Final Assessment - Fall - 2023

Course Title : Data Communication

Course Code : CSE 435

Name : Md Rakib Hasan

ID : 2216080021

Ans. to the Q. No - 01

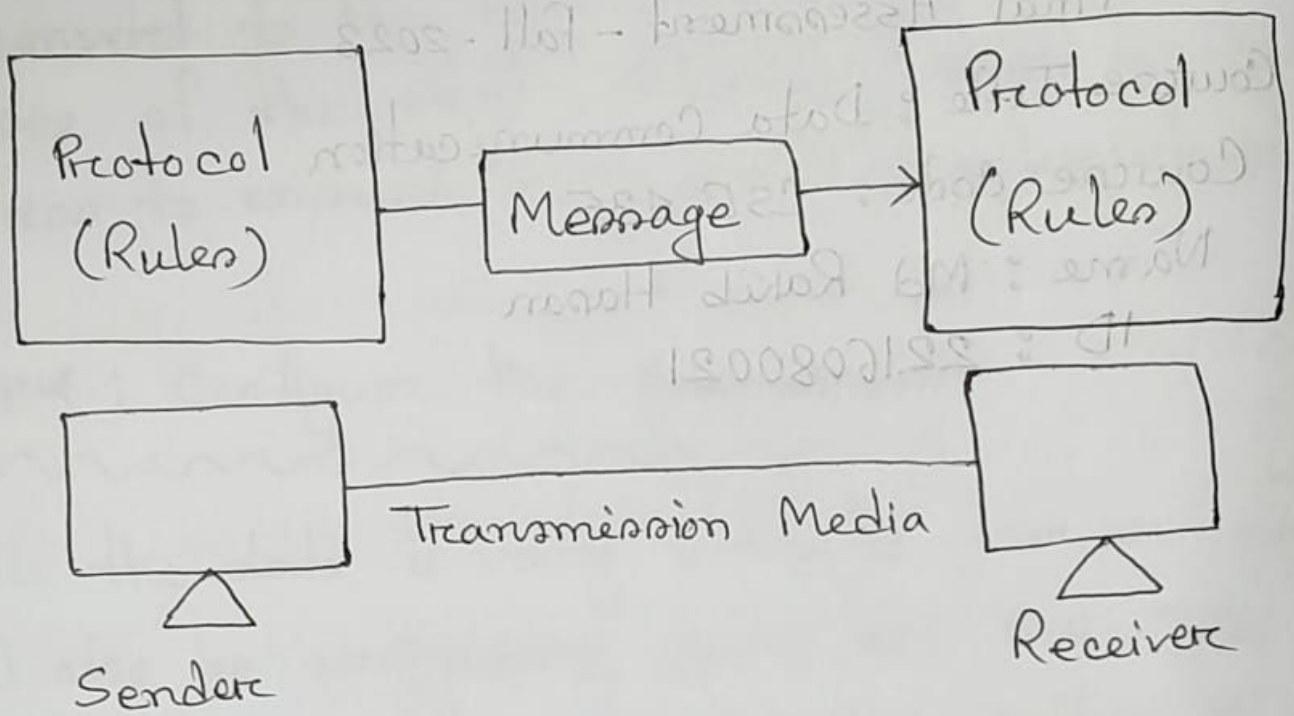
(a) Protocols:-

In order to make communication successful between devices, some rules and procedures should be agreed upon at the sending and receiving ends of the system.

Such rules and procedures should be agreed upon at the sending and receiving ends of the system.

Such rules and procedures are called as Protocols.

Different types of protocols are used for different types of communication.



In above diagram protocols are shown as set of rules. Such that communication between Sender and Receiver is not possible without protocol.

Key elements of a Protocol :-

→ Syntax
→ Semantics
→ Timing

A protocol is a set of rules that mainly govern data communications. The protocol mainly defines what is communicated, how it is communicated, and when it is communicated.

Standards :-

Standards are the set of rules for data communication that are needed for exchange of information among devices. It is important to follow standards which are created by various Standared Organization like IEEE, ISO, ANSI etc.

Types of standards :
→ De Factore Standard
→ De Jure Standard

De factor Standard :-

The meaning of the work "De Factore" is "By fact" or "By Convention". These are the standards that have not been approved by any Organization, but have been adopted as standards because of its widespread use. Also, sometimes these standards are often established by Manufacturers.

