Simulation of Standard Ethernet (IEEE 802.3) LAN using Bus topology and analyze the performance parameters under multiple loads transmitting at same time/different times using NS2

AIM:

a. To Simulate the Standard Ethernet LAN IEEE 802.3 (1-persistent CSMA/CD) using BUS Topology

b. To analyze the performance of the ETHERNET LAN parameters under multiple loads.

Use the make-lan -trace on as given below for simulating the bus topology with 15 nodes [1Mb Bandwidth, 10ms Propagation Delay, Mac/802_3]

```
$ns make-lan -trace on $nodelist $opt(bw) $opt(delay) $opt(ll)
$opt(ifq) $opt(mac) $opt(chan)
```

- Increase the number of CBR Traffic sources transmitting at the same time. This can create collisions in the simulation. Tabulate the results as given in the table. Note : Each CBR Traffic Source is generated at a data rate of 100Kbps. Bus Bandwidth is 1Mb

- Count the total number of collision events in the trace file. You can see "c" events in the first column in the trace file for every packet sequence number colliding with other packets. Use grep to count the total collision events.

- Compute the Total Packets Generated in Network, Total Packets Received at Destination (Node 0) ,PDR, Average End to End delay.

- In the Linux Terminal Window when you run the simulation, observe whether when traffic generated exceed the BW of shared medium, collision increases further as Binary Exponential Back off (BEB) algorithm runs.

No of Loads	Total Packets Generated	Total Packets Received at Destination	Total No of Collided Events	PDR (Packet Delivery Ratio)	Min Delay Max Delay Avg End to End Delay
1	488	488	0	100	0.018116
2	488	488	828	100	0.018248 0.034536 0.02307757

					377
4	976	976	3010	100	0.018248 0.069392 0.03327989 754
10	2440	2163	3712	88	0.018116 2.3267 0.05018872 677
12	2928	2273	4185	77	0.018116 2.037404 0.04258280 334
14	3416	2273	4434	66	0.018116 2.27818 0.04494753 014

- Record your results, Take screenshot of Terminal Window output when BEB (Binary Exponential Backoff) runs.

- Also in Tracegraph observe 2D graph on Packet ID vs Simulation End to End delay and see the variations of packet wise delay variations experienced. Save 3D charts if interested!

