CN (IT-3001)
Introduction

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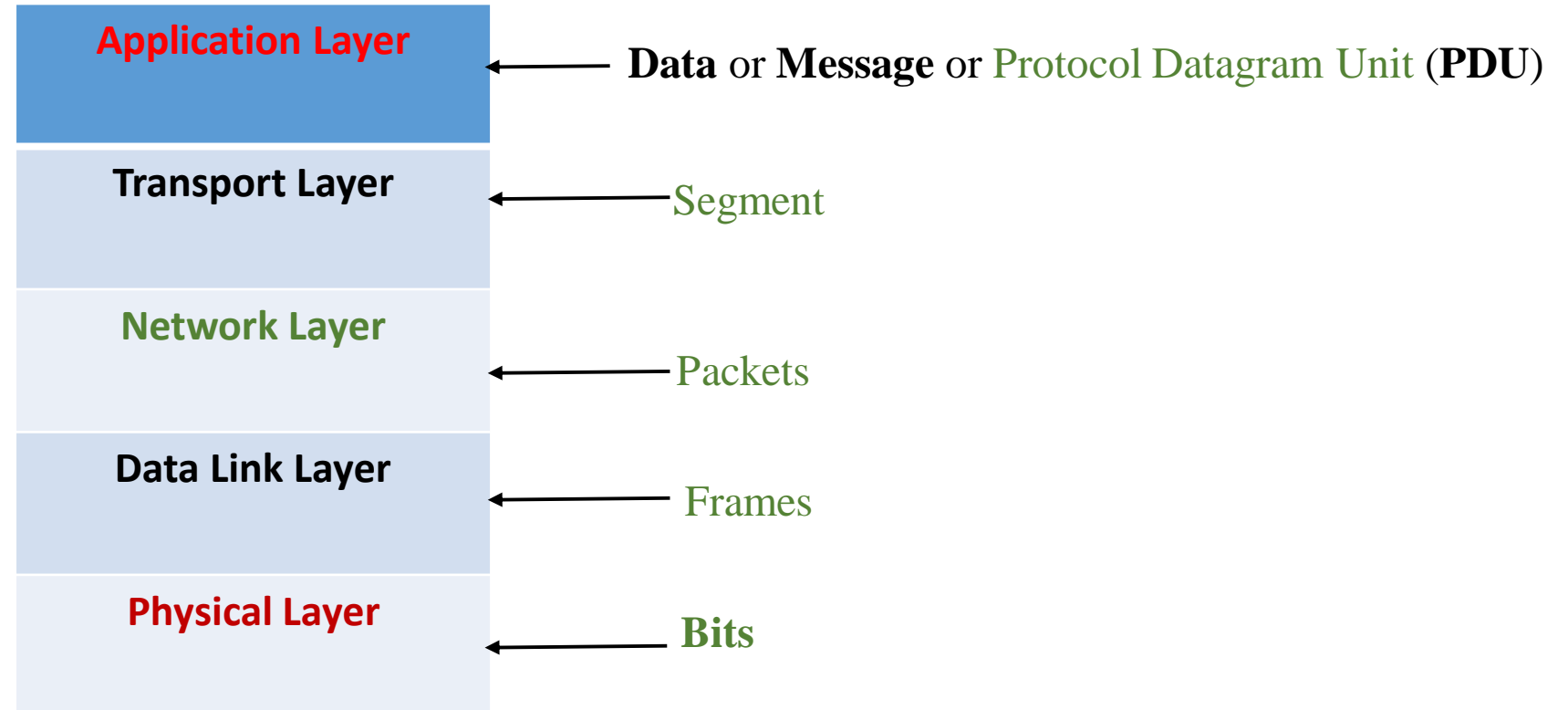KIIT Deemed to be University

Content

- Basics of TCP/IP Suite
  - Different naming to message and its reason
  - Different addressing Mechanism and its reason
  - Different protocols at different layers
  - Logical connection between different layers
  - Encapsulation and Decapsulation

TCP/IP Protocol Suite

- It is a protocol suite used in the Internet today.

