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**Course Title : Introduction to Telecommunication System**

**Assignment No : CT - 1**

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1. (a) What is telecommunication? What is needed for switching Exchanges? 5

(b) What is switching system? Describe the classification of switching system. 6

(c) What is telecommunication networks? Define Communication links? 3

2. (a) Define Switching Matrix. What are the types of a telecommunication network. 6

(b) Define blocking network. What are the elements of switching system? 4

(c) What are the forms of signaling? 4

3. (a) Describe the advantages of Automatic switching system. 4

(b) What does a rotary dial phone use for implementing pulse dialing? Describe the disadvantages of implementing Multi-Exchange in switching. 6

1. (c) Why Common Control Subsystem is better than Multi-Exchange network? 4

2. (a) Describes the features of Crossbar switches? 4

(b) Draw the block diagram of the common control switching system. 5

(c) Define charging. Describe the call processing. 5

3. (a) What are the reasons for separating the band of two frequencies? 4

(b) What are the disadvantages of Non-blocking crossbar switch? What are the challenges for the Crosspoint Technology? 6

(c) Describe the states of a process. 4

4. (a) Define PCB. Describe the significance of PCB. 5

(b) Define Multi-stage Network. Describe the limitations of crossbar switching. 5

(c) Describe the advantages and disadvantages of Multi-stage Network. 4



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Ques. 2. (a) How many types of switching techniques

are available for digital traffic? Discuss the drawbacks of circuit switching. 6

(b) Discuss three types of switching for digital traffic. 6

(c) what are the drawbacks of message switching? 4

8. (a) Define System, Subsystem, Layer. 3

(b) Which functions the node processor perform? 5

(c) what are the advantages of LANs? 6

Ans. to the Q. NO 1(a)

(a) What is telecommunication? What is needed for switching Exchanges?

Ans: Telecommunication means the exchange of information between two distant places.

Telecommunication represent the transfer of information from one entity at one place to another entity at another place, whereas the information can be in the form of data, voice or symbol. The entities can be human beings, computers, facsimile machines, telegraphy machines, phones or so on.

Need for Switching Exchanges:

The point-to-point connection for establishing communication requires the telephone sets to be linked using wires. If the number of telephone sets are

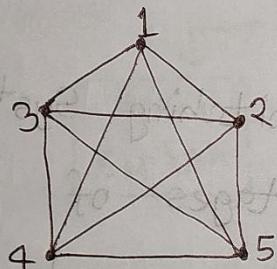


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(d) If the no. of entities is low in numbers, the subscribers presentation is slow in numbers, the type of connection will be a little complex. However if this number is high or moderate, then it will lead to a mess. To understand the complication, let us consider a network of 5 subscribers. The following illustration shows a point-to-point connection for five subscribers (telephone sets).



In the point-to-point connection, for  $n$  entities, we need  $n(n-1)/2$  links. All these links form a network. Networks with point-to-point links among all the entities are known as Fully Connected Networks. The number of links required in a fully connected network becomes very large even for moderate values of  $n$ .

(b) What is switching System? Describe the classification of its switching system.

Ans: A switching system can be understood as a collection of switching elements arranged and controlled in such a way as to set up a common path between any two distant points. The introduction of switching systems reduced the complexity of wiring and made the telephony hassle free.

### Classification of Switching System:

In the early stages of telecommunication systems, the process and stages of switch played an important role to make or break connections. At the initial stages, the switching systems were operated manually. These systems were later automated. The following flowchart shows how the switching systems were classified:

switching purposes.

Electromechanical Switching Systems are further classified into the following:

Step-by-step: The step-by-step switching system is called the strowger switching system after its inventor A B strowger. The control functions in a strowger system are performed by circuits associated with the switching elements in the system.

Crossbar: The crossbar switching systems have hard-wired control subsystems which use relays and latches. These subsystems have unlimited capability and it is virtually impossible to modify them to provide additional functionalities.

