CS348 Computer Networks
Lab Excercises 1

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Circuit Switching TDM :

In Circuit Switching every source sends data after getting it's time division(TDM). While one source is sending others have to wait till it's time come(Round robin manner). Assume for all source sending rate(in packets per unit time), data generating rate(packet per unit time) and bandwidth is taken as input which is constant. Packet size is taken as input and same for all packets. Total time units for witch simulation works and time division is constant(10).

Instead of taking system clock I used while loop, assume each iteration of while loop is 1 unit time.
In while first I created packets for each source as given generating rate and then send the packet as per round robin manner using given time division.

In each source one queue is generated for storing packets which are yet to send.

For gererating data : **boolean** `generatePacketCs`(**int** time,**int** size)

For sending data : **void** `sendpacketCs`(**int** time)

Packet Switching:

In this any source can send packets to switch.
We need to consider queue in switch which contains packets from any source.

In packet switched mode, the switch uses a single queue. Packets arriving from the sources are inserted in the queue in order of their arrival and dispatched to the sink by dequeuing one at a time.

My tar file contains 4 folders for source code of 1.a , 1.b, 2.a, 2.b.

Following are graphs based on some imput

1)
a) Average sending delay Vs Number of sources for circut switching

```
dnysdk@dnysdk-Inspiron-3542:~/Desktop/sem6/networking_lab/varry_number_of_sources$ java Simulation
Enter number of Suorces
5
how much time
200
enter packet size of each packet
15
enter packet sending rate(packets per unit time) for source
2
enter packet generating rate(packets per unit) for source
5
enter bandwidth for source
20
enter 1 for circuit switching and 2 for packet switching
1
average sending delay if number of sources  are 1 is = 60.0
average sending delay if number of sources  are 2 is = 80.0
average sending delay if number of sources  are 3 is = 86.6
average sending delay if number of sources  are 4 is = 90.0
average sending delay if number of sources  are 5 is = 92.0
dnysdk@dnysdk-Inspiron-3542:~/Desktop/sem6/networking_lab/varry_number_of_sources$
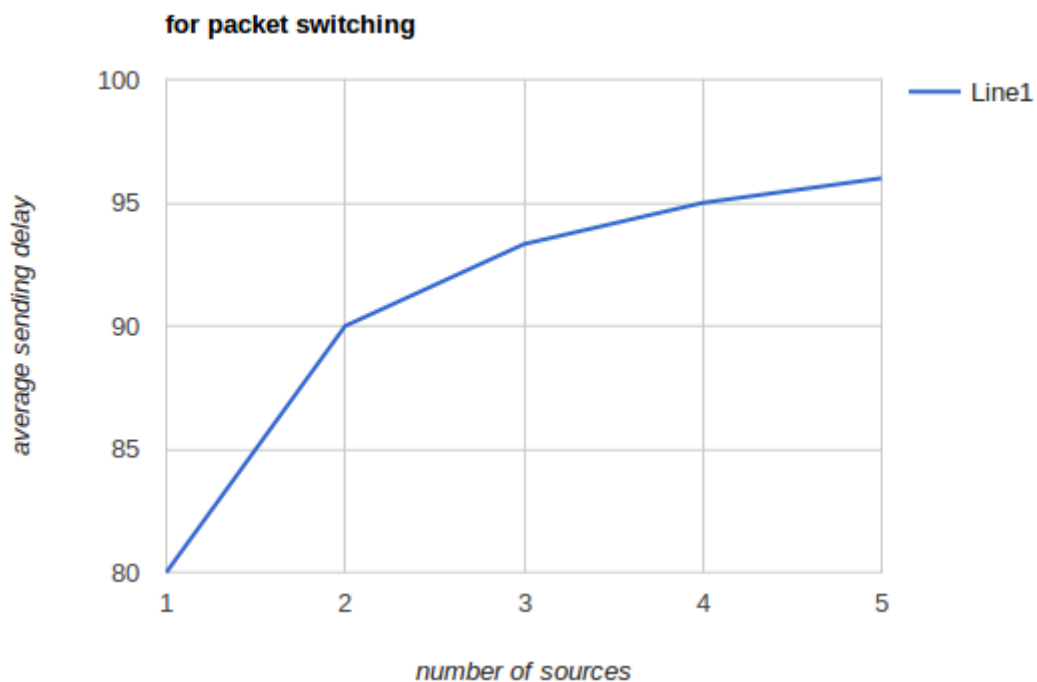```

Graph :
     for circuit switching
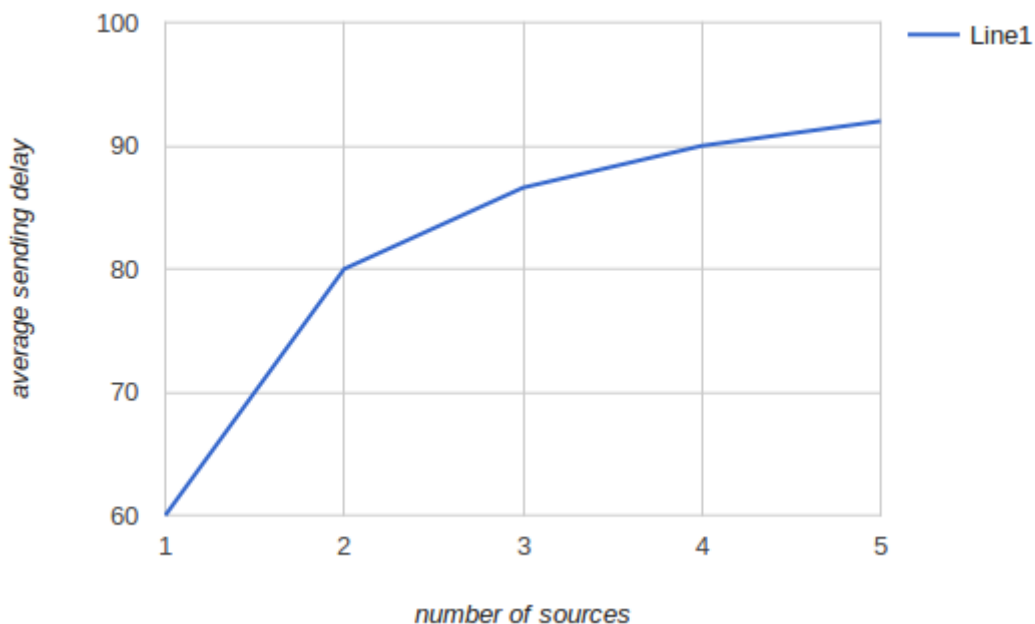


For circuit switching average sending delay will increase as number sources increases

# Average sending delay Vs Number of sources for packet switching

