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Data Communication CS601 Lecture No 22

Lecture Prepared By

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CS601 Lecture No 21 Topic 124 to 128

Data Link Layer (Layer 2)

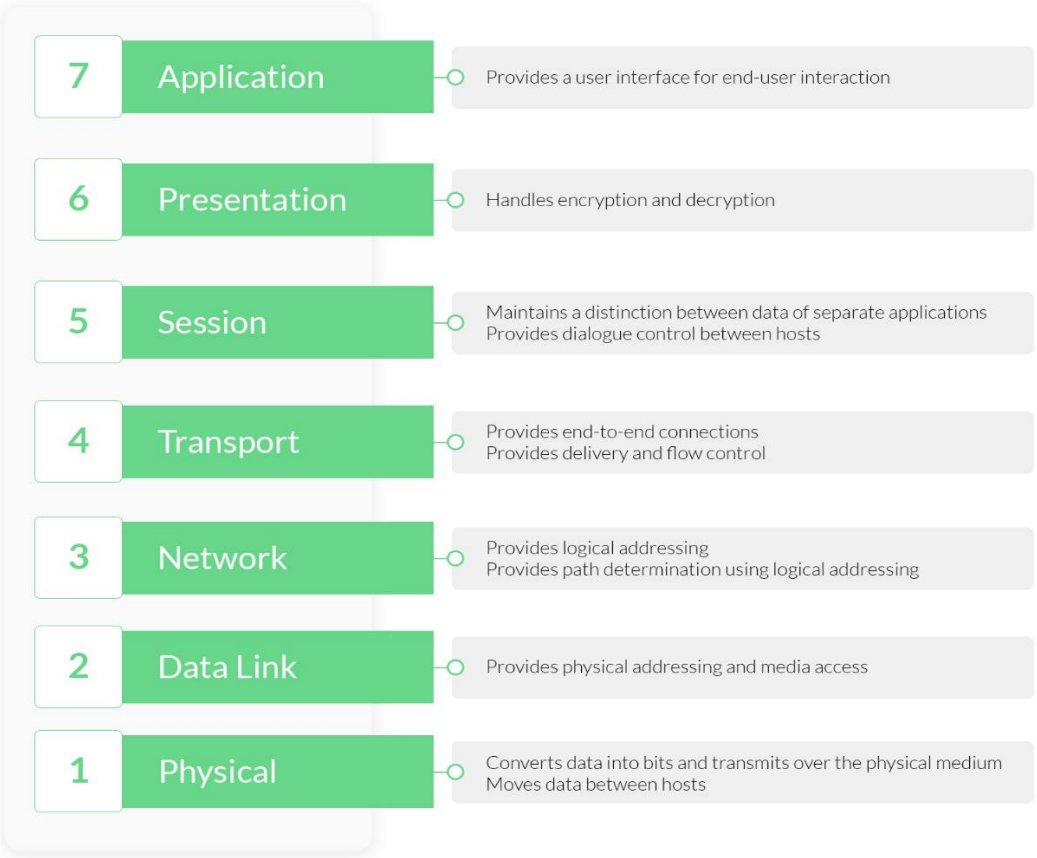
- The Internet is a combination of networks glued together by connecting devices (routers or switches)
- If a packet is to travel from a host to another host, it needs to pass through these networks