- It is a hierarchical protocol made up of interactive modules, each of which provides a specific functionality.

- The term hierarchical means that each upper level protocol is supported by the services provided by one or more lower level protocols.

- The original TCP/IP protocol suite was defined as four software layers built upon the hardware.

- Today, however, TCP/IP is thought of as a five-layer model.

- Protocols: A network protocol defines rules and conventions for communication between network devices. Network protocols include mechanisms for devices to identify and make connections with each other, as well as formatting rules that specify how data is packaged into sent and received messages.

- A set of cooperating network protocols is called a protocol suite. The TCP/IP suite includes numerous protocols across layers -- such as the data, network, transport and application layers -- working together to enable internet connectivity
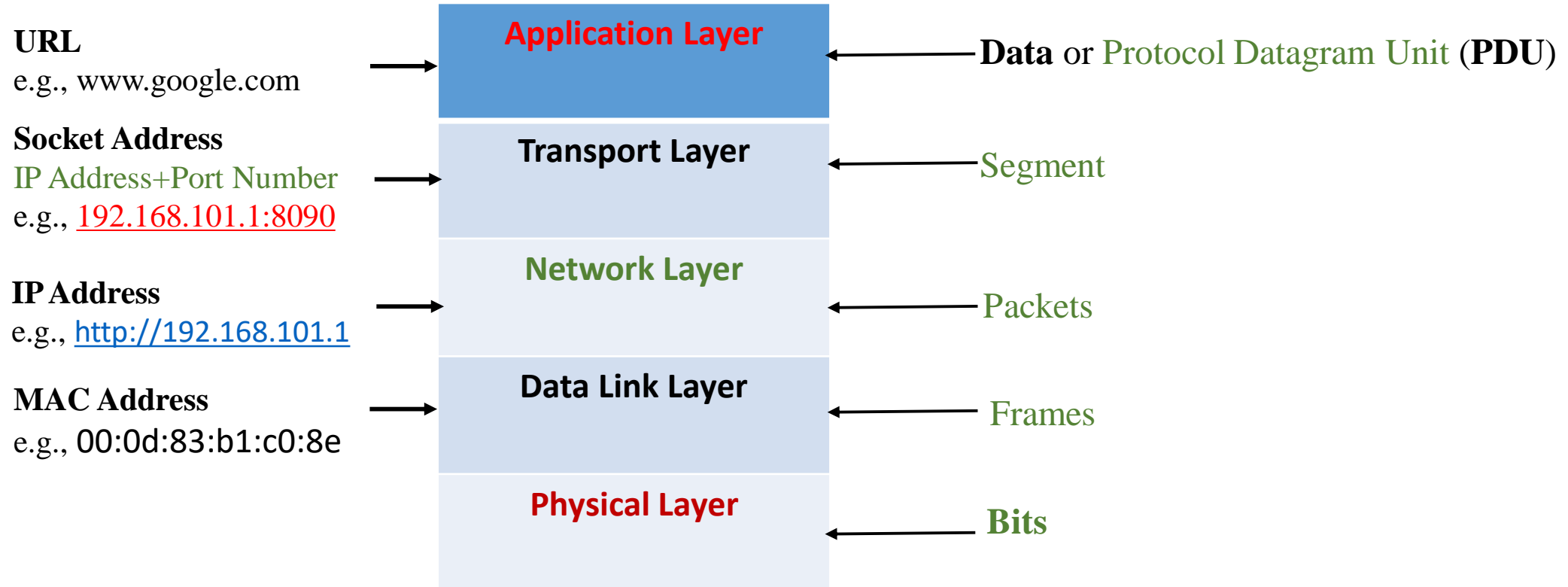
TCP/IP: Nomenclature of the Data

- We use different names for the data or information to each layers of TCP/IP Stack.

