ECE466 Lab 2a Report

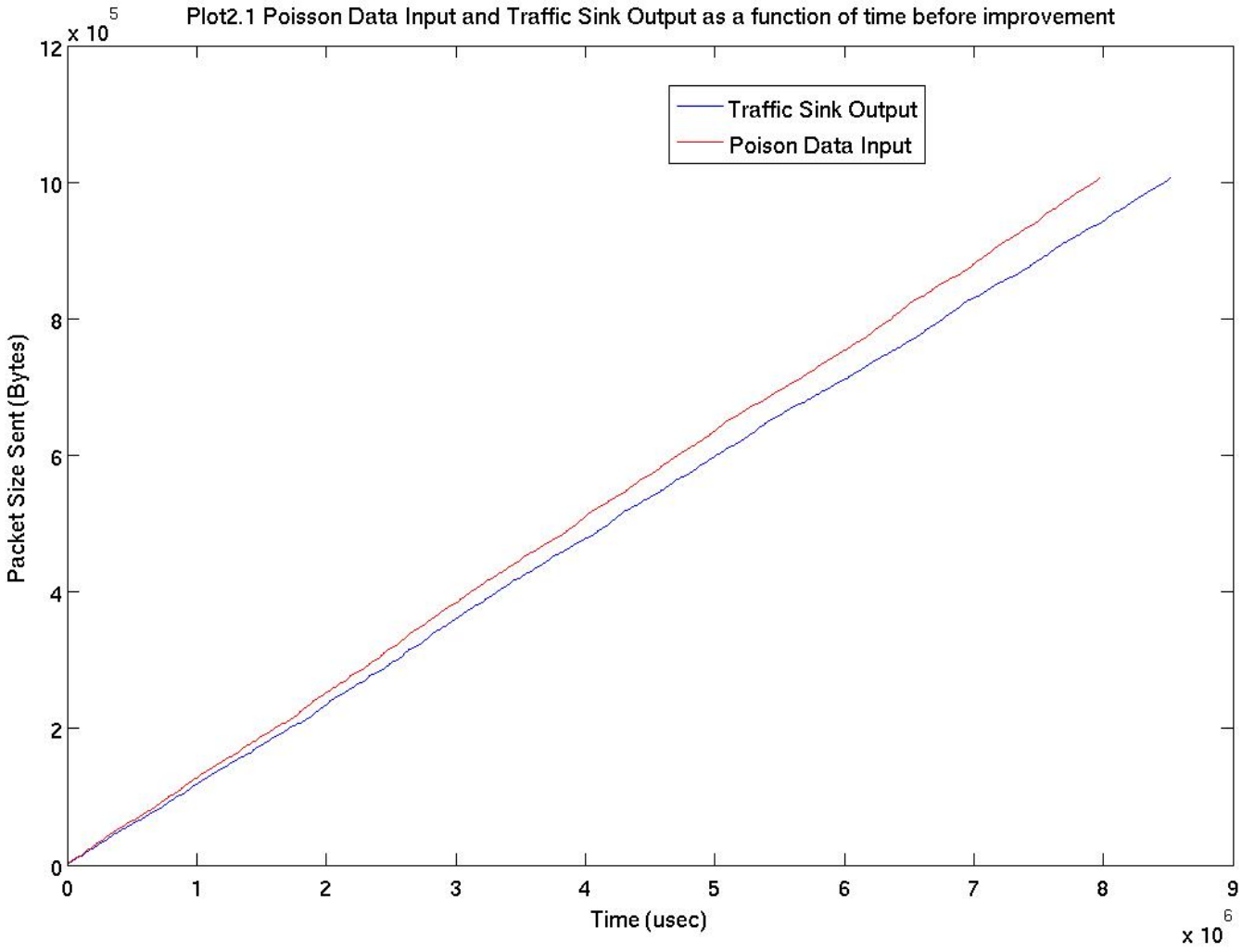
Lizhou Wang 99832733

Qiuyi Guan 998373175

Part 2. Traffic generators

Exercise 2.3 Evaluation

Prepare a plot that shows the difference of trace file and the output file:



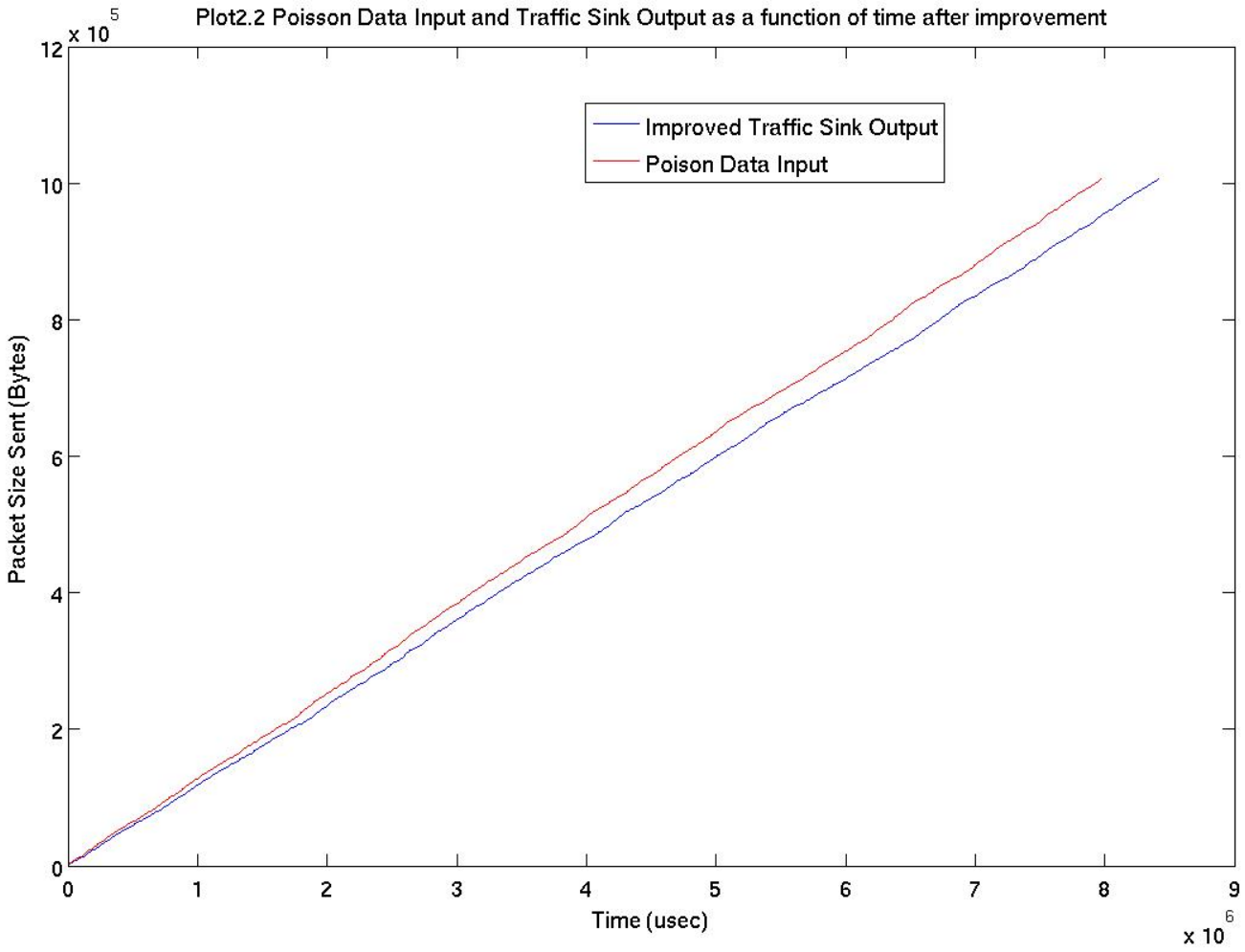
Plot 2.1 Discussion:

The red lines represents the input trace to the Traffic generator which is the Poisson3 data provided, and the blue lines represent the Traffic Sink trace(Output). The x-axis is the time when the packet is transmitted and y-axis is the sequence number of the packet. The output trace has longer accumulative receiving time compare to input trace due to the transmission and program delay. In another word, the blue trace(output) is below red trace(input) which indicates the delay.

Improve accuracy:

In our original implementation, we read a line from the poisson3 data file and sent that line right away. This is very time consuming since that each time a line is read, the program has to access the file on local disk. This influence the accuracy of our overall result. To improve our code, we first read data into memory, so that we only have to access the disk once, which improved our program accuracy. Below is a plot of our improved output vs poisson3 data input.