- Repeat the simulation and iterations, by replacing with $ns at [expr ($i+0.5)] "$cbr_($i) start" where multiple loads transmit at different times. Does the collision events reduce significantly ? Comment by recording your results.
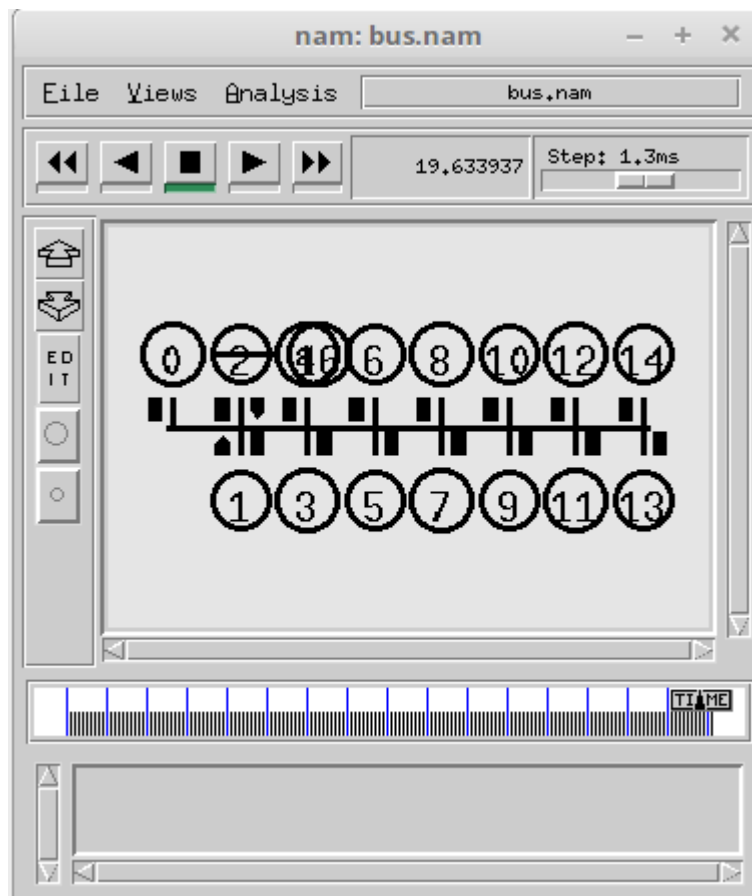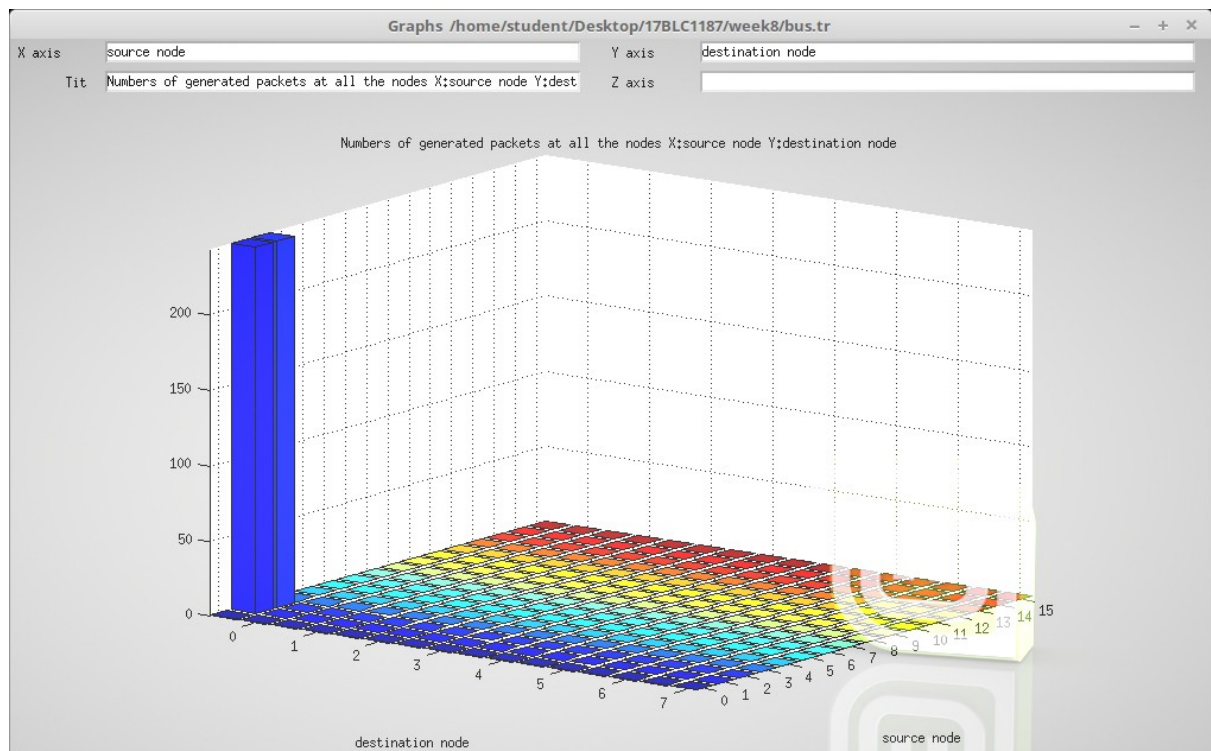
GREP results: 15,2

NAM:

Tracegraph Results:

