Department of Computer Engineering

Academic Term: July-Oct 2020

Class : B.E Computer Sem -VII

Subject : Mobile Communication And Computing

Practical No:	4
Title:	To simulate Fixed Time Division Multiplexing.
Date of Performance:	
Date of Submission:	09-10-2020
Roll No:	8364
Name of the Student:	Vedant Sahai

Evaluation:

Sr. No	Rubric	Grade
1	On time Completion & Submission(2)	
2	Output(3)	
3	Code Optimization(3)	
4	Knowledge of the topic(2)	
5	Total (10)	

Signature of the Teacher :

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PRACTICAL - 4

Title:: To simulate Fixed Time Division Multiplexing. Take 12 stations. Every station has time slice of 417 microseconds. Delay should be 10ms. Every time station gets turn, it shows message.

Objective: To study time division Multiplexing.

Reference: Mobile communication by Schiller, Mobile Computing by RajKamal

Prerequisite: Knowledge of Time Division Multiplexing.
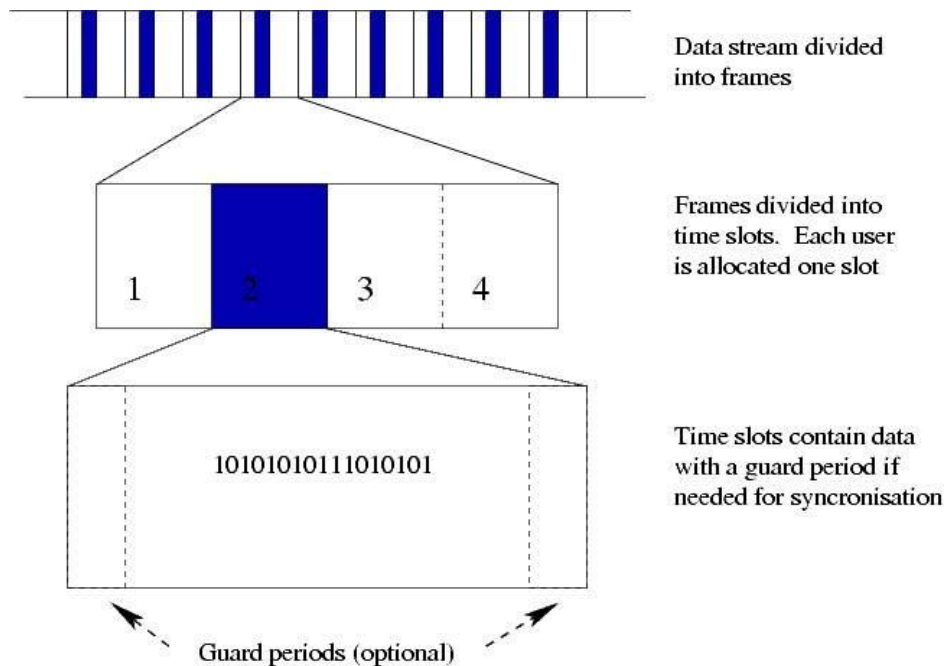
Description:

Time division multiplexing (TDM) is a communications process that transmits two or more streaming digital signals over a common channel. In TDM, incoming signals are divided into equal fixed-length time slots. After multiplexing, these signals are transmitted over a shared medium and reassembled into their original format after de-multiplexing. Time slot selection is directly proportional to overall system efficiency.
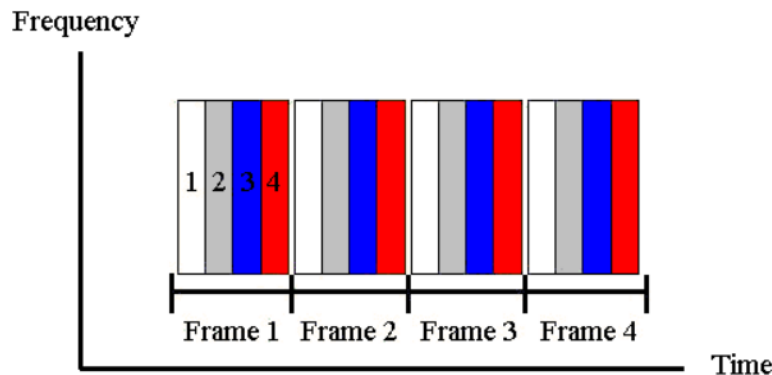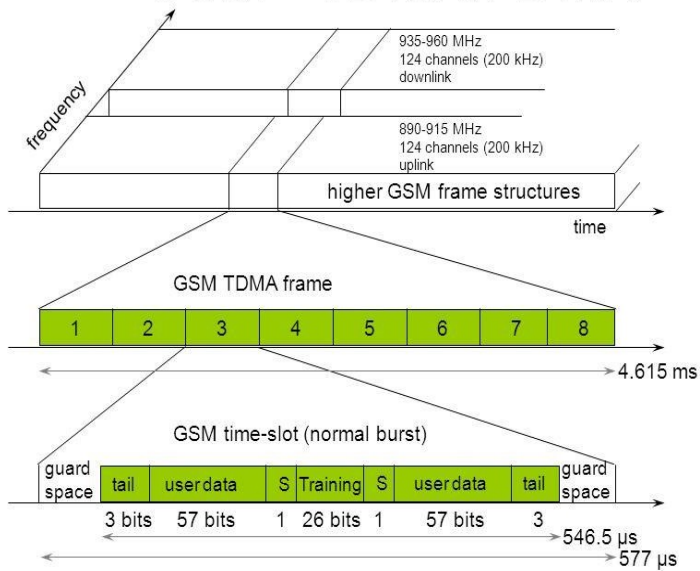

- **T**DMA system divides the radio spectrum into time slots.
- In each slot only one user is allowed to either transmit or receive.
- Each user occupies a cyclically repeating time slots.
- However, TDMA suffers one significant drawback. Idle users waste network resources because their time slots cannot be redistributed to other needy users.

