Roll no: 42428
Date: 04/02/2021

Experiment No. 1

Title: Set up and carry out experiment on PSTN T/S/T switch.

Aim: Set up and carry out experiment on PSTN T/S/T switch.

Pre-requisites:

1. Theory of switching techniques.
2. TDM.

Apparatus:

1. PSTN T/S/T switches hardware trainer kit.
2. DSO.
3. Connecting probes.

Specifications:

1. Power supply requirements: 230V, 50Hz AC.
2. I/P signal generator: sine wave (250 Hz, 500 Hz).
3. Control pulse signal generator: frequency 2kHz to 128kHz.

Theory:

Necessity of switching functions:

a) Functions of switching are to set up and release the connection between transmitting channel on end as needed.
b) There are no of telephones with large no of subscribers but it won't happen with every subscriber at the same time, in fact there will be many subscribers. So it will be wastage of no of channels trunks which are dedicated for each subscriber, therefore different switches are needed.
c) Switching involves direct connection between subscriber and end office.
d) Switching techniques are necessary to make efficient use of available trunks.

Different switching techniques:

1. Message switching:

In message switching, the text message is encoded and transmitted from source telegraph office to telegraph switching centre. In message switching, dedicated path is not establish

between two communicating devices. In message switching, each message is treated as independent unit and includes its own destination and source address as shown in fig 1.1.

2. Circuit Switching:

It is often used in public telephone networks. It establishes the dedicated path between two communicating devices. However handling of digital data using circuit switching generally proves to be efficient. In this routing decisions are made when the path is set up across the network. After the link has been fixed, the information will continuously forward. It operates in three phases:

1. Circuit Establishment
2. Data Transfer
3. Circuit disconnect

3. Packet Switching:

In packet switching message is broken up into packets. Each packet includes:

a) Header
b) Source
c) Destination
d) Intermediate mode

Individual packet takes different routes to reach the destination. The length of packets is restricted to maximum length.

Comparison of different switching techniques:

Parameter	Message switching	Circuit Switching	Packet switching
Transmission System	Digital data over different transmission media.	Analog and digital data over different transmission media	Digital data over different transmission media
Transmission type	Morse, Baudot, ASCII	Analog, voice or PCM digital voice	Binary information
Addressing scheme	Geographical address	Hierarchical numbering plan	Hierarchical address space
End terminals	Telegram, teletype	Telephone, modem	Computer

Multiplexing scheme	Character or message multiplexing	Circuit multiplexing	Packet multiplexing
Application	Telegraph networks for transmission of telegrams	Telephone networks	Internet

Switching function:

Most common switching function involves direct connection between carrier lops at an end office or between carrier station loops at PBx. These connections inherently require setting a path through switch from originating loop to specific terminating loop.

Transit connections require setting up a path from specific incoming line to an outline or trunk group. Normally more than once outgoing circuit is acceptable. For example: connection to an inter office trunk group can be simplified because every incoming line. Call distribution are often implemented with the same basic equipment as PBx's.

TST switching:

TST switching is shown in fig. information arriving in TDM channel of incoming line. Delayed the inlet time charge stage until an approximate path through the space stage is available. Any space stage time slot can be used to establish a connection.

Procedure:

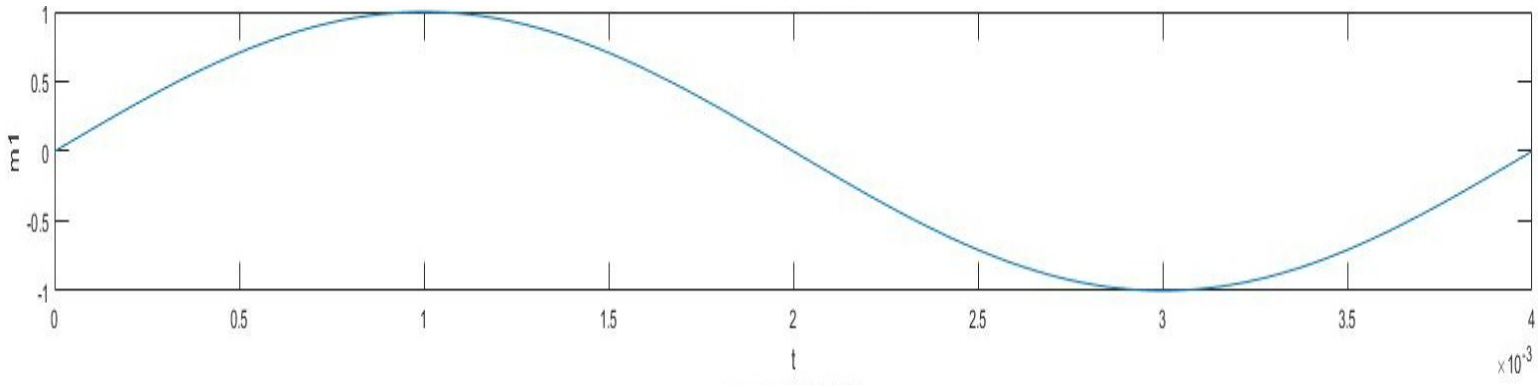
1. First connect jumpers TDM output from multiplex section to TMD input of de-multiplexer section.
2. Connect signal input 1 terminal of multiplexer section to sine wave signal of sine wave generator with frequency amplitude 2Vp-p.
3. Connect signal input 2 terminals of multiple sections to sine wave signal with amplitude 1Vp-p.
4. Input 4 to sine wave.
5. Connect CRO channel at TDM signal output (7 switching). Observe TDM signal.
6. Keep all control input (A, B, C, D) to low value
7. Keep A, B, C, D to low data to high & apply strobe.
8. Connect CRO channel 2 to output 2, 3 and 4.
9. Change value of A, B, C, D data strobe as per given truth table.

Truth table:

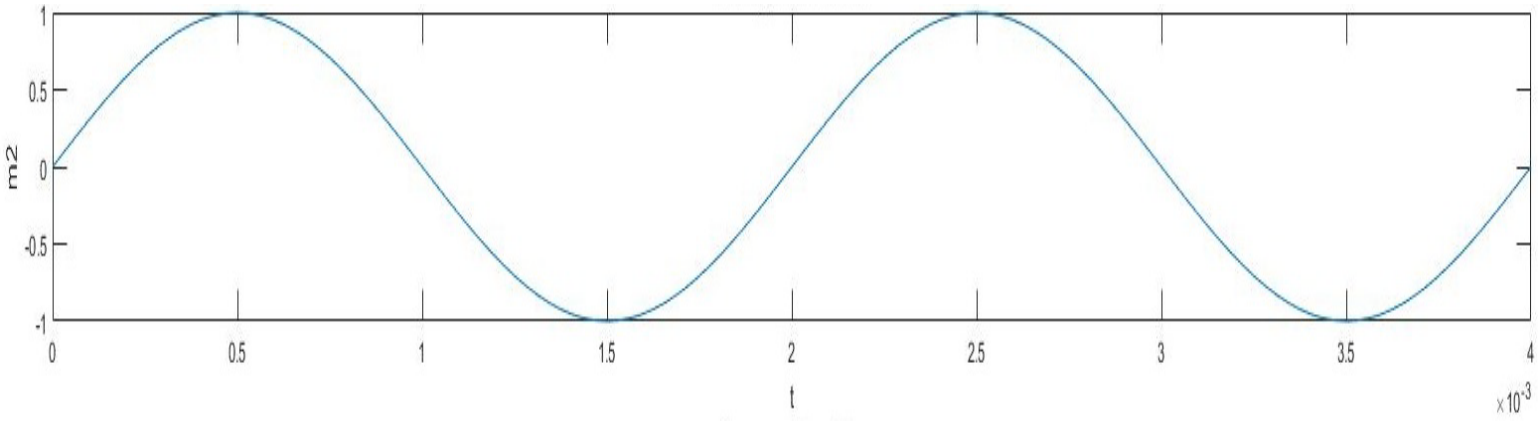
Address				Select	
A	B	C	D		
0	0	0	0	X1	Y1
1	0	0	0	X2	Y2
0	0	1	0	X1	Y2
1	0	1	0	X2	Y1

Observations:

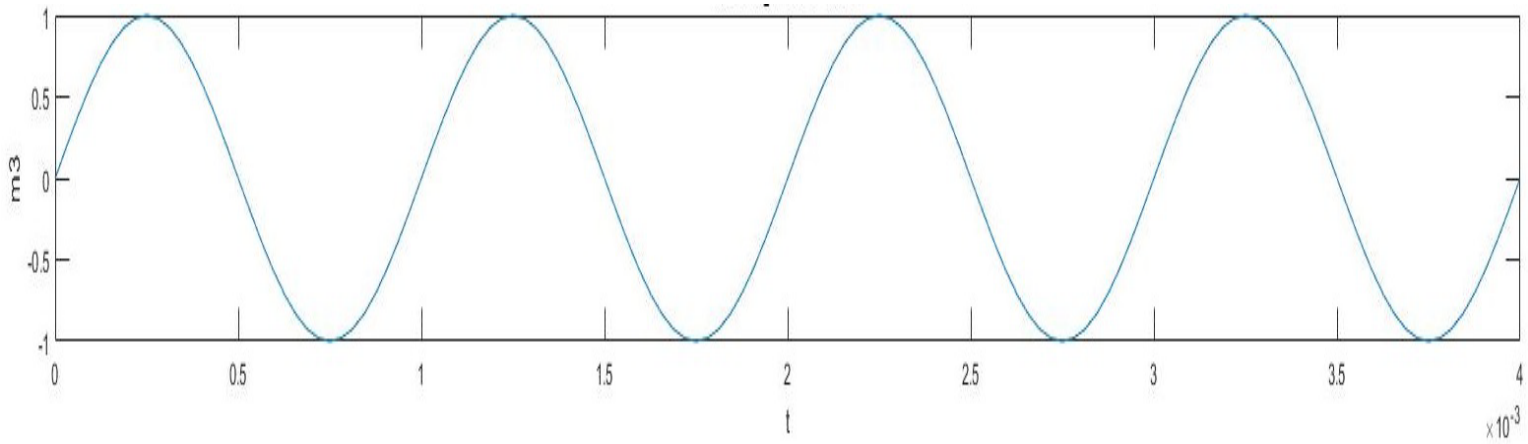
- Signal1: Sine Wave of 250 Hz



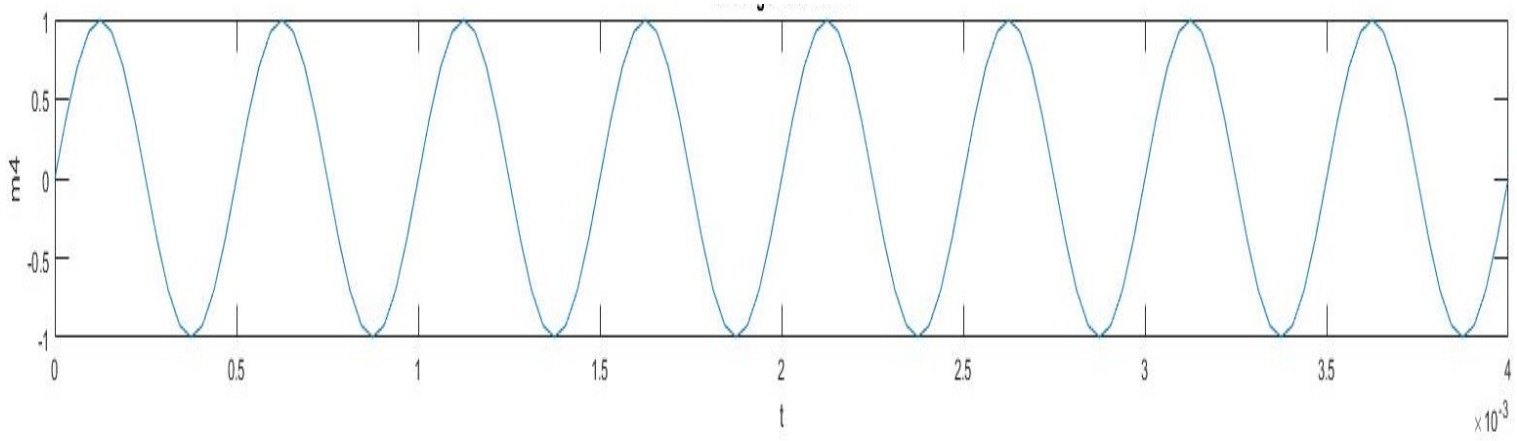
- Signal2: Sine Wave of 376 Hz