Generated Packets Throughput
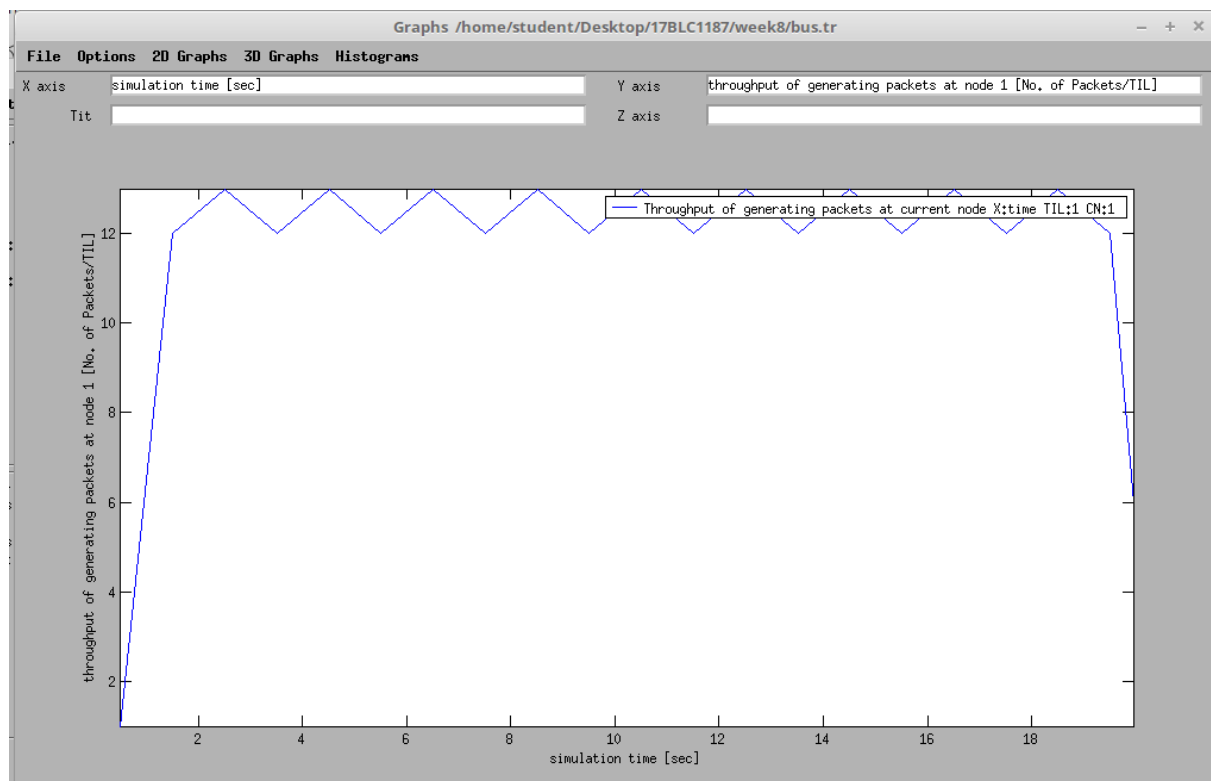
Generated packets