FDAM & TDMA in GSM

The method chosen by GSM is a combination of Time- and Frequency-Division Multiple Access (TDMA/FDMA). The FDMA part involves the division by frequency of the (maximum) 25 MHz bandwidth into 124 carrier frequencies spaced 200 kHz apart. One or more carrier frequencies are assigned to each base station. Then each carrier frequency is divided into 8 time slots.

Data stream divided into frames

Frames divided into time slots. Each user is allocated one slot

1 2 3 4

10101010111010101

Time slots contain data with a guard period if needed for syncronisation

Guard periods (optional)

GSM - TDMA/FDMA

935-960 MHz
124 channels (200 kHz)
downlink

890-915 MHz
124 channels (200 kHz)
uplink

higher GSM frame structures

time

GSM TDMA frame

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

4.615 ms

GSM time-slot (normal burst)

| guard space | tail | user data | S | Training | S | user data | tail | guard space |

3 bits   57 bits   1   26 bits 1   57 bits   3

546.5 µs

577 µs

Advantages of TDMA:

- TDMA can easily adapt to transmission of data as well as voice communication.

- TDMA has an ability to carry 64 kbps to 120 Mbps of data rates.

- TDMA allows the operator to do services like fax, voice band data, and SMS as well as bandwidth-intensive application such as multimedia and video conferencing.

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- Since TDMA technology separates users according to time, it ensures that there will be no interference from simultaneous transmissions.

- TDMA provides users with an extended battery life, since it transmits only portion of the time during conversations.

- TDMA is the most cost effective technology to convert an analog system to digital.

Disadvantages of TDMA

- Disadvantage using TDMA technology is that the users has a predefined time slot. When moving from one cell site to other, if all the time slots in this cell are full the user might be disconnected.

- Another problem in TDMA is that it is subjected to multipath distortion. To overcome this distortion, a time limit can be used on the system. Once the time limit is expired the signal is ignored.

Code:

```python
users= int(input(" Enter the number of users : "))
timeslot= int(input(" Enter the timeslot : "))
delay=[]
state=[]
for i in range(users):
    print(" Enter delay for user : ",i+1)
    d = int(input())
    delay.append(d)
    state.append("0")

cycles=int(2)
for i in range(cycles):

    #print("User", i+1)
    cycle= i+1
    t=0
    s=0
    print("Cycle ", cycle)
    for a in range(users):

        if cycle==1:
            if delay[a]<10 :
                t = s
                s = s + timeslot
                print("Channel " , a+1 ," Time slot allocated", t+1,"till", s, " ms ")
                state[a]=1
            else:
                print("Channel " , a+1 ," Time slot not allocated ")
        else:
```

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```
        t = s
        s = s + timeslot
        if state[a]==1:
            print("Channel " , a+1 ," Time slot allocated", t+1,"till", s, " ms ","| idle")
        else:
            print("Channel " , a+1 ," Time slot  allocated", t+1,"till", s, " ms ")
            state[a]=1
    print("--------------")
```

Output:
(rasa) D:\Vedant>python mcc4.py
 Enter the number of users : 12
 Enter the timeslot : 417
 Enter delay for user : 1
12
 Enter delay for user : 2
3
 Enter delay for user : 3
4
 Enter delay for user : 4
5
 Enter delay for user : 5
6
 Enter delay for user : 6
12
 Enter delay for user : 7
4
 Enter delay for user : 8
34
 Enter delay for user : 9
2
 Enter delay for user : 10
6
 Enter delay for user : 11
11
 Enter delay for user : 12
10
Cycle 1
Channel 1 Time slot not allocated
Channel 2 Time slot allocated 1 till 417 ms
Channel 3 Time slot allocated 418 till 834 ms
Channel 4 Time slot allocated 835 till 1251 ms
Channel 5 Time slot allocated 1252 till 1668 ms
Channel 6 Time slot not allocated
Channel 7 Time slot allocated 1669 till 2085 ms
Channel 8 Time slot not allocated

Channel 9 Time slot allocated 2086 till 2502 ms
Channel 10 Time slot allocated 2503 till 2919 ms
Channel 11 Time slot not allocated
Channel 12 Time slot not allocated

Cycle 2
Channel 1 Time slot allocated 1 till 417 ms
Channel 2 Time slot allocated 418 till 834 ms | idle
Channel 3 Time slot allocated 835 till 1251 ms | idle
Channel 4 Time slot allocated 1252 till 1668 ms | idle
Channel 5 Time slot allocated 1669 till 2085 ms | idle
Channel 6 Time slot allocated 2086 till 2502 ms
Channel 7 Time slot allocated 2503 till 2919 ms | idle
Channel 8 Time slot allocated 2920 till 3336 ms
Channel 9 Time slot allocated 3337 till 3753 ms | idle
Channel 10 Time slot allocated 3754 till 4170 ms | idle
Channel 11 Time slot allocated 4171 till 4587 ms
Channel 12 Time slot allocated 4588 till 5004 ms

Conclusion: TDMA has been studied.

PostLab assignment:

Q1. TDMA is a multiple access technique that has

a. Different users in different time slots
b. Each user is assigned unique frequency slots
c. Each user is assigned a unique code sequence
d. Each signal is modulated with frequency modulation technique

Ans: a

Q2. In TDMA, the user occupies the whole bandwidth during transmission.

a. True
b. False

Ans: a

Q3. TDMA allows the user to have

a. Use of same frequency channel for same time slot
b. Use of same frequency channel for different time slot
c. Use of same time slot for different frequency channel
d. Use of different time slot for different frequency channels

Ans: b