```
dnysdk@dnysdk-Inspiron-3542:~/Desktop/sem6/networking_lab/varry_number_of_sources$ java Simulation
Enter number of Suorces
5
how much time
200
enter packet size of each packet
15
enter packet sending rate(packets per unit time) for source
2
enter packet generating rate(packets per unit) for source
5
enter bandwidth for source
20
enter 1 for circuit switching and 2 for packet switching
2
average sending delay if number of sources  are 1 is = 80.0
average sending delay if number of sources  are 2 is = 90.0
average sending delay if number of sources  are 3 is = 93.325
average sending delay if number of sources  are 4 is = 95.0
average sending delay if number of sources  are 5 is = 96.0
dnysdk@dnysdk-Inspiron-3542:~/Desktop/sem6/networking_lab/varry_number_of_sources$
```

graph:

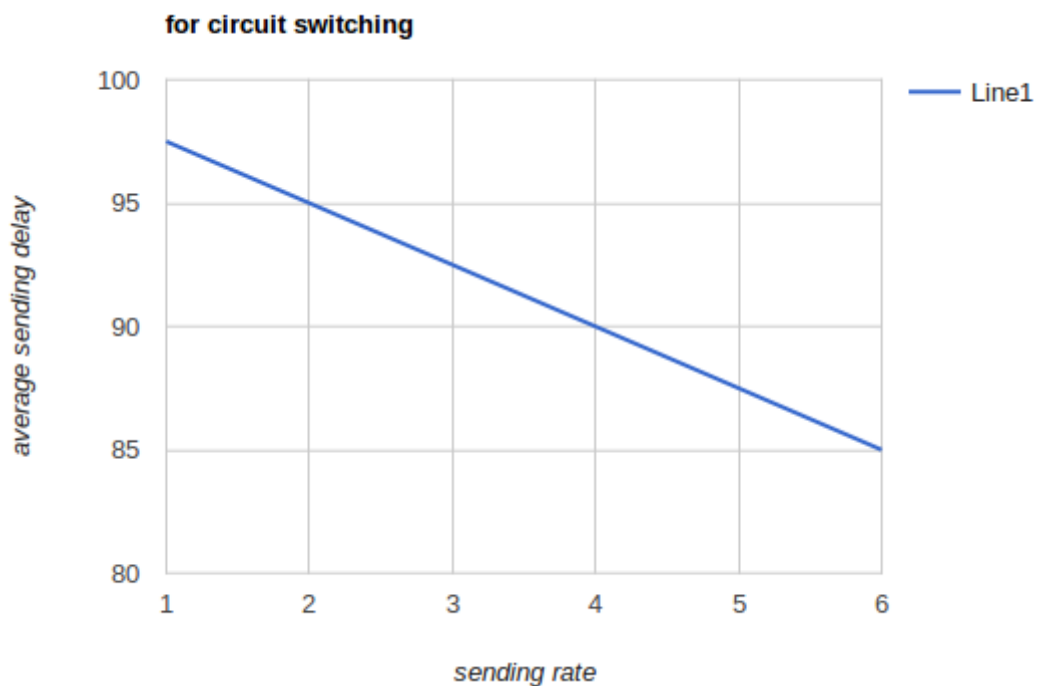For packet switching average sending delay will increase as number sources increases

1)
B)
average sending delay Vs sending rate for circuit switching