GREP: 15, 4

File   Views   Analysis

19.878718   Step: 794.3ms

ED IT

0   2   46   6   8   10   12   14

1   3   5   7   9   11   13

TIME
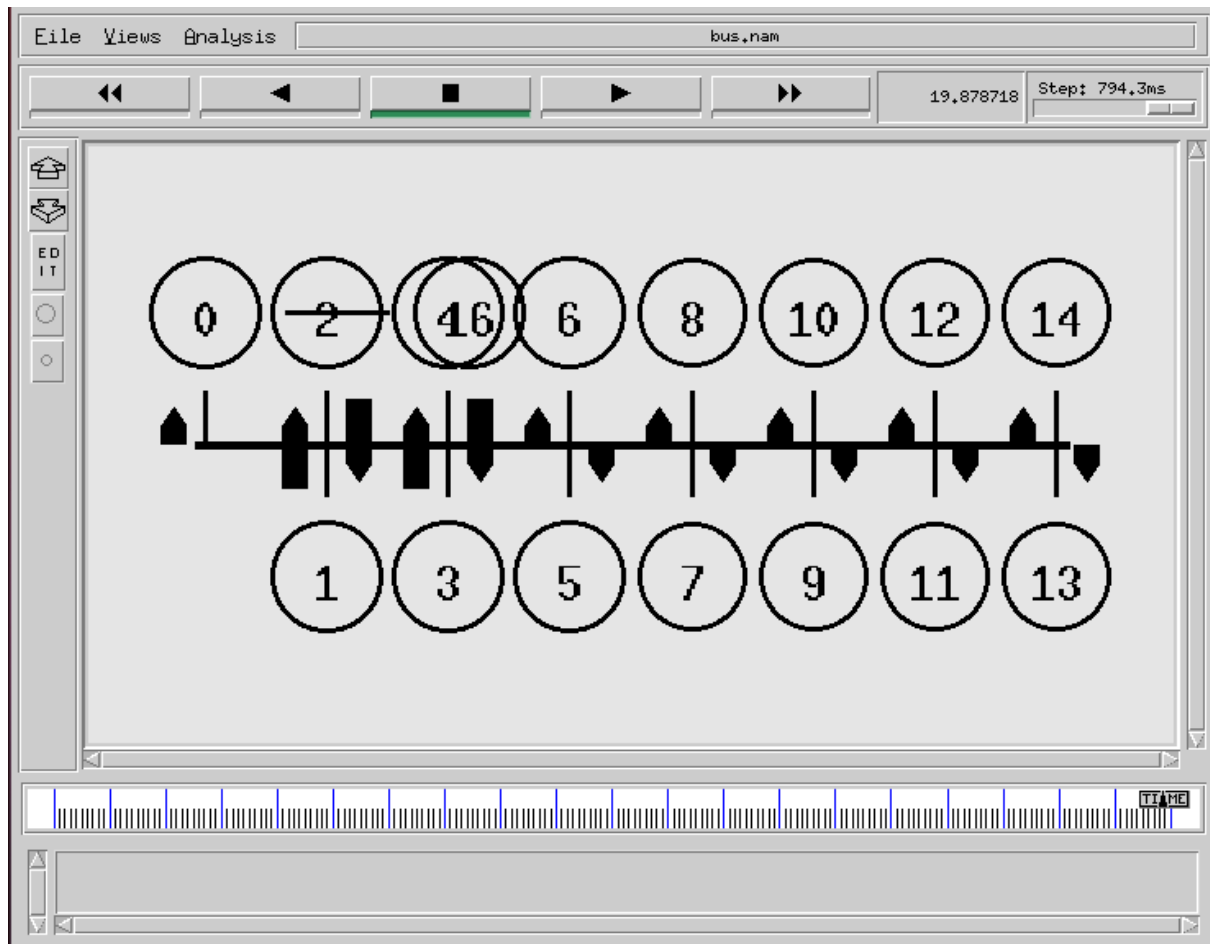