Ans. to the Q.No 1(c)

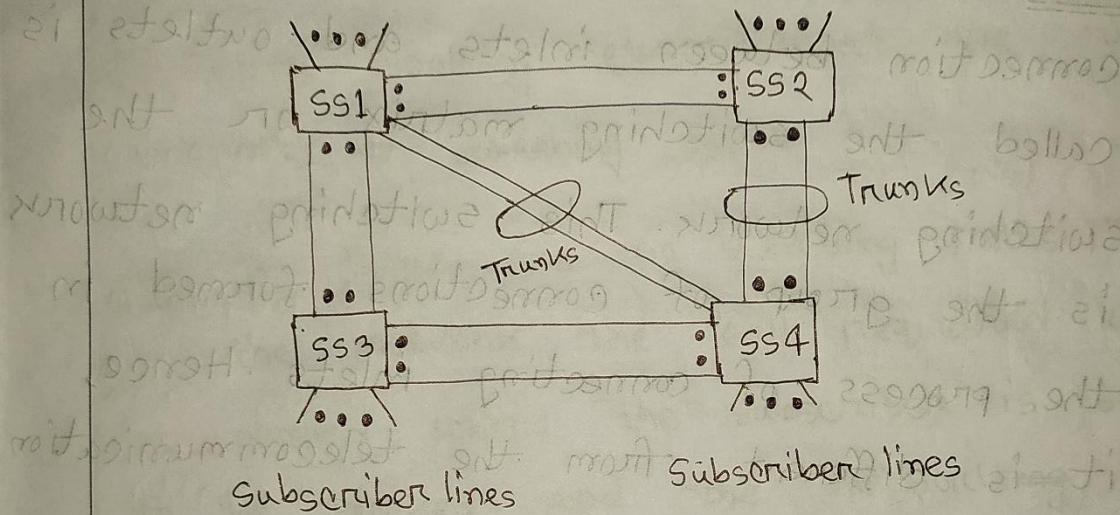
(c) What is telecommunication networks? Define

Communication links.

Ans: A telecommunication network is a group of system that establishes a connection between two distant locations. The switching systems are part of

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a telecommunication network. The following figure shows a telecommunication network.



Communication Links: A telephone switching network is made tip of switching systems trunks. Subscriber lines and telephone instruments. Trunks and subscriber lines are essentially communication links which carry information signals from one point to another. There are basically only two forms of communication links electrical and optical. In the former information conveyed by means of electrical energy and in the latter by means of light energy.

Ans. to the Q.No 2(a)

(2)(a) Define switching matrix. What are the types of a telecommunication network?

Ans: The hardware used to establish connection between inlets and outlets is called the switching matrix or the switching network. This switching network is the group of connections formed in the process of connecting inlets. Hence, it is different from the telecommunication network.

Types of connection: There are four types of connections that can be established in a telecommunication network. The connections are as follows:

1. Local call connection between two subscribers in the system.

2. Outgoing call connection between a subscriber and outgoing trunk.

3. Incoming call connection between an incoming trunk and a local subscriber.

4. Transit call connection between an incoming trunk and outgoing trunk.

Ans. to the Q. No 2(b)

(b) Define blocking network. What are the elements of switching system?

Ans. If there are no switching paths free in the network, the call requested will be denied, where the subscriber is said to be blocked and the networking is called the blocking Network.

Elements of a Switching System:

Though there are different kinds of switching systems from manual to automatic, a few basic elements play an essential role for the functioning of a switching system.

Along with the switching network, there

different sub systems such as control

system, signalling system, trunk and subscriber

line interfaces, distributor units, operator console, juncture circuits, essential for the operation of the whole switching system

Ans. to the Q.No 2(c)

(c) What are the forms of signaling?  
Describe the types of switching system.

Ans: The signaling formats and requirements for the subscribers, the trunks and the sub systems differ significantly.