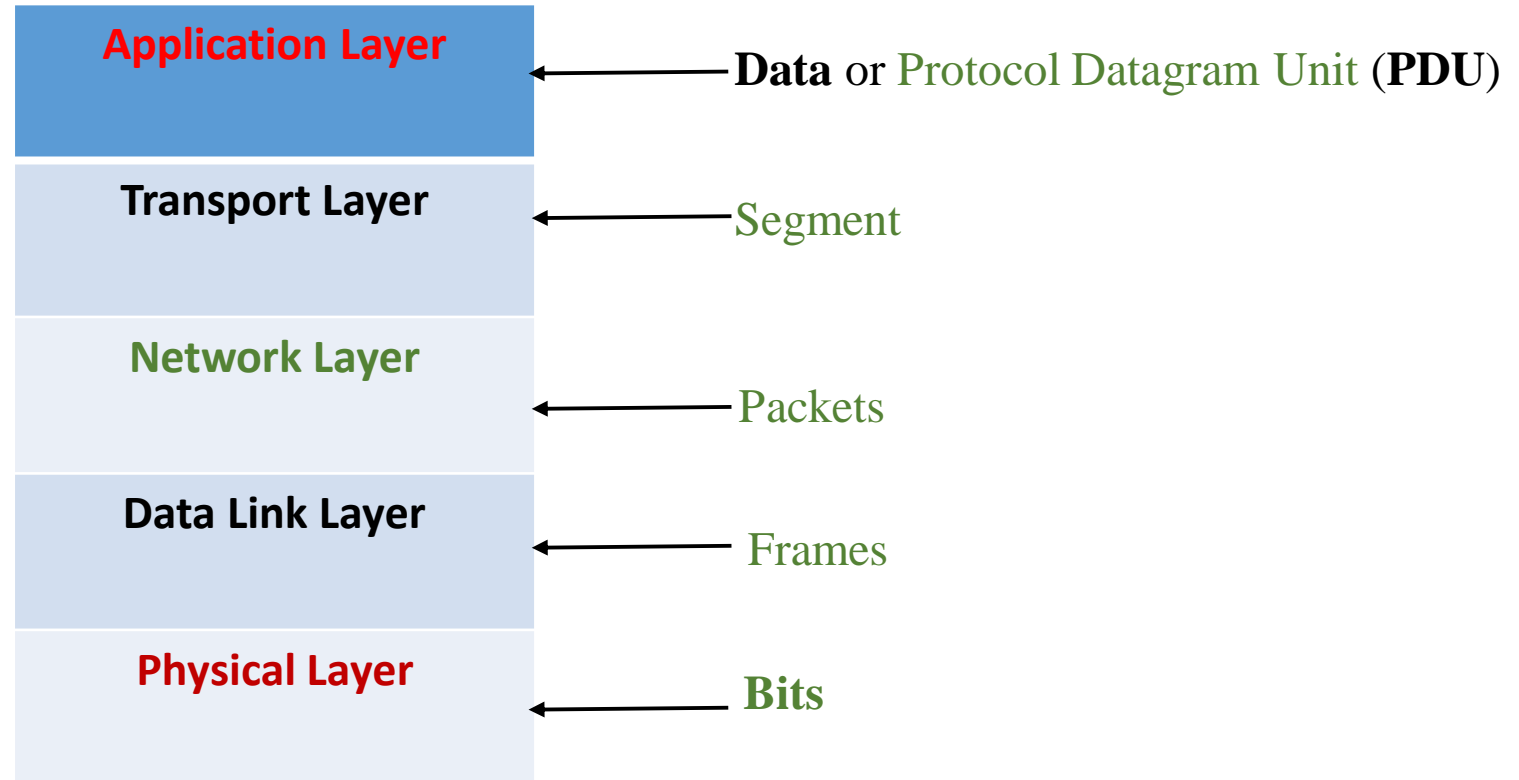|	
Application Layer	**Data** or **Message** or Protocol Datagram Unit (**PDU**)
Transport Layer	Segment
Network Layer	Packets
Data Link Layer	Frames
Physical Layer	**Bits**

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TCP/IP: Addressing at Different Layers

- We use different names for the data or information to each layers of TCP/IP Stack.