```
dnysdk@dnysdk-Inspiron-3542:~/Desktop/sem6/networking_lab/varry_sending_rate$ java Simulation
Enter number of Suorces
5
how much time
200
enter packet size of each packet
5
enter maximum packet sending rate(packets per unit time) for source
6
enter packet generating rate(packets per unit) for source
8
enter bandwidth for source
20
enter 1 for circuit switching and 2 for packet switching
1
average sending delay if packet sending rate  1 is = 97.5
average sending delay if packet sending rate  2 is = 95.0
average sending delay if packet sending rate  3 is = 92.5
average sending delay if packet sending rate  4 is = 90.0
average sending delay if packet sending rate  5 is = 87.5
average sending delay if packet sending rate  6 is = 85.0
dnysdk@dnysdk-Inspiron-3542:~/Desktop/sem6/networking_lab/varry_sending_rate$
```

graph :

Average sending delay decreases if sending rate increases as more number of packets can be send per unit time.

average sending delay Vs sending rate for packet switching

```
dnysdk@dnysdk-Inspiron-3542:~/Desktop/sem6/networking_lab/varry_sending_rate$ java Simulation
Enter number of Suorces
5
how much time
200
enter packet size of each packet
5
enter maximum packet sending rate(packets per unit time) for source
6
enter packet generating rate(packets per unit) for source
8
enter bandwidth for source
20
enter 1 for circuit switching and 2 for packet switching
2
average sending delay with packet sending rate 1 is = 97.5
average sending delay with packet sending rate 2 is = 97.5
average sending delay with packet sending rate 3 is = 97.485
average sending delay with packet sending rate 4 is = 97.5
average sending delay with packet sending rate 5 is = 97.5
average sending delay with packet sending rate 6 is = 97.47
dnysdk@dnysdk-Inspiron-3542:~/Desktop/sem6/networking_lab/varry_sending_rate$
```
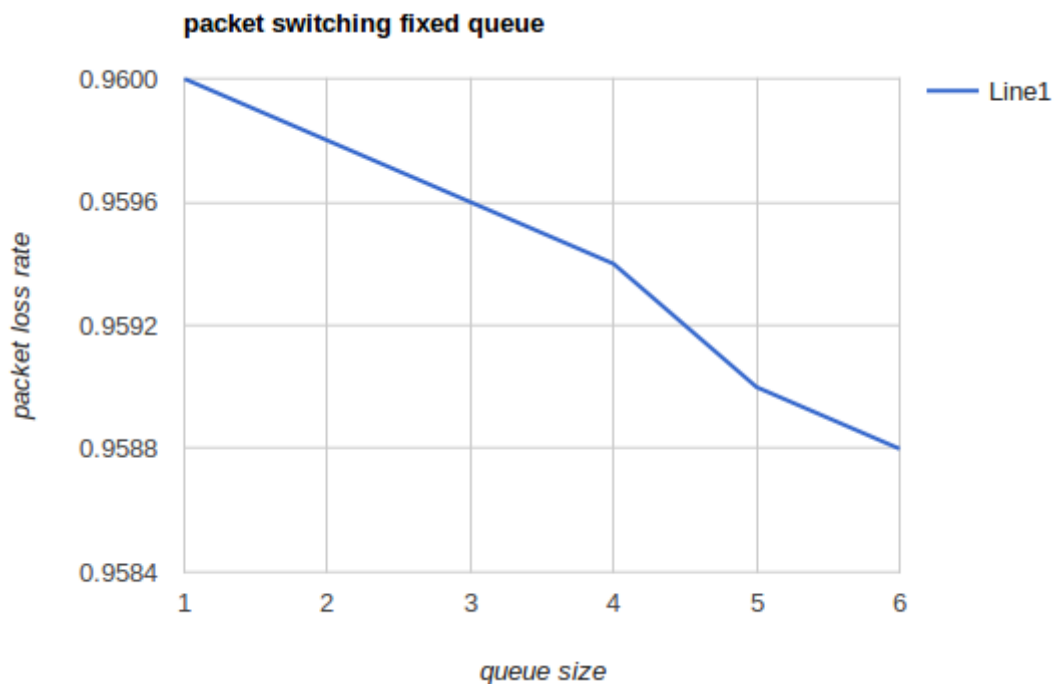
graph :

for packet switching
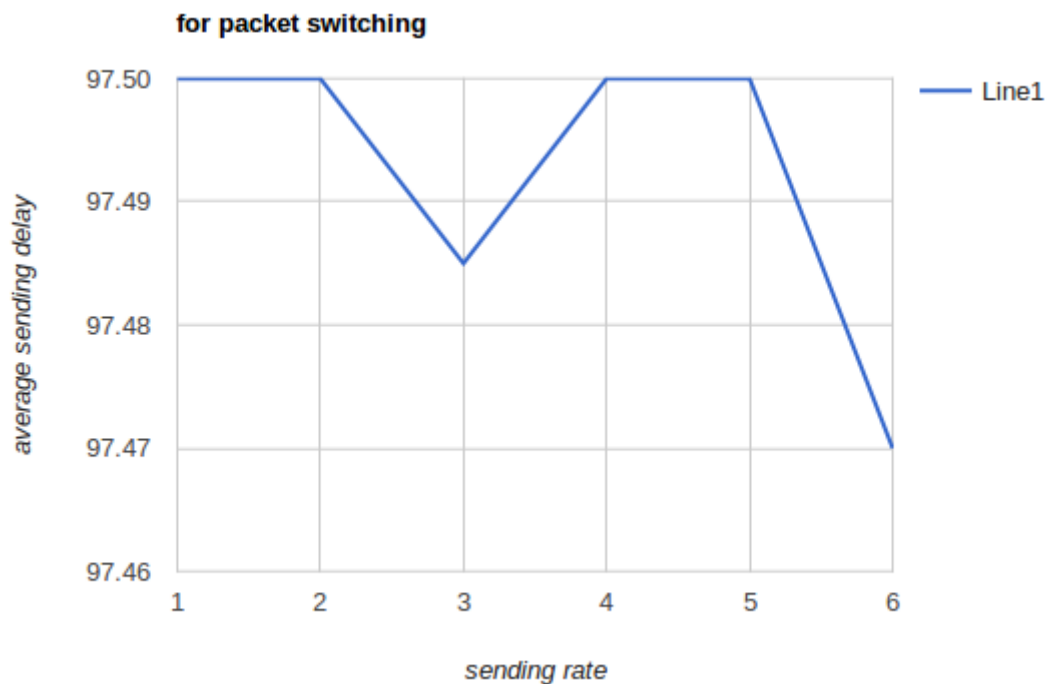
For packet switching average sending delay is almost same.

2

A)

Packet loss rate vs queue size