De Jure Standard :-

The meaning of the word "De Jure" is "By Law" or "By Regulations". Thus, these are the standards that have been approved by officially recognized body like ANSI, ISO, IEEE etc.

(b) Application of Co-axial cable :-

Domestic Radio and Television :

→ Domestic televisions and some VHF FM or digital radio solutions sometimes have external antennas. These antennas need to be connected to the TVs or radios via a coaxial cable/feede

Commercial Radio communications :

→ Coax feeder is used within commercial radio communications systems. Like all other RF feeders used in professional applications, a standard of 50Ω has been adopted for the characteristic impandance.

Broadcasting :-

→ It is necessary to transfer the transmitter to the antenna.

Satellite Antennas :

→ It is not unusual to see sets of satellite antennas used for sending information up to satellites. apart from the direct broadcast satelites.

→ These satelite antennas need to be fed and on of the ways that are often used is a coaxial feede

→ It's applications include feedlines connecting radio transmetters and receivers to their antennas, computer network connections, digital audio, and distribution of cable television signals.

Disadvantage of Fiber Optic Cable :-

Fragility :-

As they are made of glass, fibere optic cables are more fragile than electrical wires like copper cabling. If you bend them too much, they will break.

Splicing Difficulties :-

When deploying a new fibere optic network or expanding an existing one, the fibres need to be properly sliced in order to avoid network disruptions.

Installation and Construction Risk :-

Due to how small and compact the fibre optic cable is, It is highly susceptible to becoming cut or damaged during installation or any construction activities.

Cost :-

Even though the cost of a fiber-optic cabling installation has dropped dramatically over the last couple of years, it is still a much higher outlay than when installing a structured networcking system using coppere cables.

(c)

Difference between Guided and Ungaided Media :-

Guided Media	Unguided Media
1. In guided Media, the signal energy communicates via wires.	2. In unguided Media, the signal energy communicates through the air,
2. Guided Media is generally preffered when we ant to execute direct communication.	2. Ungaided media is generally preffered for radio broadcasting in all directions.

Guided Media	Unguided Media
3. The guided media formed the diffrent network topologies.	3. The unguided media formed the continuous network topologies.
4. Here, the signals are in the state of currcent and voltage.	4. Here, the signals are in the state of electromagnetic wavers.
5. In the case of guided media, the transmission capacity can be boosted by counting more wirces.	5. In the case of unguided media, it is not feasible to acquire morce capacity.
6. Open wire, Twisted Pair, Coaxial Cable, and Optical Fibre are the different Kinds of guided media.	6. Microwave Transmission, Radio Transmission, and Infracred Transmission are the typers of unguided media.

Ans. to the Q. No–02

(a) Internetworks :-

A network of networks, which consists of two or more physical networks, is called Internetwork. Unlike a wan WAN, an internetwork may reside in only a single location.

Because it includes too many computers or spans too much distance, an internetwork cannot fit within the scope of a single LAN.

Internetwork is a complex network created when two or more independent networks are connected using routers.

Internetworking is combined of 2 words, inter and networking which is implies an association between totally different nodes or segments.

There is chiefly 3 units of Internetworking:

1. Extranet
2. Intranet
3. Internet

(b) Wireless WANs and LANs :-

A WAN is a network covering any large geographic area. WANs can be as large as a state, a country, or the world. The internet itself is a type of WAN, because it covers the entire globe. Although a network connecting LANs in the same city, like a group of offices belonging to the same company, are usually called metropolitan area networks.

A LAN is a network limited to a small area, like a home or office, and is usually confined to a single building. The LAN can consists of computers smartphones, Tvs and tablets. A wireless LAN is usually limited to the radius of a wireless access point which can be a couple of hundred feet. However, this distance can be extended by linking additional wireless access points to the network. A Wi-fi routers is an example of a wireless access point.

A LAN, or Local Area Network, is a small network, often within a home or business or perhaps within a largere environment like a corporate office park or a college campus.

Devices on a LAN often use the LAN's infrastructure to connect to the public internet but they can often communicated with each other directly through the LAN more quickly. For instance, its not usually necessary to send a file to the public internet in order to get it to a printer on the same LAN.

A LAN can use wireless communication, wired connections or both. A wide area network usually traverses multiple geographical areas.

The internet is the most prominent example of the WAN network type, though other wide area networks exist for scientific purposes, military and government work and to connect far flung offices and data centers within some big corporations.

