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# Imperial College of Engineering

Boikali, Khulna

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Code: 385

Assignment-1.

Submitted by,

Name: Tenesa Jency Bala

Department: Computer Science and Engineering

ID: 1938520113

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Course Title: Computer Networks

Topic: Mid term question Solution.

Submitted to,

Shamim

Lecturer, ICE.

1.

(a) Define computer networks. Write down its Characteristics.

3.

Answer: A group of computer system and other computing hardware devices that are linked together through communication channels to facilitate communication and resource-sharing among a wide range of users.

The most common resource sharing connection system is Internet.

Characteristics of a Computer Network :

1. Share resources from one computer to another.

2. Create files and store them in one computer, access those files from the other computer(s) connected over the network.

3. Connect a printer, scanner, or a fax machine to one computer within the network and let

other computers of the network use the machines available over the network. So, these are the characteristics of computer.

(b) Describe some of the key issues that occurs in the computer network layers.

Answer: A number of design issues exist for the layer approach of computer networks. Some of these issues are -

1. Reliability: Network channels and components may be unreliable, resulting loss of bits while data transfer. So, an important design issue is to make sure that the information transferred is not distorted.

2. Scalability: Network is continuously expanding which may lead to congestion; So, design should be done so that networks are 'scalable' and can accommodate addition and alteration of with new technology.

3. Security: A major factor of data communication is to defend against eavesdropping



and alteration of messages. So, there should be adequate mechanism to prevent unauthorized access to data through process like authentication and cryptography.

Addressing:- At a particular time, innumerable messages are being transferred between large numbers of computers. So, a naming or addressing system should exist so that each layer can identify the sender and receivers of each message.

Flow Control: If the rate at which data is produced by the sender is higher than the rate at which data is received by the receiver, there are chances of overflowing the receiver. So, a proper flow control mechanism needed to be implemented.

So, some of the design issues are described here.

© Define Protocols. Mention the differences between -

- i. Connectionless and Connection-Oriented Communication.
- ii. Broadcasting and Multicasting.

Answer: Protocols: A protocol is an agreement between the communicating peers on how communication is to proceed. These are rules that dictate how to format, transmit and receive data so computer network devices i from servers and routers to endpoints - can communicate regardless of the difference in their underlying infrastructures, design and standards.

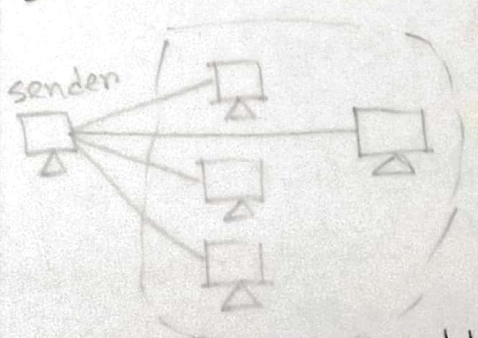
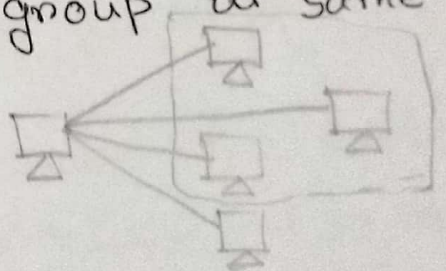
i. Connectionless Vs Connection-oriented

Connection-less	No	Connection-Oriented
Connectionless Services are similar to Postal System	1 Analogy	Connection-oriented services are similar to Telephone System
Used in volatile networks	2. Usage	Used in long and steady communication networks.



Connection-less Service	No.	Connection-Oriented
Congestion is possible	3. Congestion	No congestion
No guarantee of reliability	4. Reliability	Are highly reliable
Data packets can follow any routes in the network.	5. Packet Routing	Packets follow the same dedicated Route.

