** (IP address) to it.

- Once the IP address (and other related information) are added, the segment becomes a **packet**.

- Routers and switches are devices used for this layer

Packet

Source: 195.10.213.120
Destination: 195.11.214.120
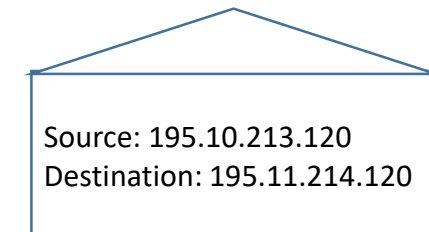
The **IP protocol** is used in this layer. It is responsible for addressing and routing data packets.
Router moves packets between two networks. They use **IP address** to take routing decisions.
Routing is a process of forwarding data packet to its destination.

2 – Data Link Layer

- The Data Link Layer **provides node- to-node data transfer** (between two directly connected nodes) and **handles error** correction from the physical layer.

- The **Data Link layer** is responsible for **creating the frames** that move across the network and sends data from the network layer to the physical layer

  - *A data frame consists of a link layer header followed by a packet.*
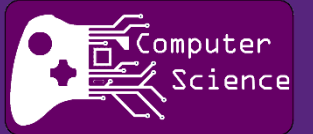
- These frames use **MAC** addresses to identify the source and destination.

  1D:GH:J8:I9AB

Frame

1D:GH:J8:I9AB

Source:
195.10.213.120
Destination:
195.11.214.120
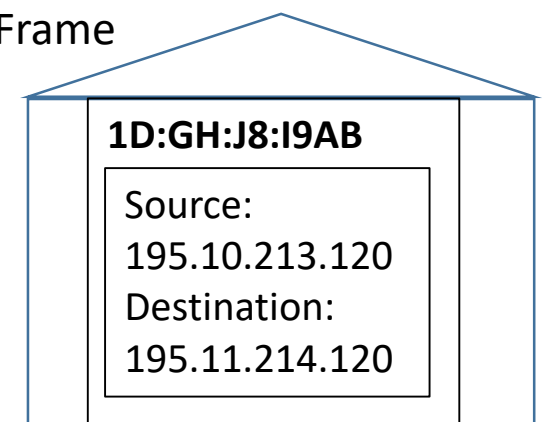
1 - Physical Layer

This layer converts the data packets into bits so they can be transferred across a physical network using routers and switches

This layer deals with the hardware of networks including cable types and radio frequency links for wireless systems.

Protocols used in this layer are :
Ethernet
Wi-Fi (802. 11) and **Bluetooth**

IP Addresses

- **An IP address is** an address, which is allocated to a computer system on a network

- **IP addresses** are used to uniquely identify computer systems on a network, thus allowing communication between them.

- Each of the four 8-bit fields is represented by a decimal number ranging from 0 to 255.

Example: 195.10.213.120

MAC Addresses

- A MAC address (media access control address), also known as a physical address or a hardware address, is a unique hexadecimal number given to any communication device, such as a network interface card.

- Unlike IP addresses MAC addresses cannot change

MAC Addr = 00:04:A3:4D:1C:73