Accordingly, a switching system provides for three different forms of signaling:-

- i. Subscriber loop signaling.
- ii. Interexchange signaling.
- iii. Intraexchange or register signaling.

The switching systems can be of following two types:

(i) Direct control switching System: The switching systems where the control subsystems form an integral part of the network

are called in the Direct Control Switching systems.

For example, the stronger switching system.

To see the book from slides refer (iii)

(ii) Indirect Control Switching System: The switching system in which the control sub system is present outside the switching network is called the Indirect Control Switching system or the Common Control Switching system. The examples of this system include Crossbar switching system, Electronic switching system.

Ans. to the Q. No 3(a)

Q. (a) Describe the advantages of Automatic Switching System.

Ans: Overcoming the disadvantages of Manual Switching Systems, the Automatic Switching systems come with the following advantages

(i) Language barrier will not affect

request for connection



(ii) Higher degree of privacy is maintained.

(iii) Faster establishment and release of calls is done.

(iv) Number of calls made in a given period can be increased.

(v) Calls can be made irrespective of the load on the system or the time of the day.

Ans. to the Q.No 3(b)

(a) CHS off of soft switching network to implement pulse dialing? Describe the disadvantages of implementing Multi-Exchange network in switching.

Ans: A rotary dial phone uses the following for implementing pulse dialing:

- (i) Finger plate and spring.
- (ii) Shaft, gear and pinion wheel.
- (iii) Pawl and ratchet mechanism.

Ans. to the Q. No 3(c)

(c) Why common control subsystem is better than Multi-Exchange network?

Ans: In order to avoid the complication and to make it easier for a subscriber to place a call, two main ideas were implemented by the common control subsystem. The ideas are listed below:

(i) The routing of the call should be done by the exchange, but not by the numbers dialed.

(ii) A Unique Identification Number should be allotted to the subscriber. The UIN contains the number of the exchange of the subscriber and the number indicating the line of the subscriber.

The above ideas helped solve the associated with the placement of calls. These two solve the problem and make

the work simple. Whenever the calling subscriber calls from a particular network, the call is directed to the particular called subscriber, in a particular network. The routing of this call is taken care by the exchange itself. Hence, the uniform numbering scheme identifies them subscriber based on the aspects.

Ans. to the Q. No 4(a)

4 (a) Describe the features of the crossbar switches.

Ans: The features are described below:-

(i) While processing a call, the common control system helps in the sharing of resources.

(ii) The specific route functions of a call processing are hardwired because of the wire logic computers.

(iii) The flexible system design helps in the appropriate ratio selection is

allowed for a specific switch.

(iv) Fewer moving parts ease the maintenance of crossbar switching systems.