## (ii) Broadcasting and Multicasting.

Broadcasting	No	Multicasting
A method to transfer a message to all recipients at the same time.	1.	A method to transfer a message to some selected recipient group at same time
 <p>Message received by all in network.</p> <p>More traffic</p> <p>Slower</p> <p>Requires more bandwidth</p>	2.	 <p>Message received by selective individual devices.</p>
	3.	Less traffic
	4	Faster
	5.	Requires less bandwidth



2.(a) Describe the architecture of an ATM network and ATM layers. (4)

Answer: Asynchronous Transfer Mode is a switching technique that uses time division multiplexing (TDM) for data communications.

Architecture of an ATM network:

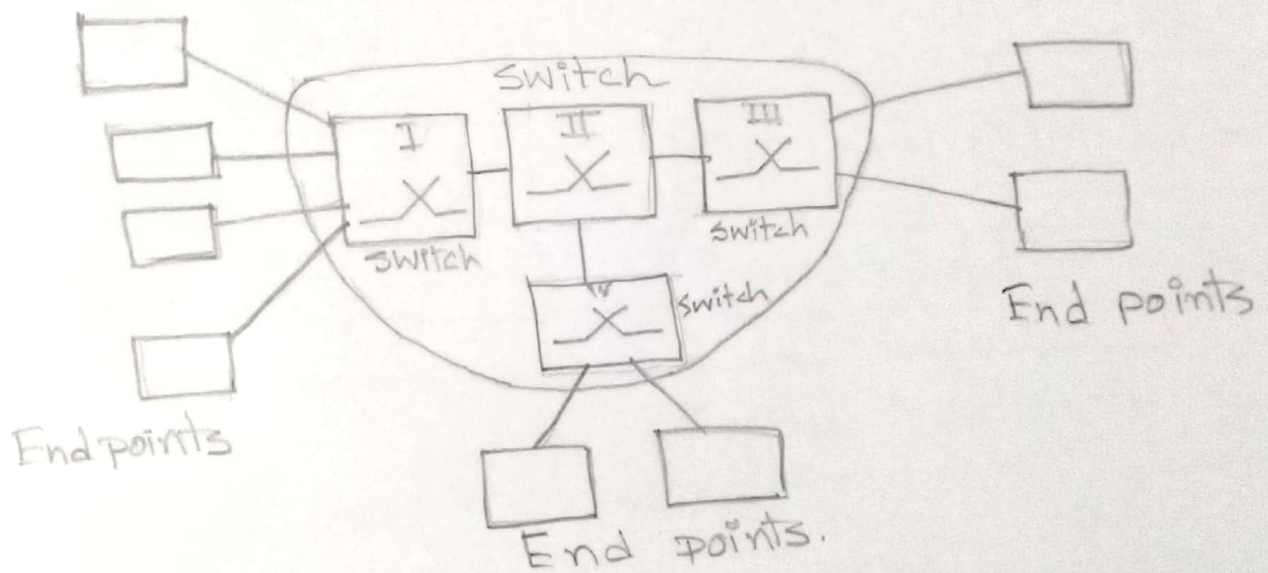


Figure: Architecture of ATM

The user access devices, called the end points are connected to the switches inside the network. The switches are connected to each other using high-speed communication channels.

The connection between end points are done using transmission path, virtual path and virtual



circuits. Transmission path is physical connection between end points and a switch or between two switches. Virtual path provides a connection or a set of connection between two switches. ~~the~~

ATM Layers: ATM standard defines three layers.