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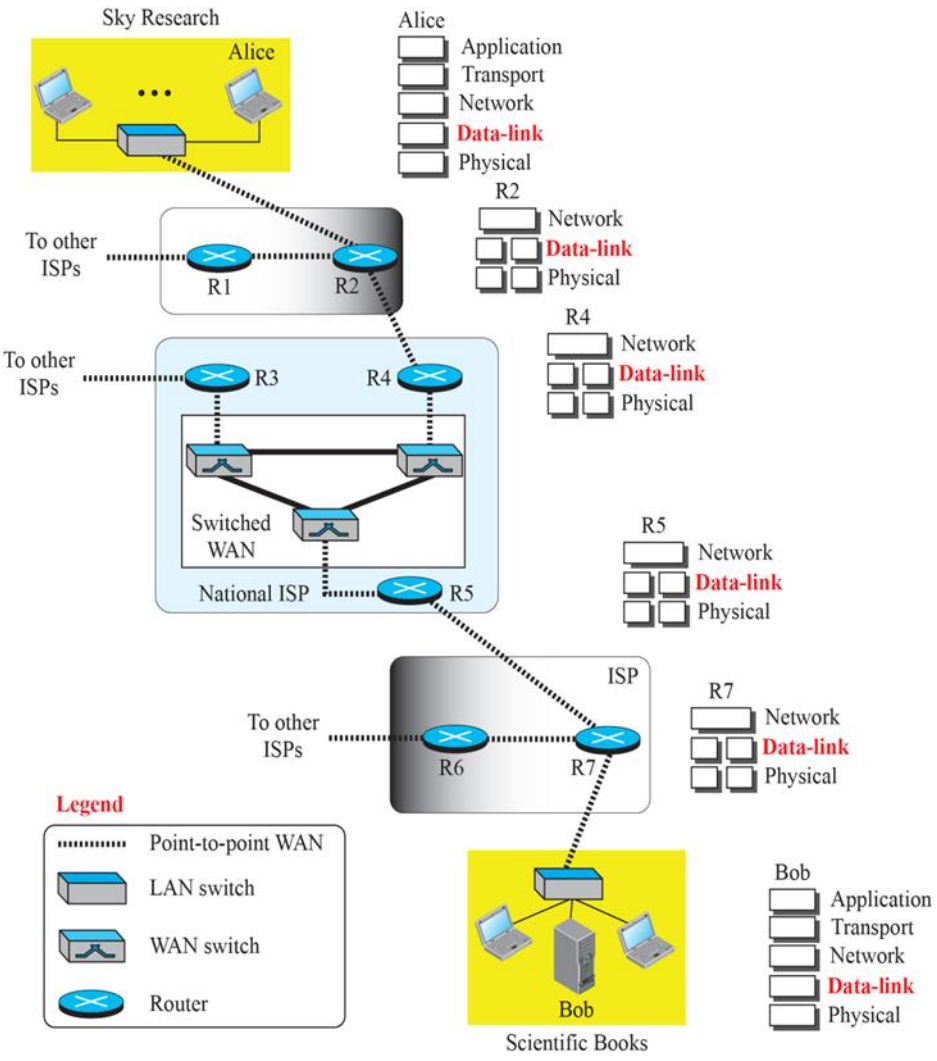
- Data Link layer controls node-to-node communication



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Nodes and Links

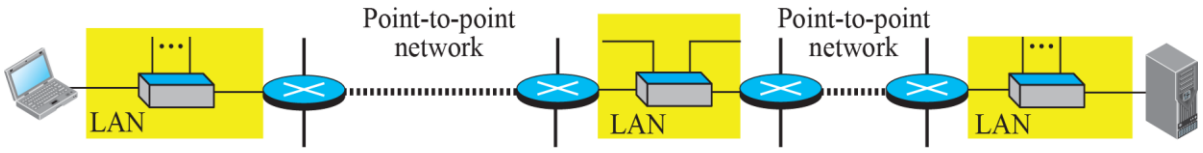
- **Communication at the data-link layer is node-to-node**
- **A data unit from one point in the Internet needs to pass through many networks (LANs and WANs) to reach another point**
- **We refer to the two end hosts and the routers as nodes and the networks in between as links**