```
dnysdk@dnysdk-Inspiron-3542:~/Desktop/sem6/networking_lab/fixed_queue_varry_queue_size$ java Sim
Enter number of Suorces
5
how much time u want to run simulation
200
enter packet size of each packet
15
enter maximum packet sending rate(packets per unit time) for source
5
enter packet generating rate(packets per unit) for source
8
enter bandwidth for source
20
Enter size of queue in switch
10
loss rate for queue size 1 is = 0.96
loss rate for queue size 2 is = 0.9598
loss rate for queue size 3 is = 0.9596
loss rate for queue size 4 is = 0.9594
loss rate for queue size 5 is = 0.9592
loss rate for queue size 6 is = 0.959
loss rate for queue size 7 is = 0.9588
loss rate for queue size 8 is = 0.9586
loss rate for queue size 9 is = 0.9584
loss rate for queue size 10 is = 0.9582
dnysdk@dnysdk-Inspiron-3542:~/Desktop/sem6/networking_lab/fixed_queue_varry_queue_size$
```

Graph :

Here we can see that less packet will get loss as queue size is increases for fixed queue packet switching

B) packet loss rate vs packet sending rate

```
dnysdk@dnysdk-Inspiron-3542:~/Desktop/sem6/networking_lab/fixed_queue_varry_sending_rate$ javac Simulation.java
dnysdk@dnysdk-Inspiron-3542:~/Desktop/sem6/networking_lab/fixed_queue_varry_sending_rate$ java Simulation
Enter number of Suorces
5
how much time u want to run simulation
200
enter packet size of each packet
15
enter maximum packet sending rate(packets per unit time) for source
5
enter packet generating rate(packets per unit) for source
8
enter bandwidth for source
10
Enter size of queue in switch
10
packet loss rate for sending rate 1 is = 0.791
packet loss rate for sending rate 2 is = 0.8955
packet loss rate for sending rate 3 is = 0.9303333333333333
packet loss rate for sending rate 4 is = 0.94775
packet loss rate for sending rate 5 is = 0.9582
dnysdk@dnysdk-Inspiron-3542:~/Desktop/sem6/networking_lab/fixed_queue_varry_sending_rate$
```

graph :
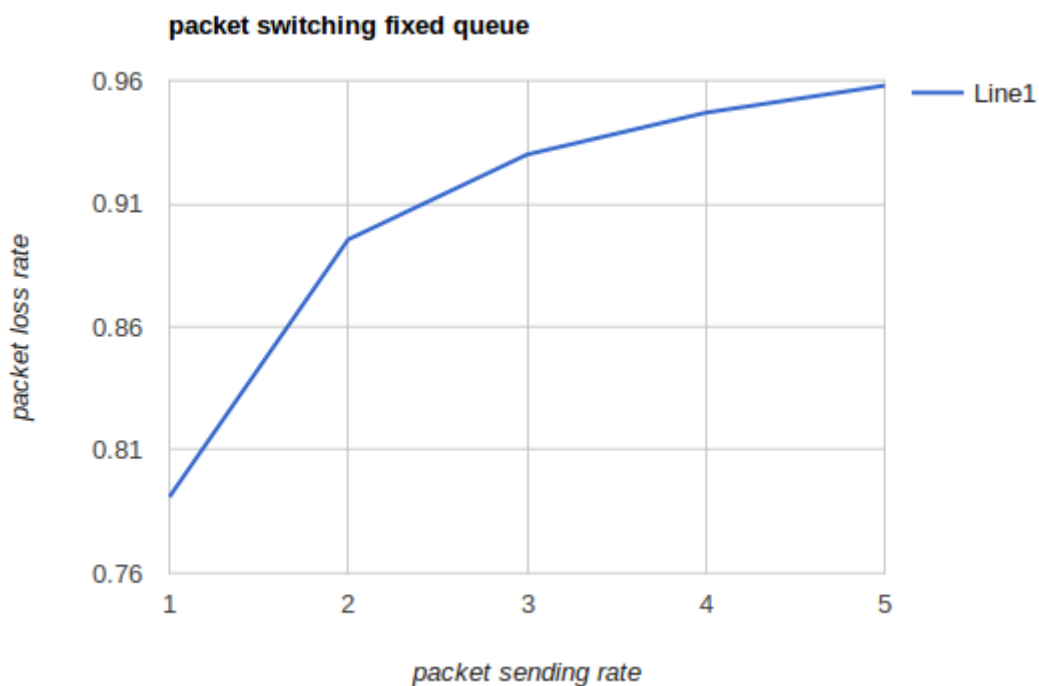
Here we can see that more packet will get loss if seding rate is increases for fixed queue packet switching