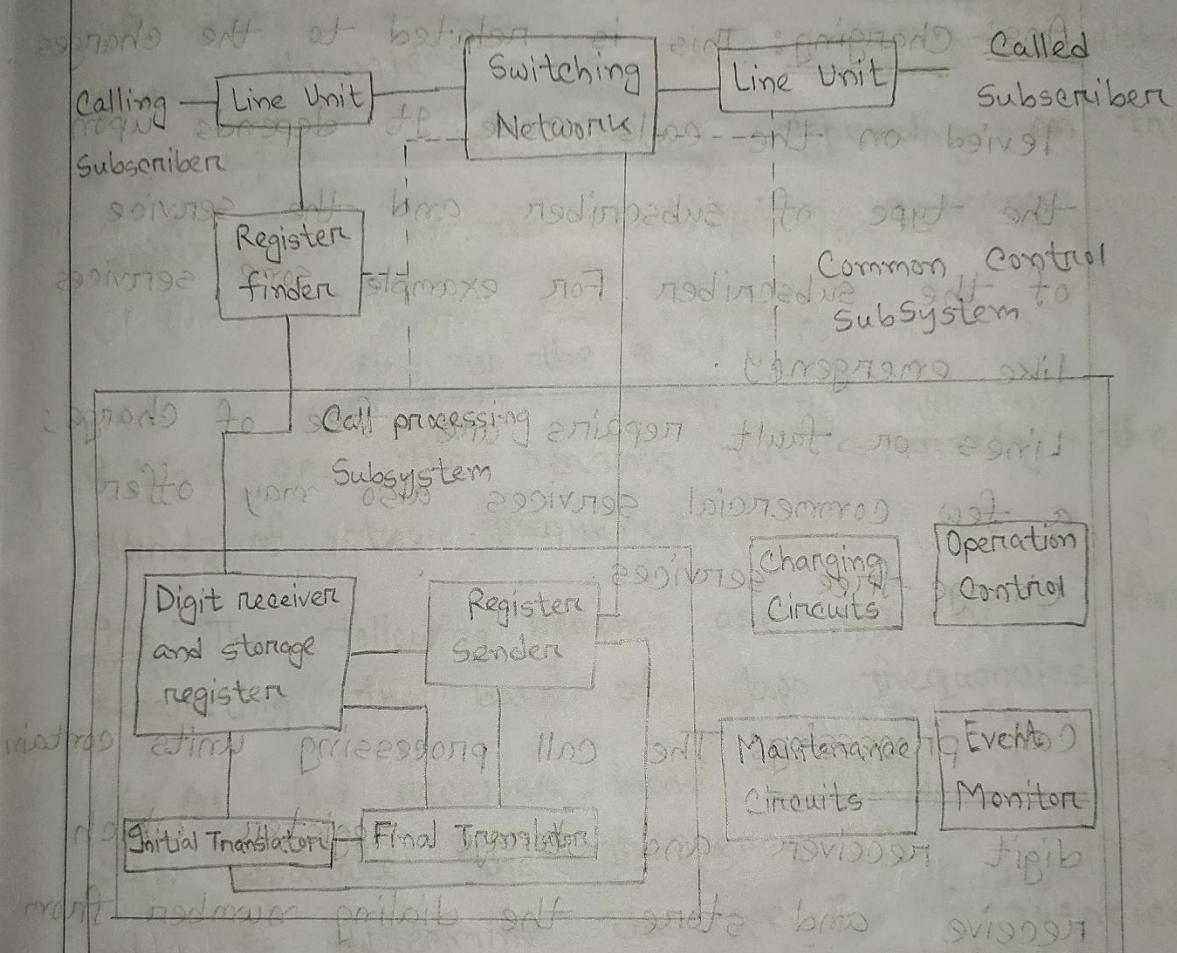
The crossbar arrangement switching system uses the common control networks which enable the switching network to perform event monitoring, call processing, charging, operation and maintenance. This method helps to avoid the disadvantages associated with the step by step switching method through its unique process of receiving and storing the complete number to establish a call connection.

#### Ans. to the Q.No 4(b)

b) Draw the block diagram of common control switching system.

Ans: The following figure shows the diagram of the common control subsystem, which contains Call processing Sub system, Charging

# Circuits, Operation Control, Maintenance Control and Event Monitor



Ans. to the Q. No 4 (c)

c) Define charging. Describe the call processing.

Ans:- Charging: This is related to the charges levied on the calls made. It depends upon the type of subscriber and the service of the subscriber. For example, some services like emergency.

Lines or fault repairs are free of charge; a few commercial services also may offer charge-free services.

Call processing: The call processing units contain digit receiver and storage register, which receive and store the dialing number from the calling party. The units also contain the initial and final translators. The initial translator is the Office Code translator that determines the route for the call through the network or charging method or rate. The final translator is the Subscriber Code.

translator which determines the line unit to which a call must be connected and category of the called line. The Register Sender transfers the route digit and dialed digit using proper signaling, depending on the requirements of the destination exchange.