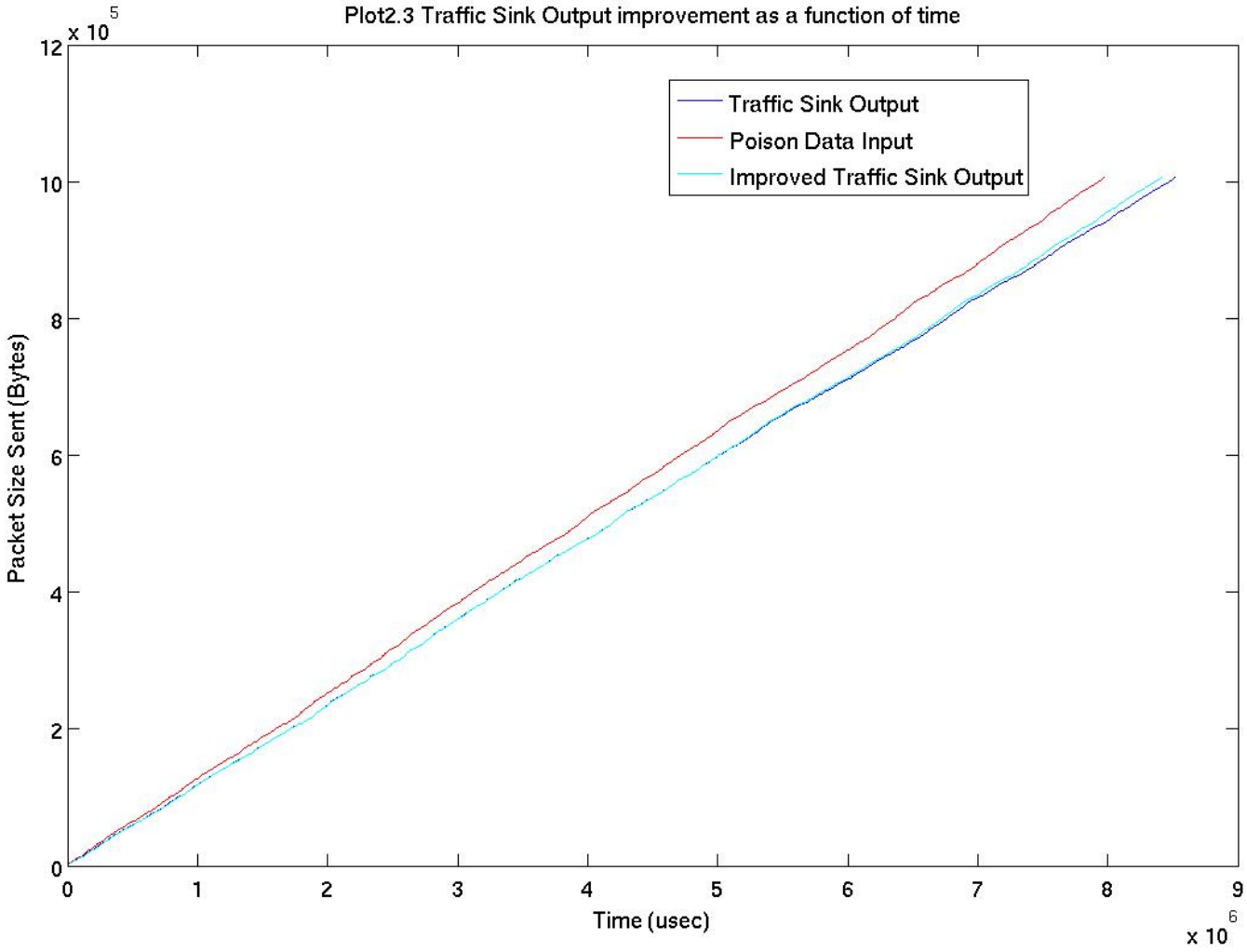
Below is the plot after improvement:



Plot 2.2 Discussion:

The red lines represents the input poisson trace, and the blue lines represent the improved Traffic Sink Trace(Output).