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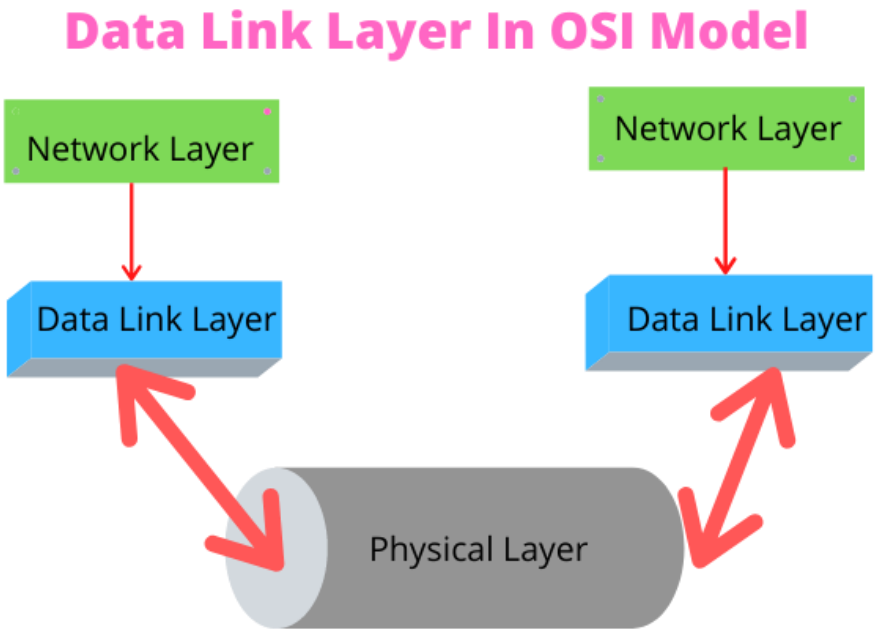
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a. A small part of the Internet