Ans. to the Q. NO 5 (a)

Q. What are the reasons for separating the band frequencies?

Ans: The following reasons are considered for separating the bands of two frequencies:

(i) At the receiver, band filtering is used to separate the frequency groups; this helps to determine the specific frequencies in a simple way.

(ii) Easy amplitude regulation of each frequency component separately.

(iii) Limiters can be used to guard the action of each frequency separately.

(iv) The probability of false response is reduced.

The attenuation and delay characteristics of the telephone network circuits determine the choice of frequencies.

Ans. to the Q. No 5(b)

(b) What are the disadvantages of Non-blocking

Crossbar switch? What are the challenges for the Cross point Technology?

Ans: The disadvantages of Non-blocking Crossbar

Switch are:

(i) Large number of switching elements

are required.

(ii) This is difficult to implement in

practice.

(iii) This is neither a cost-effective process.

In order to overcome these disadvantages

the blocking Crossbar switching was

introduced.



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The challenges for the Crosspoint Technology are:-

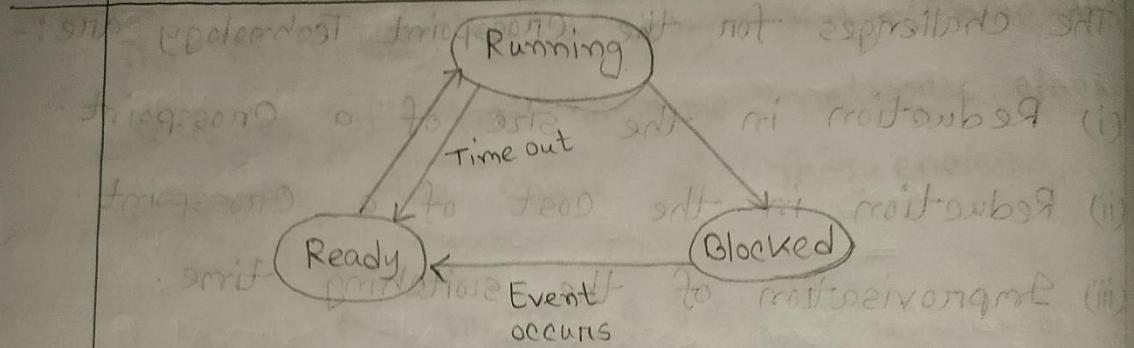
- (i) Reduction in the size of a Crosspoint.
- (ii) Reduction in the cost of a Crosspoint.
- (iii) Improvisation of the switching time.

Ans. to the Q.No 5(c)

Q. Describe the states of a process.

Ans: A Process in a multi programming environment may be one of the following:

- (i) Running : A process is said to be running, if an instruction is currently being executed by the processor.
- (ii) Ready : A process is said to be ready if the next instruction of running a process is waiting or has an instruction that is timed out.
- (iii) Blocked : A process is said to be blocked, if it is waiting for some event to occur before it can proceed.



(Q) 8. Fig. states of a process

Ans. to the Q. No 6(a)

Q. Define PCB. Describe the significance of PCB.

Ans: The PCB is the abbreviation of Process Control Block. It represents each process in the operating system. PCB is a data structure containing the following information about the process :-

- Current running state of the process
- Process priority which are in the ready state.
- CPU scheduling parameters.
- Saves the content of CPU, when a process gets interrupted.

- (v) Memory allocation to the process.
- (vi) The details of process like its number, CPU usage etc. are present.
- (vii) Status of events and I/O resources that are associated with the process.

Ans. to the Q. No 6(b)

Q. Define Multi-stage Network. Describe the limitations of Crossbar switching.

Ans: The multi-stage networks are the networks built to provide connections between more subscribers more efficiently than the crossbar switching systems.

The limitations of Crossbar switching are :-

- 1) The number of Crosspoint will be the square of the number of attached stations and hence this is costly for a large switch.
- 2) The failure of Crosspoint prevents connection with those two subscribers between which the Crosspoint is connected.