To better show the improvement, we plotted the output before improvement and the output after improvement on a same graph as below:

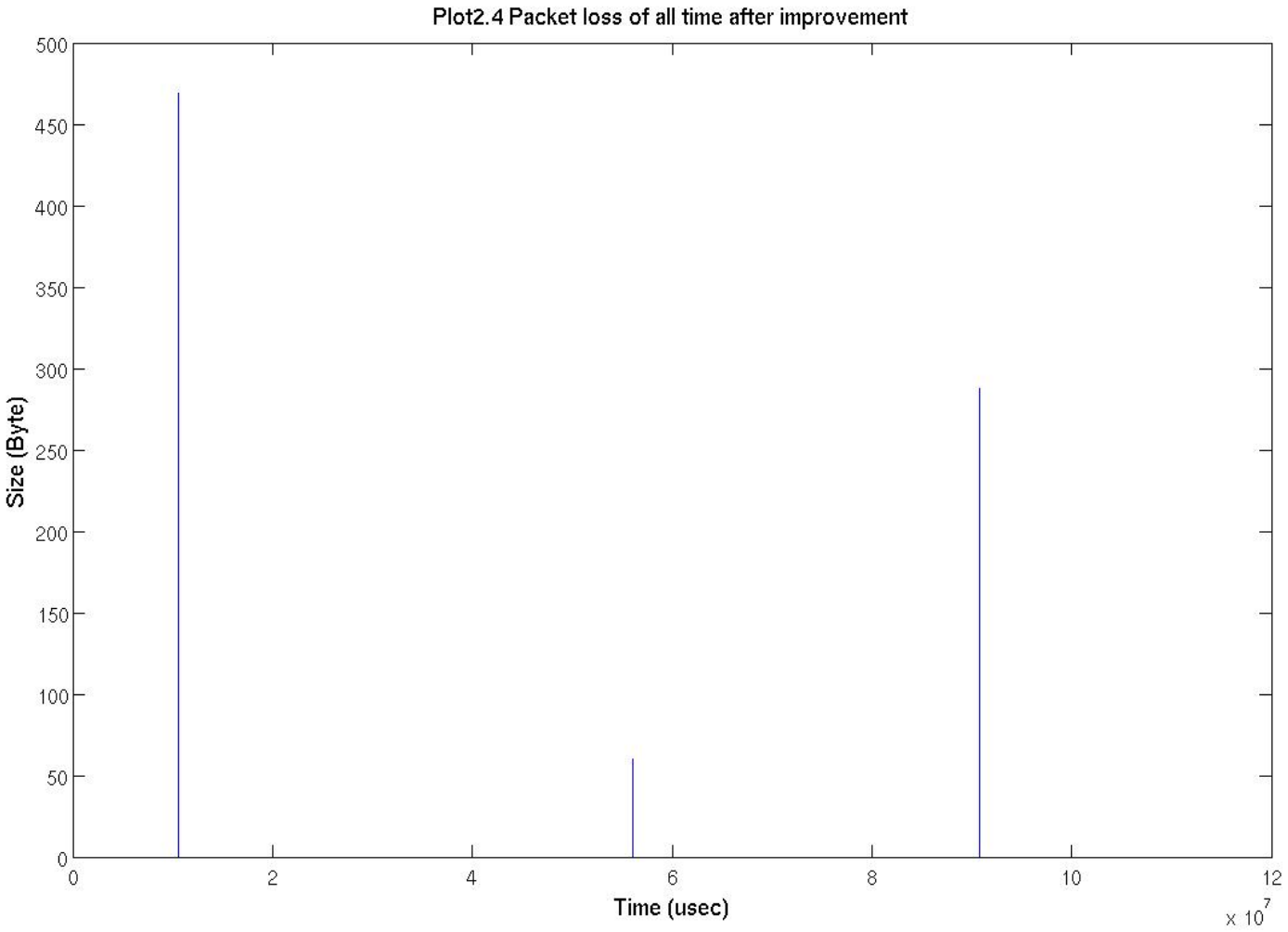


Plot 2.3 Discussion:

The red lines represents the input poisson trace, the dark blue lines represent output sink trace before improvement, and the light blue lines represents the Traffic Since Trace after improvement. We can see from the graph that the improved traffic sink(light blue blue) output has less delay which is slightly above dark blue trace.