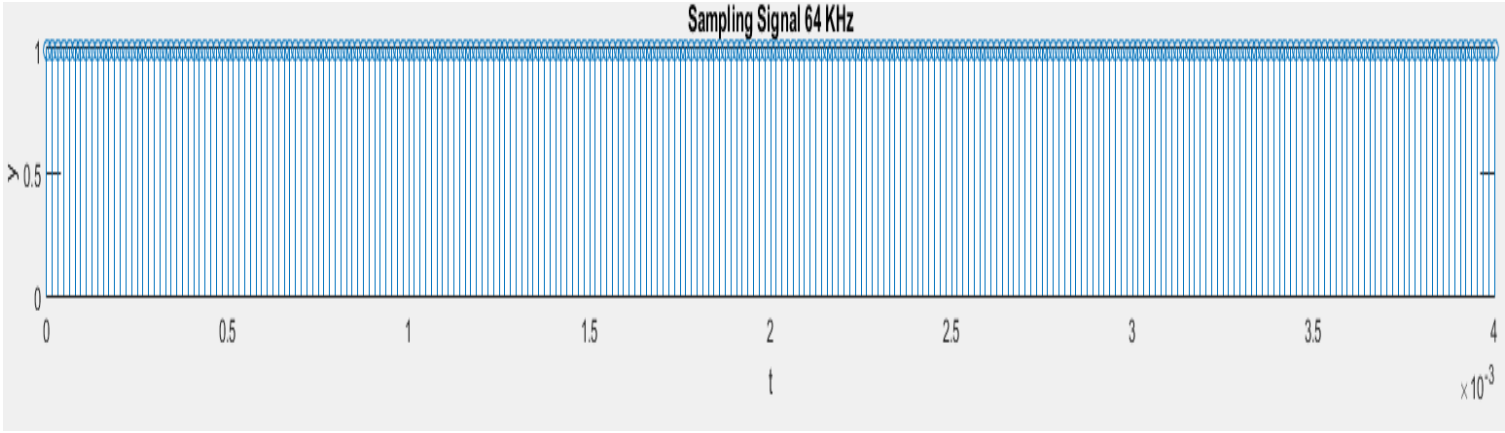
- Signal3: Sine Wave of 1 KHz



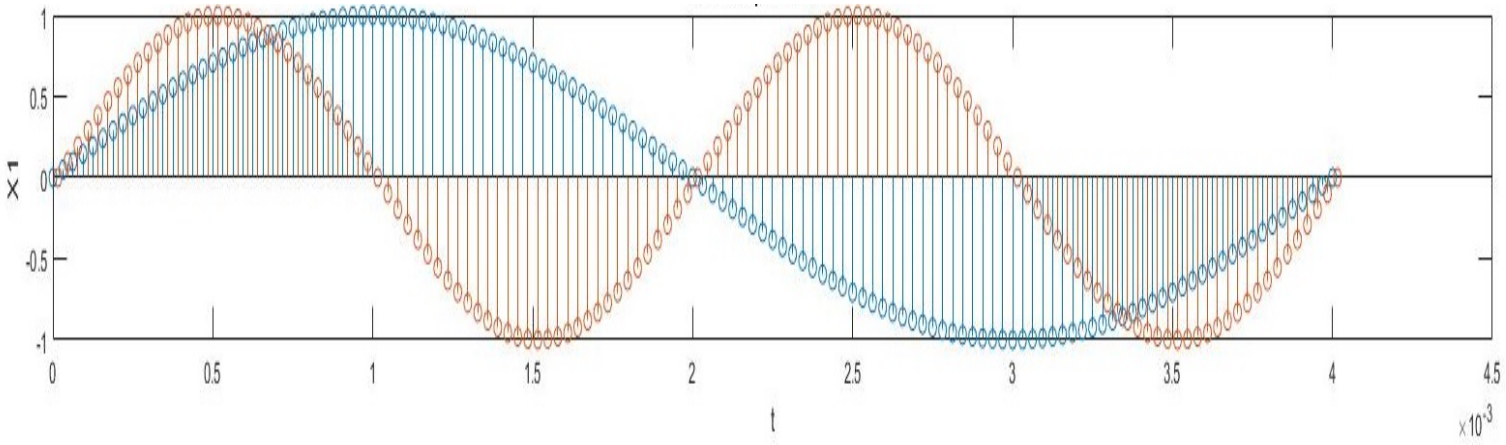
- Signal4: Sine Wave of 2 KHz



