ECE-357 Lecture 1.1

Ch 1 : Introduction

Why Computer Networks?

- Sharing of expensive resources
- Sharing of information
- Distributing music, movies (entertainment medium)
- Facilitate creation of remote backups

Components of a Computer Network

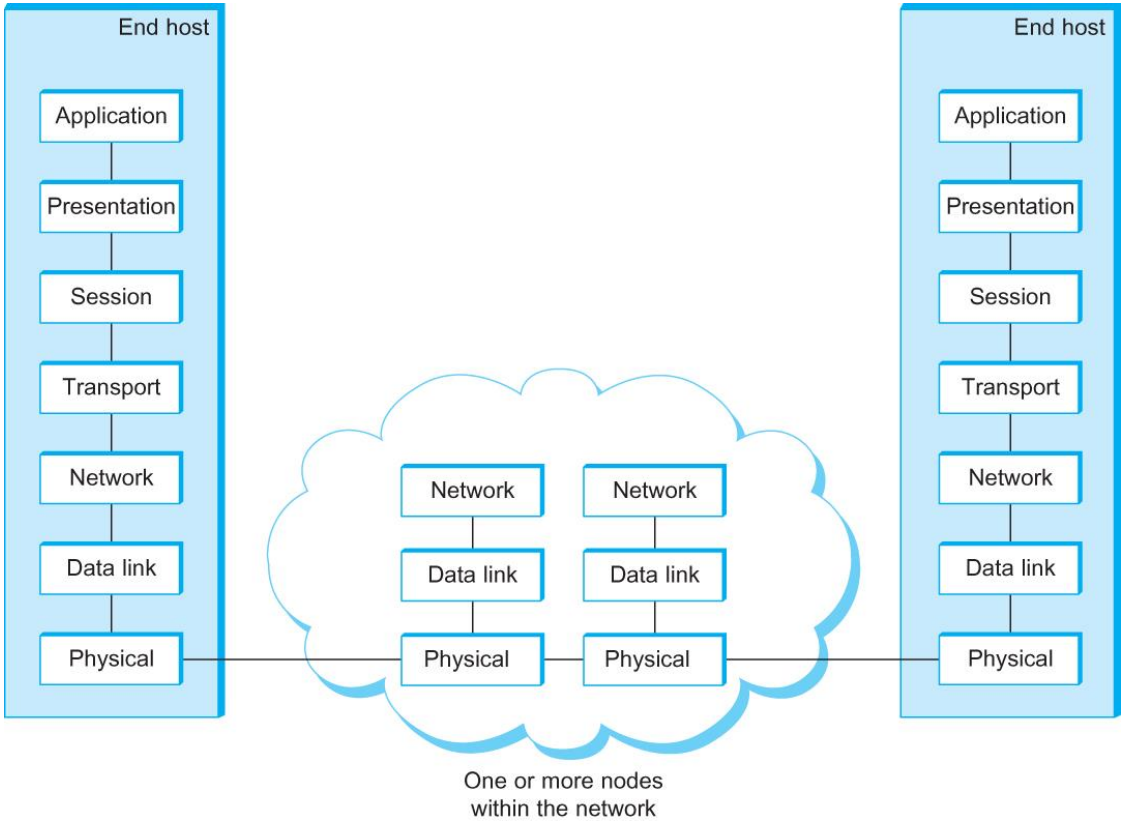
- Clients (User systems)
- Servers (Repository of information)
- Data Links (Physical medium)
- Routers (Connect data links)
- Clients and Servers together may be called ‘End Systems’ or ‘Hosts’; they are found at the periphery of a network

Network Layers

- ISO Model (7 layers)

  - Application layer
  - Presentation layer
  - Session layer
  - Transport layer
  - Network Layer
  - Data link layer
  - Physical layer

OSI Architecture



The OSI 7-layer Model

OSI – Open Systems Interconnection

Functions of Different Layers

- Application Layer – Runs the application like email, banking, airline reservations etc
- Presentation Layer – Performs data compression, data encryption, format conversion
- Session Layer – Performs authentication and authorization of users, maintains session integrity in case of interruption
- Transport Layer- Ensures all data is transported across the network by retransmission if necessary
- Network Layer – Finds the best path thru the network
- Link Layer – Performs error checking and error detection on each link
- Physical Layer – Responsible for physical transfer of bits and clocking

Internet Layer Model

Internet Protocol Stack (5 layers)
(Top 3 layers have been combined into application layer)

- Application Layer
- Transport Layer (TCP or UDP)
- Network Layer (IP)
- Data Link Layer (LAN)
- Physical Layer
- In this model, the application layer is permitted to bypass transport and network layers if necessary

Network Layers Implementation

- The top 2 layers (top 4 layers in ISO) are implemented in S/W
- The bottom 2 layers are implemented in H/W
- The network layer is implemented partly in H/W and partly in S/W
- The 2 end points run all 5 layers
- The routers in the network run only the bottom 3 layers (see slide 5)

Terminology

- Application Layer generates “Message”
- Transport Layer generates “Segment(s)” by appending TCP/UDP header
- Network Layer generates “Datagram(s)” by appending IP header
- Link Layer generates “Frame(s)” by appending link header and link trailer which performs error checking

What is there in the Headers?

- TCP/UDP header contains source and destination port numbers. The TCP header also contains SEQ and ACK numbers
- IP header contains source and destination IP addresses
- Frame contains source and destination MAC addresses as well as error checking information