Exercise 2.4 Account for packet losses

In our experiment, we ran both the traffic generator and the traffic sink on localhost, so that packet losses didn't not occur at a high frequency. We have plotted all packet losses in the graph below:

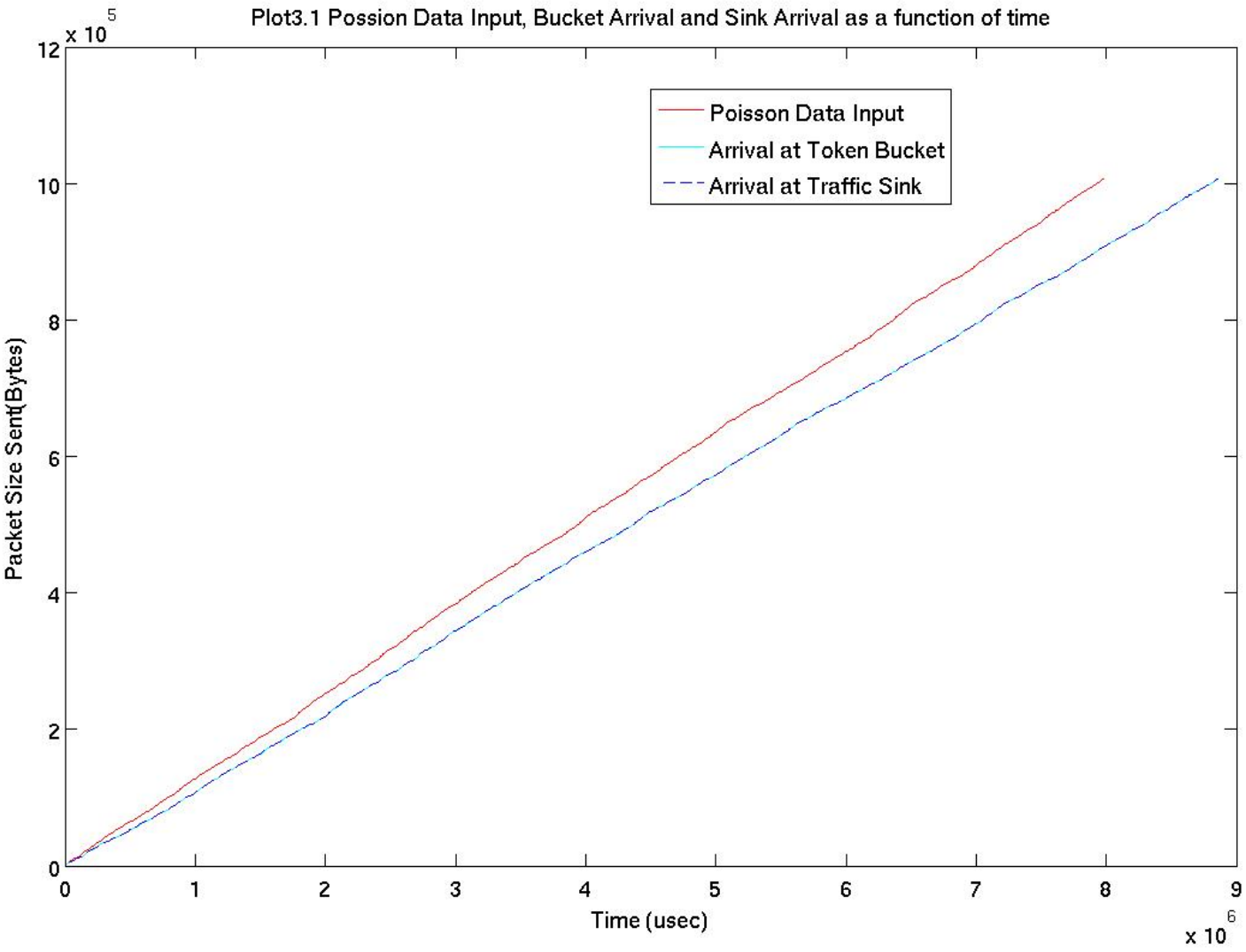


Plot 2.4 Discussion:

This graph shows all packet losses of all time. We only experienced 3 packet losses. X-axis represent the time where packet losses occurs and y-axis represent the size of the losted packets.