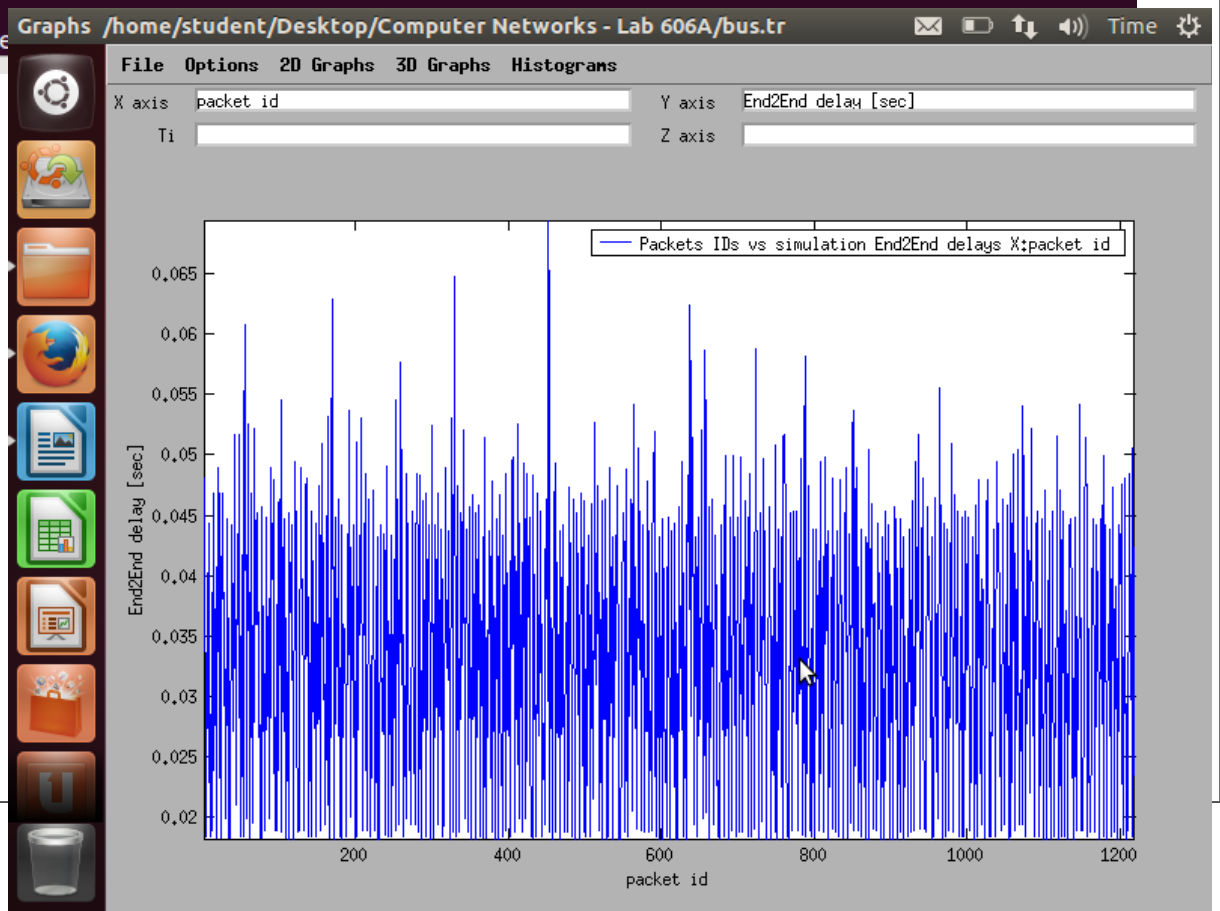
```
student@student:~$ grep "^c" bus.tr | wc -l
3010
student@student:~$ grep "^+" bus.tr | wc -l
976
student@student:~$ grep "^r" bus.tr | wc -l
976
stude
```