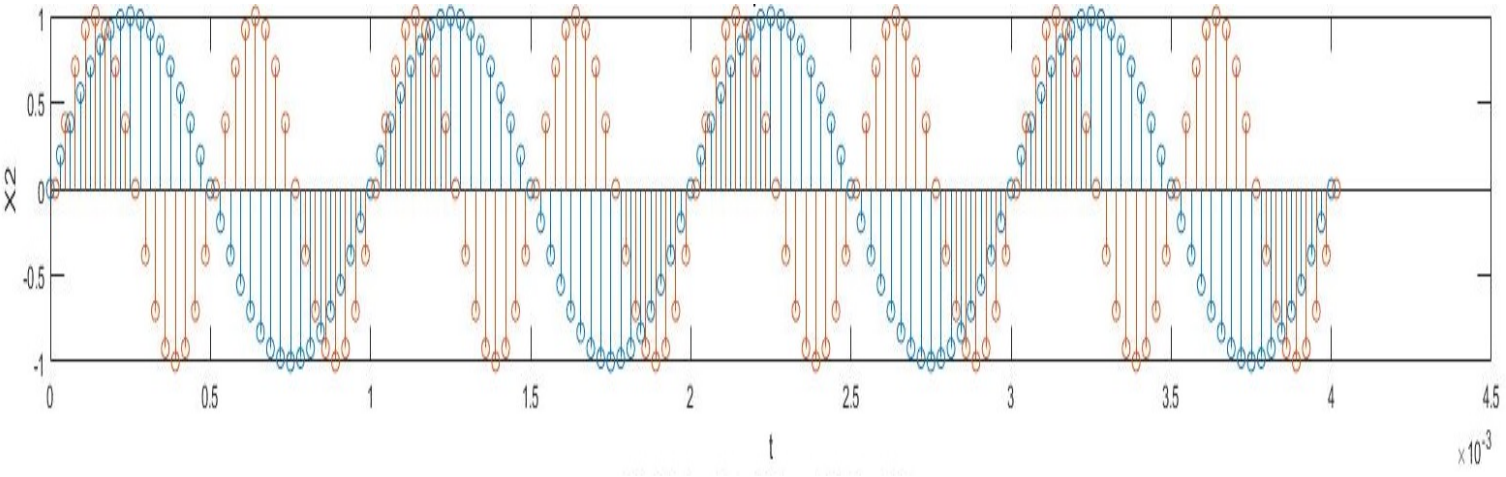
- Sampling Pulse: Impulse Train of 64 KHz



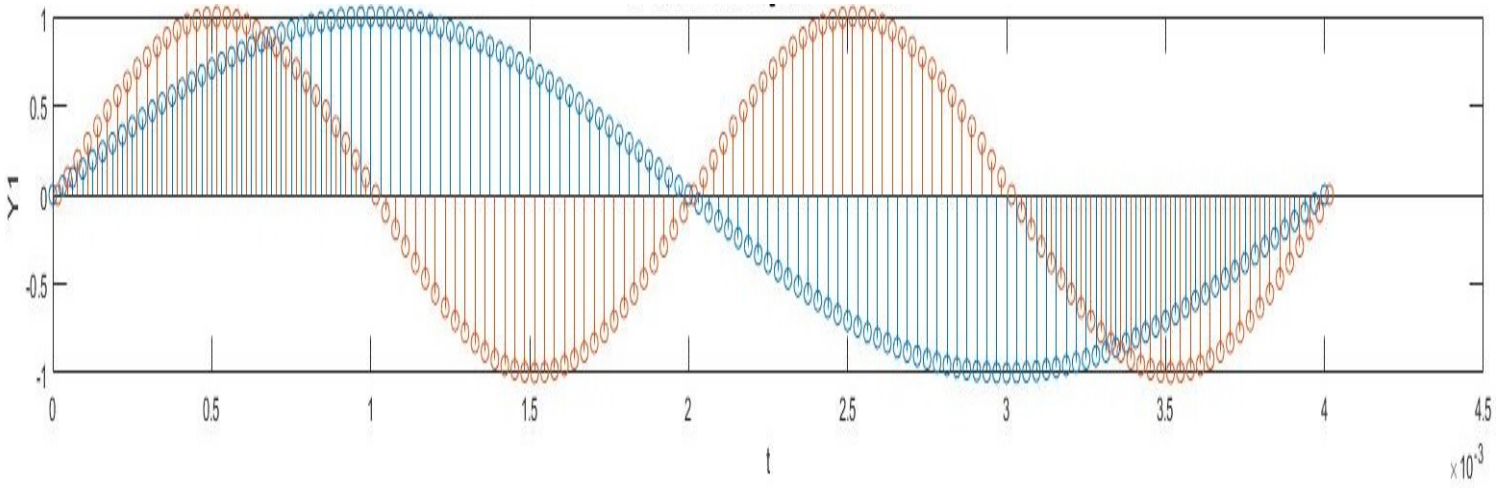
- X1: Multiplexing of Signal1 and Signal2