3) Even if all the attached devices are active, only few of the crosspoints are utilized.

Ans. to the Q. No 6(c)

Q. Describe the advantages and disadvantages of Multi-stage Network.

Ans: The advantages of a multistage network are as follow:

1) The number of crossbars are reduced.

2) The number of paths of connection can be more obvious of find extremer

The Disadvantage of a multistage network are as follows:

1) Multistage switches may cause Blocking

2) The numbers or size of the intermediate switches will increased. can solve

this problem, but the cost increase with this.

Ans. to the Q. No. 8(a)

(a) How many types of switching techniques are available for digital traffic? Discuss the drawbacks of circuit switching.

Ans: There are three typical switching techniques available for digital traffic. They are:

- (i) Circuit Switching.
- (ii) Message Switching.
- (iii) Packet Switching.

The drawbacks of circuit switching are:

- 1) The waiting time lasts long, and there is no data transfer.
- 2) Each connection has a dedicated path, and this gets expensive.
- 3) When connected systems do not use the channel, it is kept idle for longer periods of time.



### Ans. to the Q.No. x(b)

Q. Discuss the three types of switching for digital traffic.

Ans:

Circuit Switching: In circuit switching, two nodes communicate with each other over a dedicated communication path. In this, a circuit is established to transfer the data. These circuits may be permanent or temporary. It was designed for voice applications. Telephone is the best suitable example of circuit switching. Before a user can make a call, a virtual path between the called subscriber and the calling subscriber is established over the network.

Message Switching: In message switching the whole message is treated as a unit. The data is transferred in its entire circuitry. A switch working on message switching, first receives the

whole message and buffers it until there are resources available to transfer it to next hop. If the next hop is not having enough resource to accommodate large size message, the message is stored and the switch waits. In this technique data is stored and forwarded. So, it is called the Store and Forward technique.

Packet Switching: The packet switching technique is derived from message switching, where the message is broken down into smaller chunks called packets. The header of each packet contains the switching information which is then transmitted independently. The header contains details such as source, destination and intermediate node address information. The intermediate networking devices can store small size packets and don't take many resources either on carrier path or in the internal memory of switches.

Ans. to the Q.No 2(c)

Q. What are the drawbacks of message switching?

Ans: Message switching has the following drawbacks:

1) Every switch in the transit path needs enough storage to accommodate the entire message.

2) Because of the waiting included until resources are available, message switching is very slow.

3) Message switching was not a solution for streaming media and real-time applications.

The data packet is accepted even when the network is busy, this slows down the delivery.

Ans. to the Q.No 8(a)

(a) Define System, Subsystem, Layer.

Ans:

System: A system is one or more autonomous computers and their associated software, peripherals and users which are capable of information processing or transfer.

Subsystem: A logically independent smaller unit of a system. A succession of subsystem make up a system.

Layers: A layer is composed of subsystems of the same rank of all the interconnected systems.

Ans. to the Q.No 8(b)

Q. Which functions the node processor perform?

Ans: The node processor performs the following

functions:

1. Receive the full user message and store

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2) Check the message for data transmission errors and perform error recovery if required.

3) Determine the destination address from the user message.

4) Choose an appropriate link towards destination based on certain routing criterion.

5) Forward the message to the next node on the chosen link.

Ans. to the Q. No 8(c)

Q. What are the advantages of LANs?

Ans: The advantages offered by the LANs are:

1) A LAN may evolve with time. It may be put into operation with a small investment, and more systems may be added as the need arises.

2) It offers a good backup capability in the event of one or two systems failing in the network. This, in turn, enhances the

to users.

3) LAN provides a resource-sharing environment. Expensive peripherals, hosts and databases may be shared by all the LAN users.

4) A LAN adhering to a certain standard permits multivendor systems to be connected to it. Thus, a user is not committed to a single vendor.

5) In LAN, the systems are generally so chosen as to meet most of the user.



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