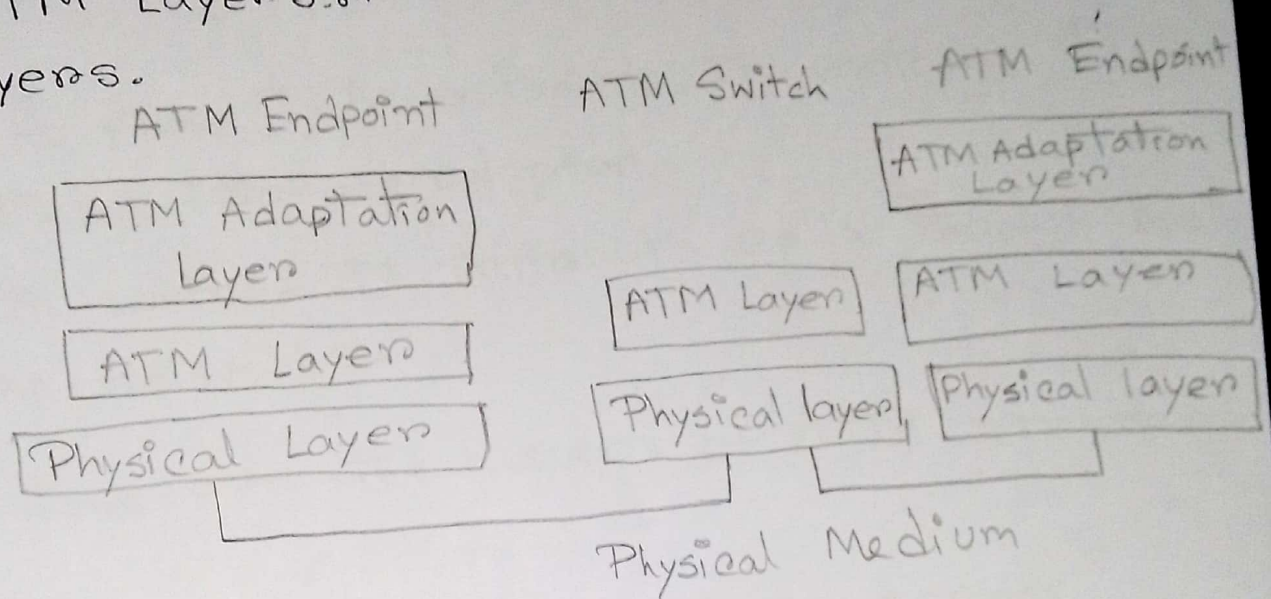


Figure: ATM layers.

Physical layer: Corresponds to physical layer of OSI Model. The cells are converted into bit streams and transmitted over physical medium.

ATM Layer: Similar to data link layer of OSI model. It accepts 48 byte data from upper layer & add a 5 byte header to each segment and convert to 53 byte cells. Responsible for routing of each cell traffic management, multiplexing and switching.



ATM Adaptation layer: Corresponds to Network layer of OSI model. Facilitate to existing packet switching network to connect to ATM network and use its services. It accepts data and convert them into fixed sized segments.

\* So, these ATM endpoints: It contains ATM network interface adapter.

ATM switch: It transmits cells through the ATM networks.

So, these are the layers of ATM standard

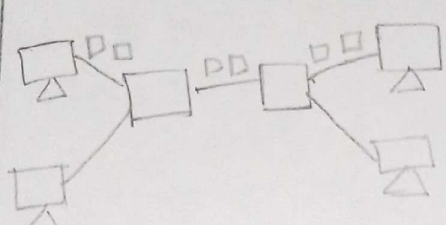
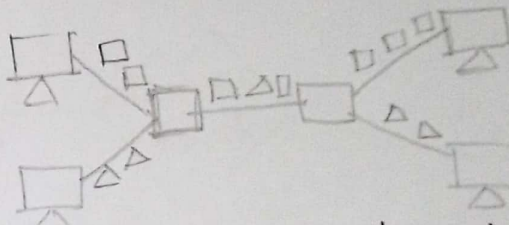
(b) Why do we need multiple access protocols? Differentiate between circuit switching and packet switching. (3)

Answer: If there is a dedicated link between the sender and the receiver then data link control layer is sufficient, however if there is no dedicated link present then multiple stations can access the



channel simultaneously. As a result there is possibility of high level collision. In order to decrease this rate of collision we need to use Multiple access protocol.

~~and~~ Difference between Circuit switching and packet switching.

Circuit Switching	No	Packet Switching.
Has dedicated path for data transmission	1.	No dedicated path for transmission.
 <p>Two end devices connect &amp; only they use the path. Full data is send.</p> <p>Expensive</p> <p>No congestion</p> <p>Fixed bandwidth</p> <p>Has no overhead bits.</p>	2.	
	3.	All devices in network can transmit data in packets.
	4.	Not so expensive.
	5.	Will cause congestion in network.
	6.	Dynamic bandwidth.
	7.	Has overhead bits in each packet which has destination info. and other such info.