Graphs /home/student/Desktop/Computer Networks - Lab 606A/bus.tr   Time

File   Options   2D Graphs   3D Graphs   Histograms

X axis   packet id   Y axis   End2End delay [sec]
Ti   Z axis

Packets IDs vs simulation End2End delays X:packet id

0.065

0.06

0.055

End2End delay [sec]   0.05

0.045

0.04

0.035

0.03

0.025

0.02

200   400   600   800   1000   1200

packet id

GREP: 15, 10

```
student@student:~/Desktop/Computer Networks - Lab 606A$ grep "^c" bus.tr | wc -l
3712
student@student:~/Desktop/Computer Networks - Lab 606A$ grep "^+" bus.tr | wc -l
2440
student@student:~/Desktop/Computer Networks - Lab 606A$ grep "^r" bus.tr | wc -l
2163
student@student:~/Desktop/Computer Networks - Lab 606A$
```
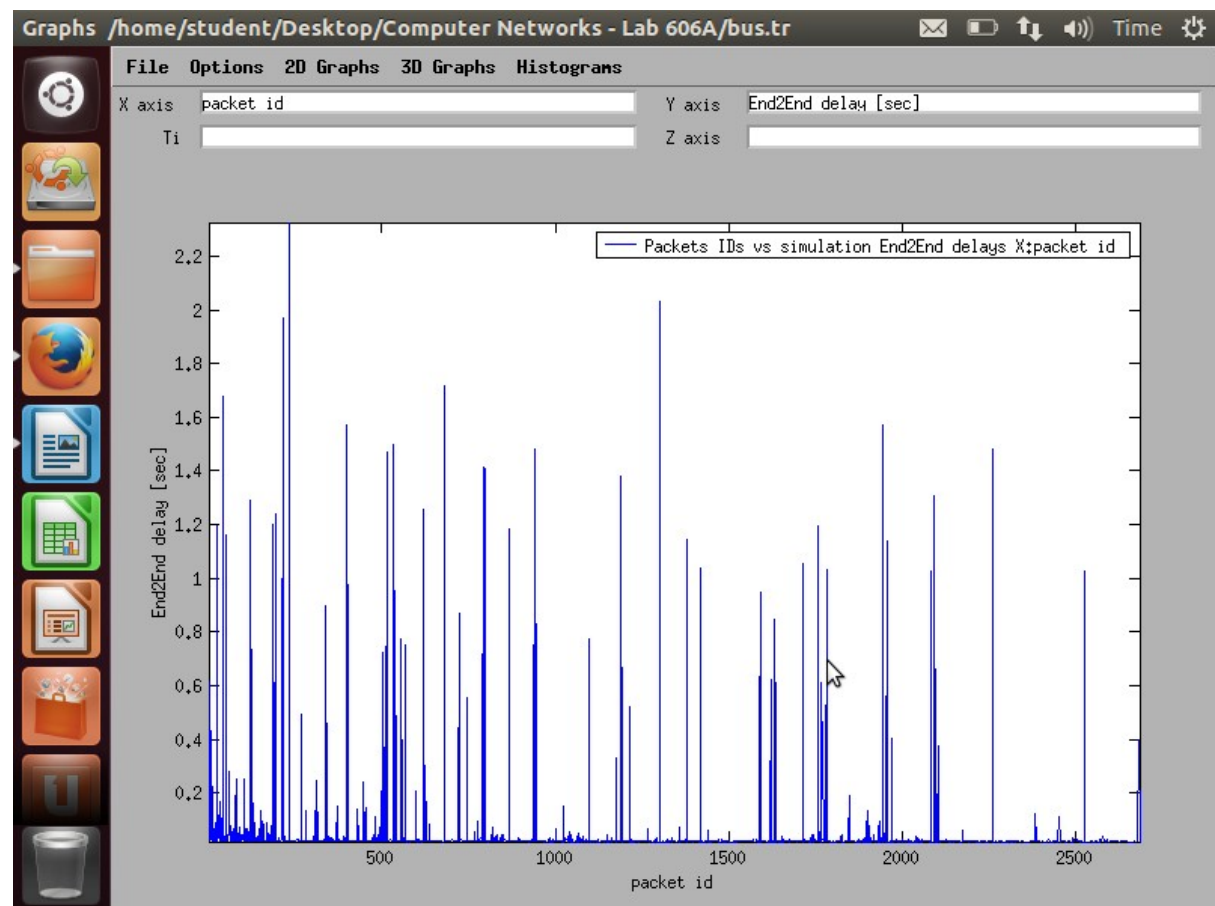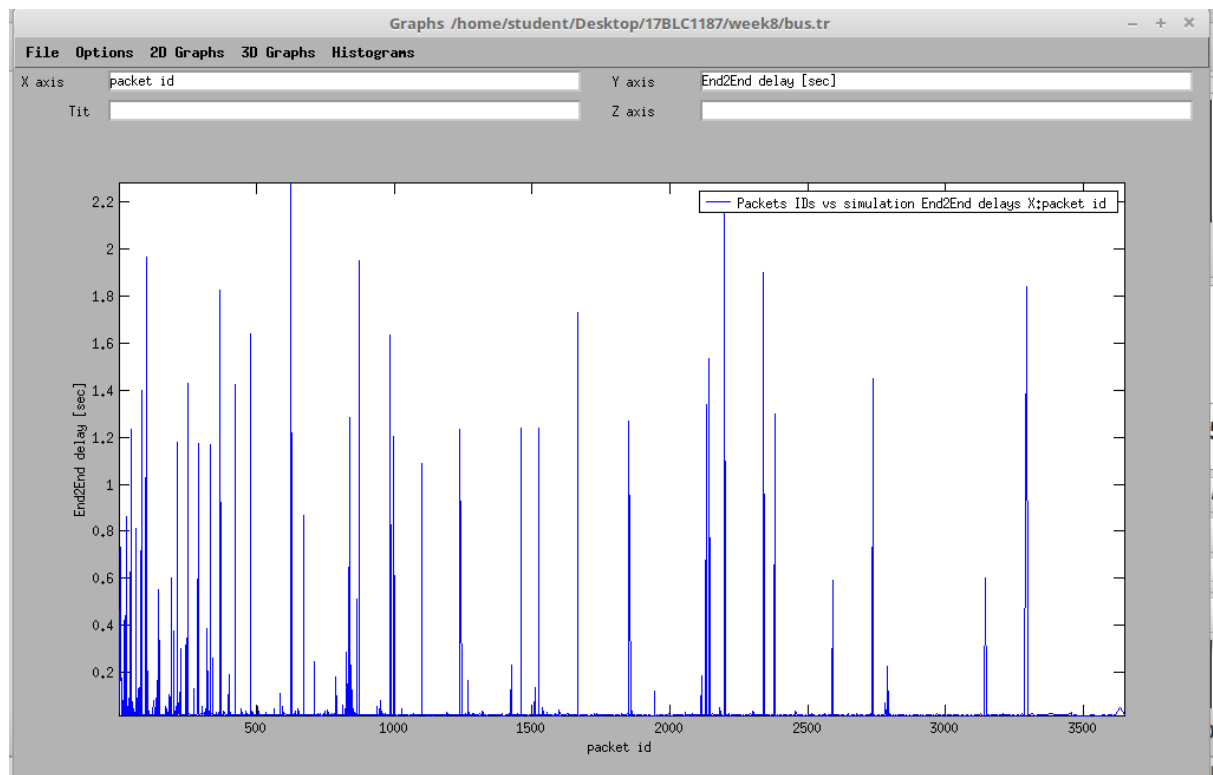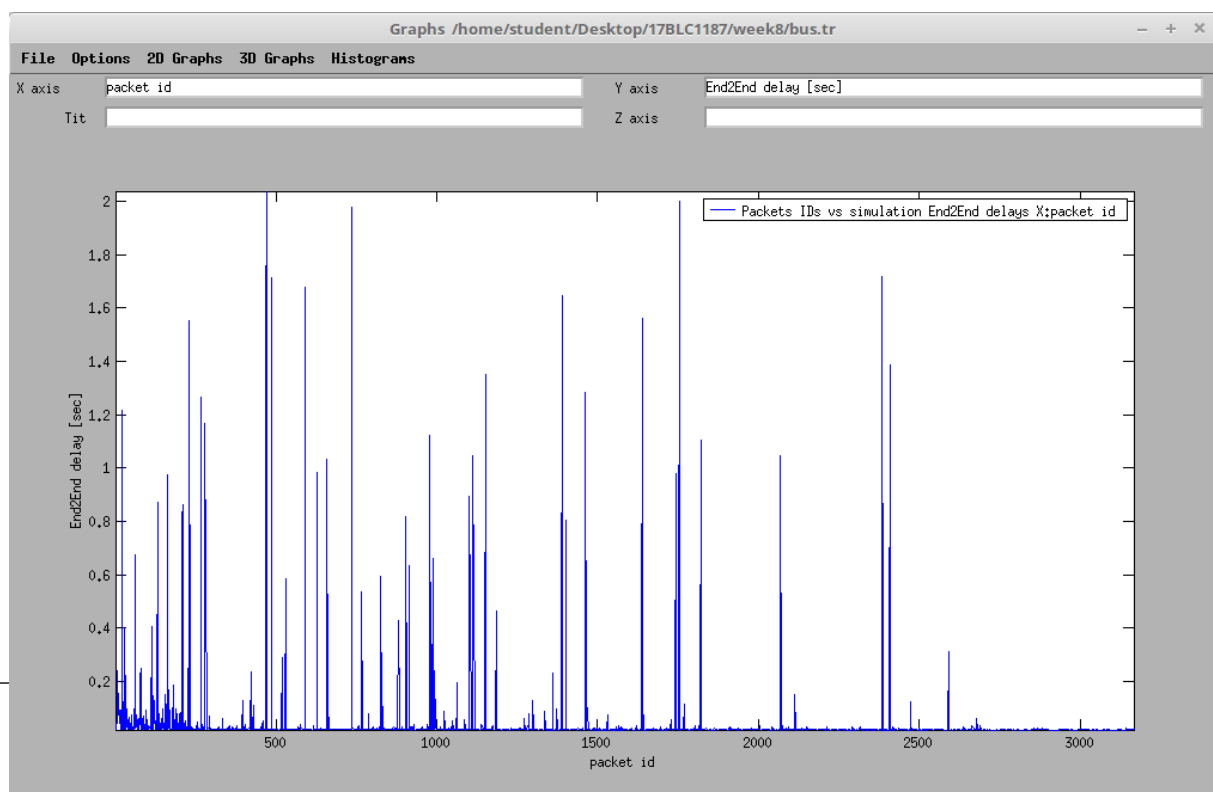