URL
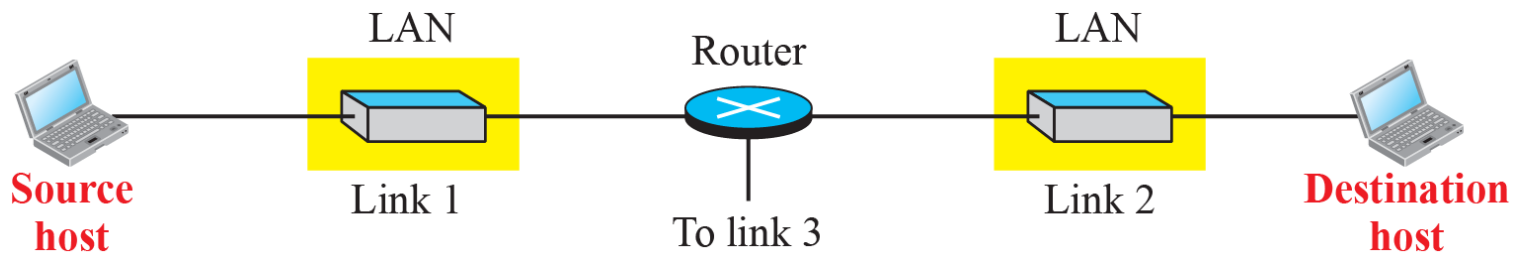e.g., www.google.com

Socket Address
IP Address+Port Number
e.g., 192.168.101.1:8090

IP Address
e.g., http://192.168.101.1

MAC Address
e.g., 00:0d:83:b1:c0:8e

| Application Layer |
| Transport Layer |
| Network Layer |
| Data Link Layer |
| Physical Layer |

Data or Protocol Datagram Unit (**PDU**)

Segment

Packets

Frames

Bits
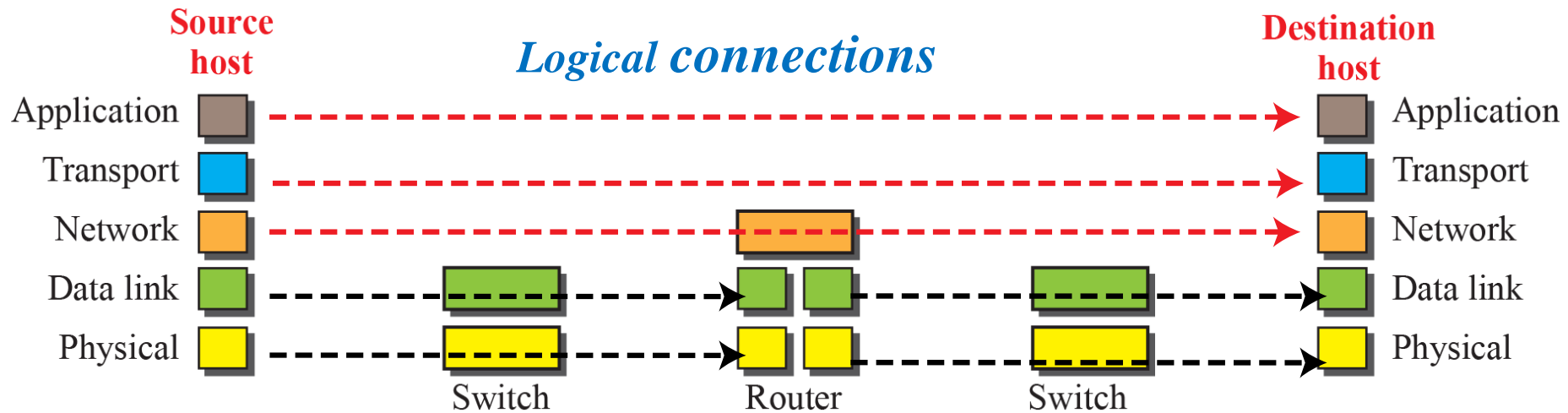
TCP/IP: Protocols

- We use different names for the data or information to each layers of TCP/IP Stack.