Ans. to the Q. No – 03

(a) Implicit congestion signaling :-

→ In implicit signaling, there is no communication between the congested node or nodes and the source.

→ The source guesses that there is congestion somewhere in the network when it does not receive any acknowledgment. ~~There is no co~~

Therefore the delay in receiving an acknowledgment is interpreted as congestion in the network.

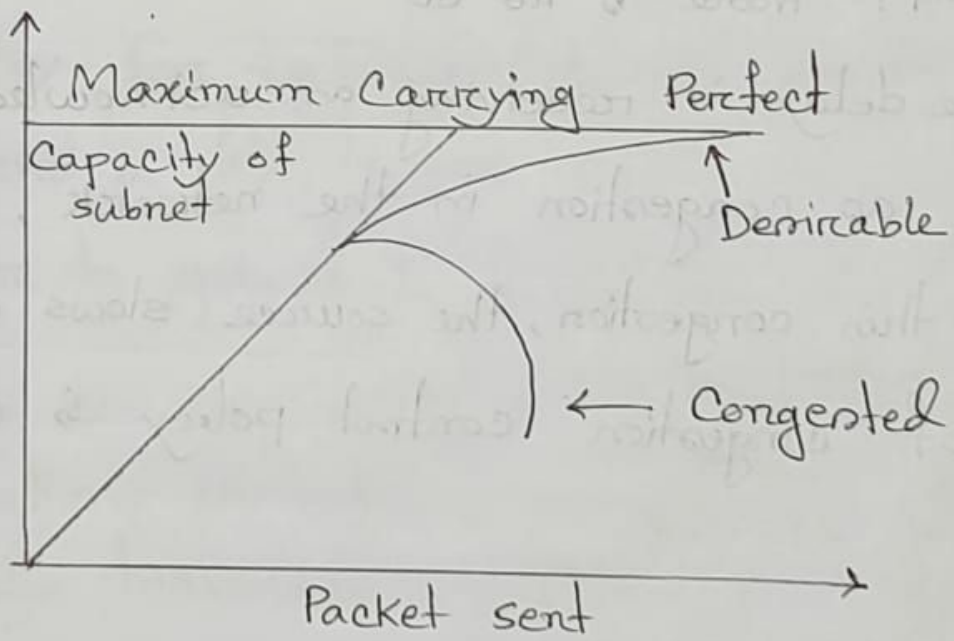
→ On sensing this congestion, the source slows down.

→ This type of congestion control policy is used by TCP.

Congestion is an important issue that can arise in packet switched network. Congestion is a situation in Communication Networks in which too many packets are present in a part of the subnet, performance degrades. Congestion is a network

may occur when the load on the network is greater than the capacity of the network. Network congestion occurs in case of traffic overloading.

In other words when too much traffic is offered, congestion sets in and performance degrades sharply.



Concept of congestion

Implicit Congestion Signaling involves detecting congestion based on observed changes in network performance rather than explicit signals.

It might involve monitoring packet loss or delays.

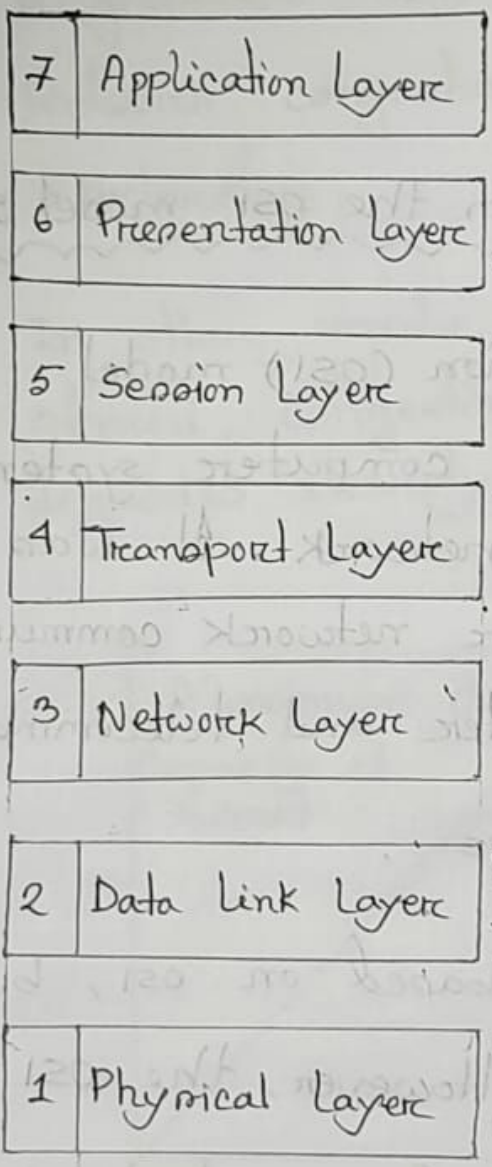
(b)