© Describe CSMA/CD flow diagram. (3)

Answer: The flow diagram of CSMA/CD protocol:

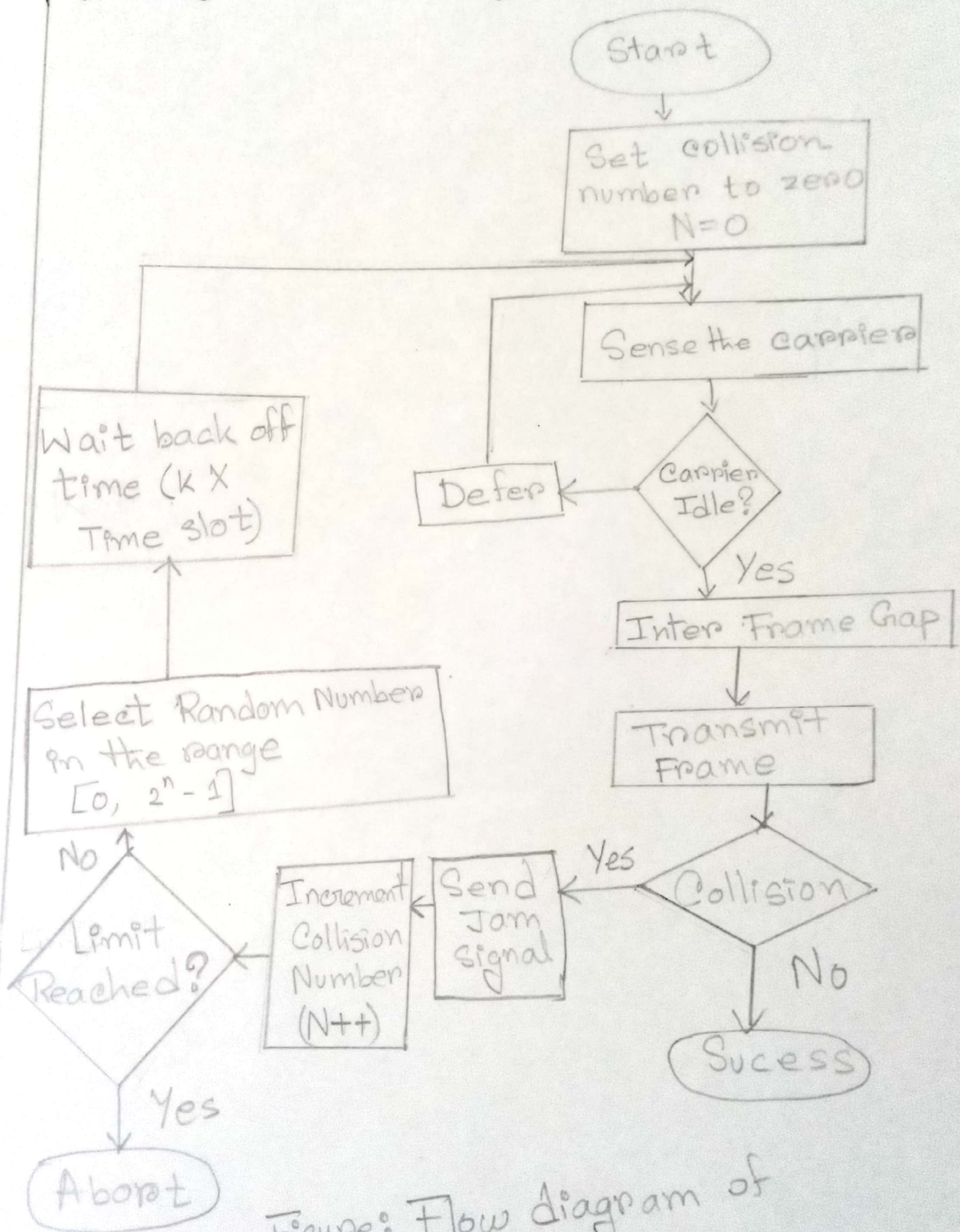


Figure: Flow diagram of CSMA/CD