b. Nodes and links



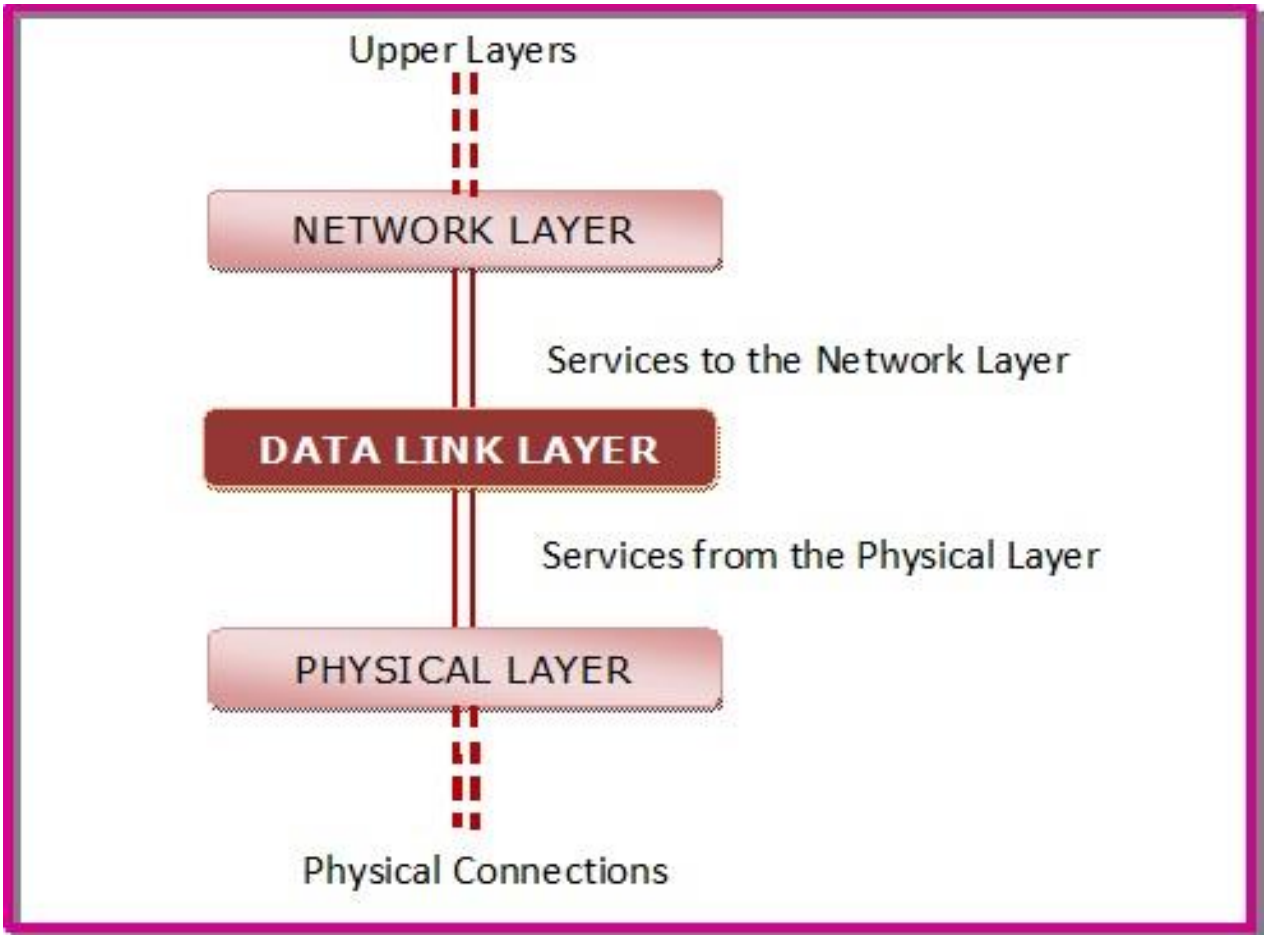
Services provided by Data-Link Layer

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- **Located between the physical and the network layers**
- **Provides services to Network Layer and receives services from Physical layer**
- **Framing**
- **Flow Control**
- **Error Control**
- **Congestion Control**



Framing

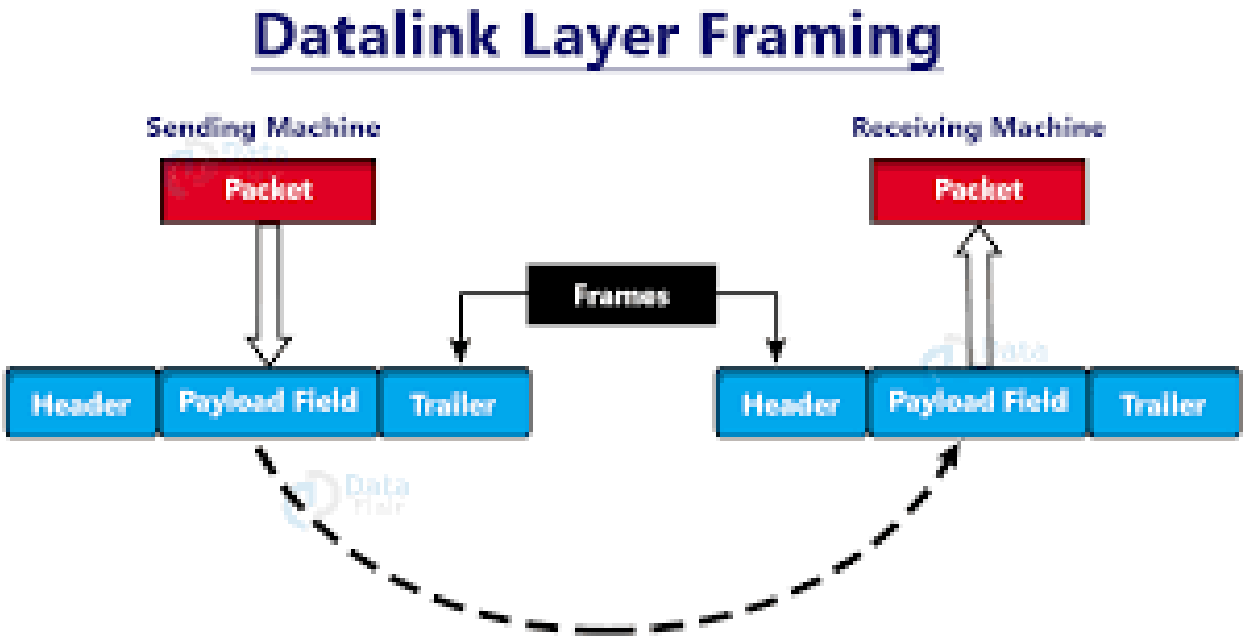
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Framing in data link layer is a point-to-point connection between the sender and receiver. The framing is the primary function of the data link layer and it provides a way to transmit data between the connected devices. Framing uses frames to send or receive data.

