1. **DATA ENCAPSULATION IN NETWORKING**

This is the process of adding information when data when data is travelling in OSI/TCP model. The additional information has been added on sender’s side, starting from application layer to physical layer.

Data encapsulation in computer networking can also be said to be the method of designing modular communication protocol in which the networks are abstracted from underlying structures by information hiding within high-level objects.

Encapsulation takes information from a higher layer and adds a header to it treating the higher layer information as data.

The physical layer is responsible physical transmission of the data link encapsulation allows Local Area Networking, IP provides global addressing of individual computers and TCP selects the process or application example UDP or TCP port that specifies the service such as a Web server.

**Working Mechanism:**

* There will be no additional information added in the user’s data in the Application layer in TCP/IP model or Application, Presentation, Session layers in OSI model.
* The session layer sends data to Transport layer.
* In the Transport layer, the data broken is up into different pieces.
* The encapsulated data is Transported layer is called Segments or Datagrams. If the transmission uses TCP, then it is called **Segments**, or UDP is called **Datagrams**.
* The data will travel down and reach the Networking Layer. Layer 3 header is added. It contains information like Source IP and Destination IP. The encapsulated data network layer is called **Packets.**
* Network layer sends packet to data Link Layer when it enters into data link layer, a new header is added.
* A trailer is also added. It contains information like source MAC address and Destination MAC address. The trailer is used for error checking. The encapsulated data in the data link layer is called **Frames.**
* The physical layer takes Frames from Data Link Layer. The encapsulated data in the physical layer is called **Bits.**

During encapsulation, each layer builds a protocol data unit (PDU) by adding a header and optionally a trailer, both of which contain control information to the PDU from the layer above.

1. **DATA DE-ENCAPSULATION**

In this, additional information added on the sender’s side (During encapsulation) gets removed when it travels on the receiver’s side from the physical layer to the Application layer.

**Working mechanism:**

* The physical layer gets the **bits** and de-encapsulates them into frames and sends them to the upper layer.
* The data link layer receives the **Frames** and checks MAC address whether it is matching or not. If everything matched and no error found. Then layer 2 header and layer 2 trailer are removed. It de-encapsulates the data and packet sent to upper layer.
* The Network layer receives the **packet** from Data link layer. It checks the IP address and if it matches the header in layer 3 is removes. The de-encapsulated data packet is delivered to the Transport Layer.
* The Transport Layer gets the **data segments/datagrams** from the network layer and removes the layer 4 header.
* After travelling through Session, Presentation and Application Layer, the de-encapsulated data is sent to the receiver.