Application Layer	← **Data** or Protocol Datagram Unit (**PDU**)
Transport Layer	← Segment
Network Layer	← Packets
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Physical Layer	← **Bits**

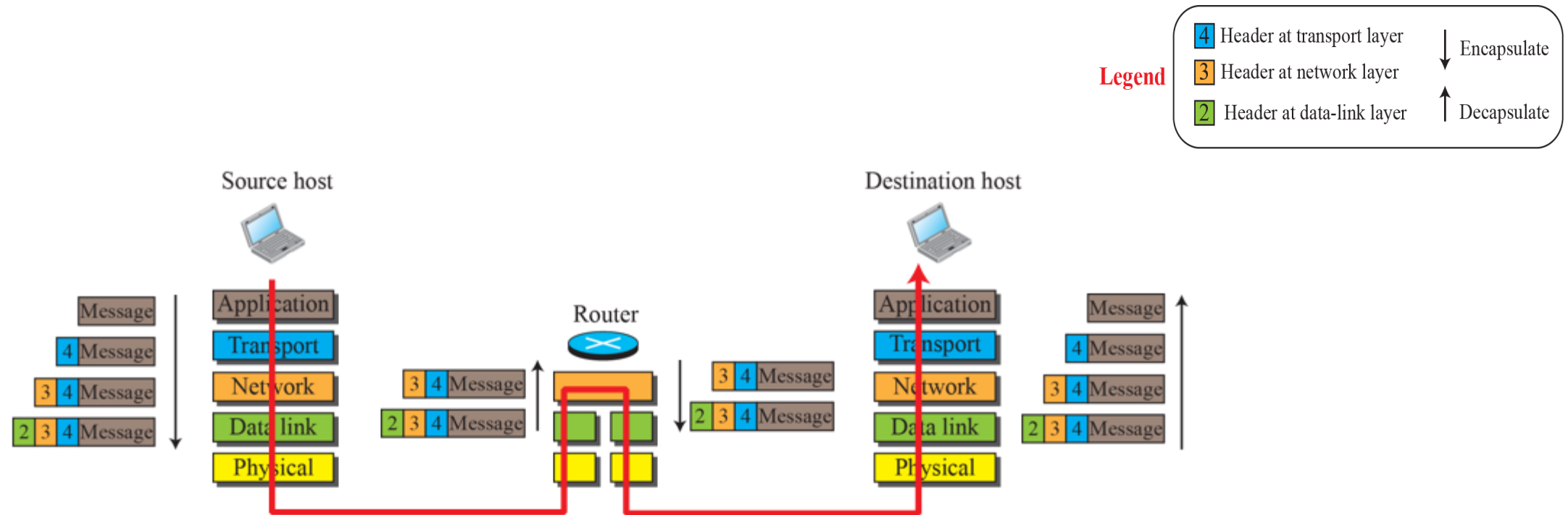# TCP/IP: Logical Connections Between Different Layers

Description

- Logical connections makes it easier for us to think about the duty of each layer.

- From logical connections, we can observe that
  - Duty of application, transport and network layer is **end-to-end**.
  - However, duty of data link layer and physical layer is **hop-to-hop**.

TCP/IP: Encapsulation and Decapsulation

TCP/IP: Encapsulation and Decapsulation

- **<u>Encapsulation:</u>**

  - The term encapsulation is used to describe a process of adding headers and trailers around some data.

  - Encapsulation is the process of taking data from one protocol and translating it into another protocol, so the data can continue across a network.

  - The lower layer encapsulates the higher layer's data between a header (Data Link protocols also add a trailer).

  - For example, a TCP/IP packet contained within an ATM frame is a form of encapsulation.

- **<u>Decapsulation:</u>**

  - Decapsulation is the process of opening up encapsulated data that are usually sent in the form of packets over a communication network.

  - Data decapsulation is simply the reverse of encapsulation.

  - As the data moves up from the lower layer to the upper layer of TCP/IP protocol stack (incoming transmission), each layer unpacks the corresponding header and uses the information contained in the header to deliver the packet to the exact network application waiting for the data.