GREP: 15,12

BEB limit exceeded:Dropping packet 2563
student@administrator-OptiPlex-3060 ~/Desktop/17BLC1187/week8 $ grep "^c" bus.tr | wc -l
4185
student@administrator-OptiPlex-3060 ~/Desktop/17BLC1187/week8 $ grep "+" bus.tr | wc -l
2928
student@administrator-OptiPlex-3060 ~/Desktop/17BLC1187/week8 $ grep "^r" bus.tr | wc -l
2273
student@administrator-OptiPlex-3060 ~/Desktop/17BLC1187/week8 $

15,14

```
                    student@administrator-OptiPlex-3060 ~/tracegraph202        —  +  ×

  File  Edit  View  Search  Terminal  Help

BEB limit exceeded:Dropping packet 2634
BEB limit exceeded:Dropping packet 2982
BEB limit exceeded:Dropping packet 2313
student@administrator-OptiPlex-3060 ~/Desktop/17BLC1187/week8 $ grep "^c" bus.tr
 | wc -l
4434
student@administrator-OptiPlex-3060 ~/Desktop/17BLC1187/week8 $ grep "+" bus.tr
| wc -l
3416
student@administrator-OptiPlex-3060 ~/Desktop/17BLC1187/week8 $ grep "^r" bus.tr
 | wc -l
2273
student@administrator-OptiPlex-3060 ~/Desktop/17BLC1187/week8 $ cd ~/tracegraph2
02/
student@administrator-OptiPlex-3060 ~/tracegraph202 $ ./trgraph /home/student/De
sktop/17BLC1187/week8/bus.tr &
[1] 3659
student@administrator-OptiPlex-3060 ~/tracegraph202 $ Copyright (c) 2001-2005 by
 Jaroslaw Malek
All rights reserved.
Author contact: wido@o2.pl

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