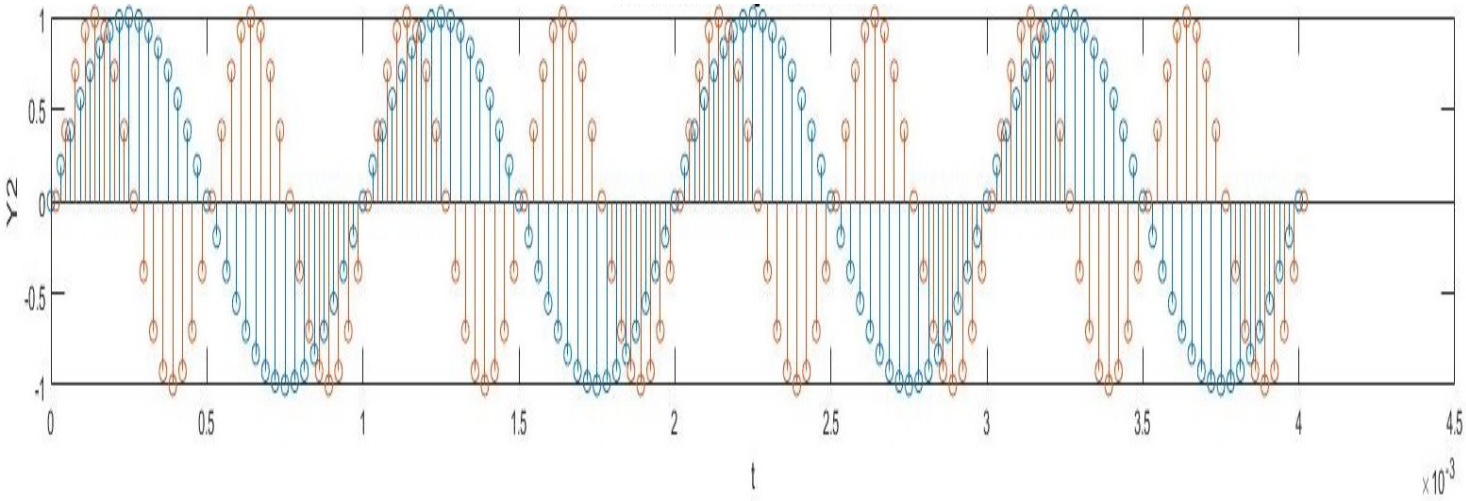
- X2: Multiplexing of Signal3 and Signal4



- Y1 = X1 when Data = High and DCBA = 0000



- Y2 = X2 when Data = High and DCBA = 0001



Conclusion:

In this experiment we studied about the PSTN TST switch and its advantages over only time switch or space switch. The main disadvantage of time switch is the delay introduced as the number of inputs increases. The time frame is equally divided in the number of inputs and as the number of inputs increases the time duration for a particular signal in that frame decreases which increases the delay. The main disadvantage of space switch is that as the number of inputs increases the number of crossbar connections increases in a significant amount (in the order of n^2). It is also observed that more that 50% of the crossbar connections are not even used even in critical hours. This causes the wastage of huge amounts of investments. So, by using the combination of both these switches we can minimize these disadvantages to a great extent.

Signature