OSI model and whole layers in the OSI model :-

The open system interconnection (OSI) model describes seven layers that computer systems use to communicate over a network. It was the first standard model for network communications adopted by all major computer and telecommunication companies in the early 1980s.

The modern Internet is not based on OSI, but on the simpler TCP/IP model. However, the OSI 7-layer model is still widely used, as it helps visualize and communicate how networks operate, and helps isolate and troubleshoot networking problems.

OSI Model Explained: The OSI 7 Layers



Layer 7 – Application :-

The application layer is the OSI Model is the layer that is the 'closest to the end user". It receives information directly from users and displays incoming data to the users.

Oddly enough, applications themselves do not reside at the application layer. Instead the layer facilities communication through lower layers in order to establish connections with applications at the other end. Web browsers TelNet, and FTP, are examples of communications that rely on Layer 7.

Layer 6 – Presentation :-

The presentation layer represents the area that is independent of data representation at the application layer. In general, it represents the preparation or translation of application format to network format, or from network formatting to application format. In other words, the layer "presents" data for the application or the network. A good example of this encryption and decryption of data for secure transmission; this happens at Layer 6!

Layer - 5 - Session :-

When two computers or other networked devices need to speak with one another, a session needs to be created, and this is done at the session layer. Functions at this layer involve setup, coordination and termination between the applications at each end of the session.

Layer 4 - Transport :-

The transport layer deals with the coordination of the data transfer between end systems and hosts. How much data to send, at what rate, where it goes, etc. The best known example of the Transport Layer is the Transmission Control Protocol (TCP), which is build on top of the internet protocol (IP), commonly known as TCP/IP. TCP and UDP port numbers work at layer 4, while IP address work at layer 3, the network layer.

Layer 3 - Network :-

Here at the Network Layer is where you'll find most of the routers functionality that most networking proffessional care about and love. In its most basic sense, this layer is responsible for packet forwarding, including routing through different routers.

Layer 2 - Data link :-

The data link layer provides node-to node data transfer, and also handles error correction from the physical layer. Two sublayers exists here as well - the Media Access Control (MAC) layer and the logical link Control (LLC) layer.

In the networking world, most switches operate at layer 2. But it's not that simple. Some switchs also operate at layer 3 in order to support virtual LANs that may span more than one switch subnet, which requires routing capabilities.

(18)

Layer 1 - Physical :-

At the bottom of our OSI model we have the the physical Layer, which represents the electrical and physical representation of the system, This can include everything from the cable type, radio frequency link, as well as the layout of pins, voltages, and other physical requirements.

(c) Comparison between analog and digial Signal:

Analog Signal	Digital Signal
A signal for conveying information which is a continuous function of time is known as analog signal.	A signal which is a discrete function of time, i.e. non-continuous signal, is knows as digital signal.

Analog Signal	Digital Signal
An analog signal is typically represented by a sine wave function. There are many more representations for the analog signals also.	The typical representation of a signal is given by a square wave function.
Analog signals use a continuous range of values to represent the data and information.	Digital signals use discrete values, i.e, discrete 0 and 1, to represent the data and information.
The bandwidth of an analog signal is low.	The bandwidth of a digital signal is relatively high.
Analog signal get affected by the electronic noise easily.	The digital signals are more stable and less susceptible to noise than the analog signals.
Due to more susceptibility to the noise, the accuracy of analog signals is less.	The digital signals have high accuracy because they are immune from the noise.

Analog Signal	Digital Signal
Analog signals use more power for data transmission.	Digital signals use less power than analog signals for conveying the same amount of information.
The analog signals give observational errors.	The digital signals do not given observational errors.
The common examples of analog signals are temperature, current, voltage, voice, pressure, speed, etc.	The common example of digital signal is the data store in a computer memory.
Continuous rang of values	Discontinuous values
Records sound waves as they are.	Converts into a binary waveform
Only used in analog devices.	Suited for digital electronics like computer, mobiles and more.