The data link divides the stream of bits from Network layer into manageable data units called "FRAMES". This process is known as Framing.



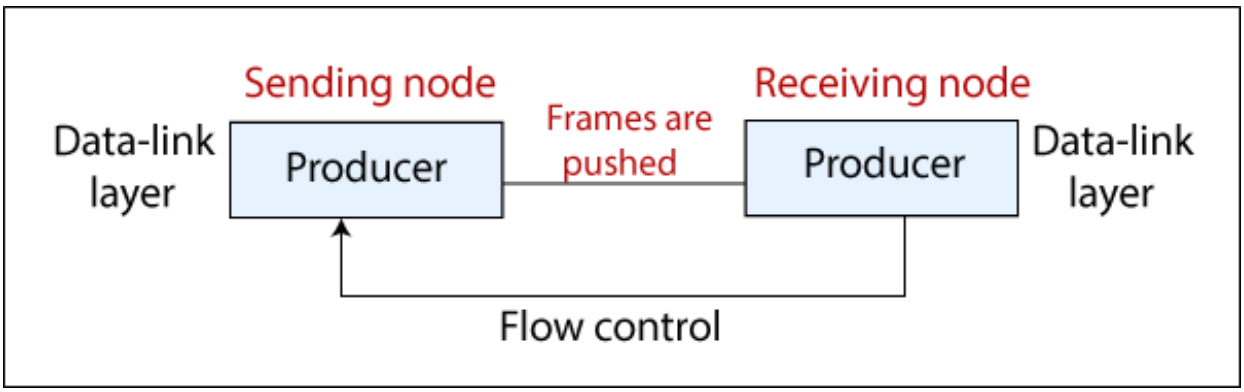
Flow Control

Flow control is **a technique that allows two stations working at different speeds to communicate with each other**. It is a set of measures taken to regulate the amount of data that a sender sends so that a fast sender does not overwhelm a slow receive

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Error Control

Error control in data link layer is the process of detecting and correcting data frames that have been corrupted or lost during transmission. In case of lost or corrupted frames, the receiver does not receive the correct data-frame and sender is ignorant about the loss.

There are different techniques for detecting errors in the transmitted data:

(a)Parity Checks: Parity check deploys single parity bit and is considered the simplest form of error detection method. It comprises of even parity and odd parity methods.

(b)Checksum: It is a simple type of redundancy check that is used to detect error. Through this method, an algorithm calculates the binary values in a packet or other block of data and stores the results with the data.

(c)Cyclic Redundancy Check: In the TCP/IP or OSI reference model, CRC is added to a packet frame at the data link layer. It is a method of checking for errors in data that have been transmitted on a communications link.

(d) Hamming code: It is an error-detecting and error-correcting binary code.

Congestion Control

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Congestion control in data link layer **occurs when a node or link carries data beyond its limit**. This often leads to the queuing of packets—and in the worst case, loss of packets—as well as a decrease in the network's Quality of Service (QoS).

Two Categories of Links

- **We can have the following two types of links:**
  - ✓ **Point-to-point link or a**
  - ✓ **Broadcast link**

Point-to-point mode of communication

Point to point communication mode is the communication over a link between a single transmitter and a receiver.

Broadcast mode of communication

In broadcast mode large number of receivers are linked to a single transmitter.

Two Sublayers of Data-Link Layer

- **We can divide the data-link layer into two sublayers:**
  - **Data Link Control (DLC) Point-to-point link**
  - ✓ **Media Access Control (MAC) Broadcast link**