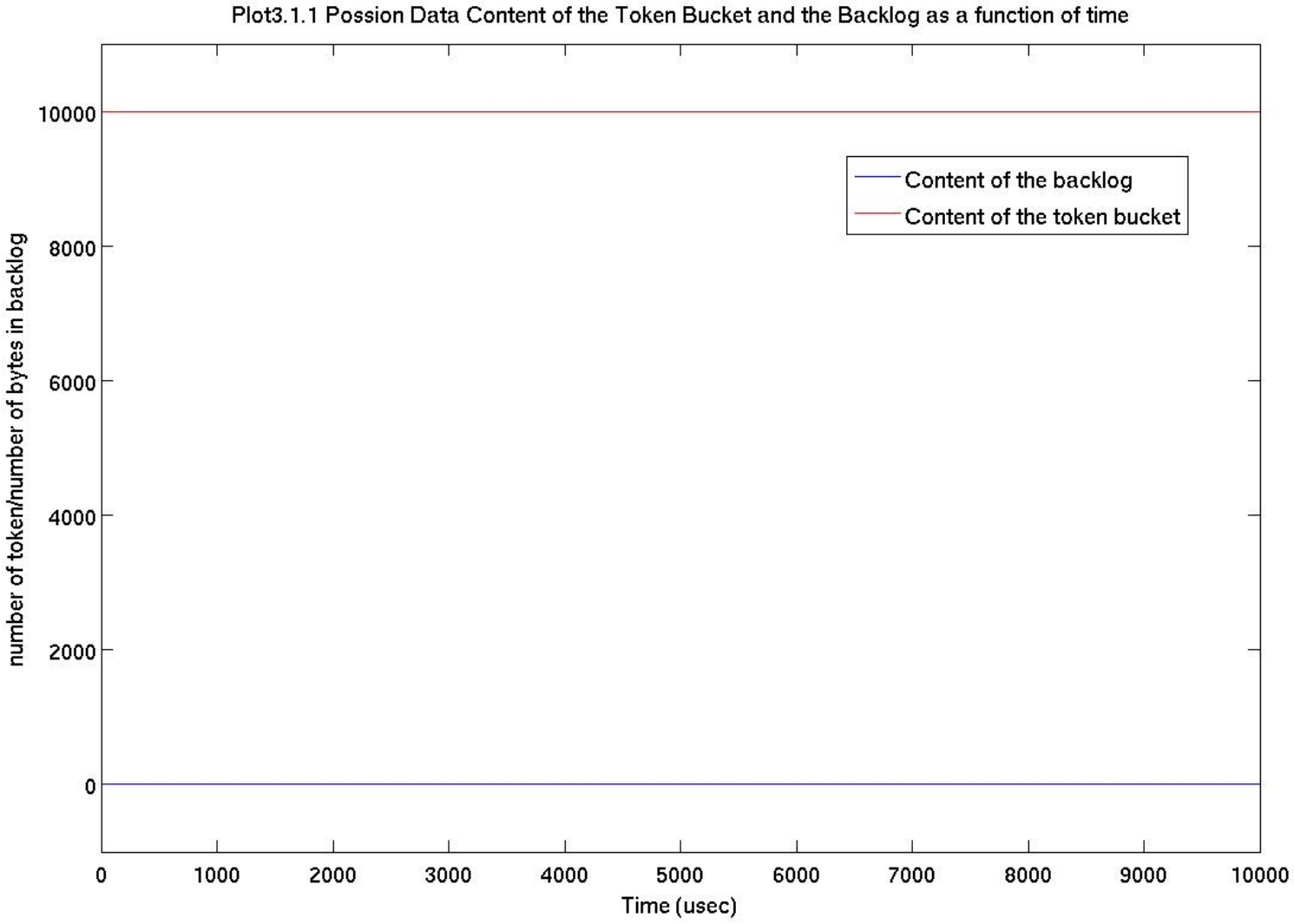
Part 3. Token Bucket Traffic Shaper

Exercise 3.2 Evaluate the reference implementation for the Poisson traffic file



Plot 3.1 Discussion:

This plot shows the the cumulative arrival function(accumulative bytes) as a function of time of the Poisson data of the trace file (Red line), the arrivals at the token bucket (light blue line), and The arrivals at the traffic sink (Dark blue dash line). The Arrival at Token Bucket is slightly above the arrival at Traffic Sink, meaning that the data arrives at Token Bucket first. However, comparing to the delay between Data input and the arrival at token bucket, the delay between Token bucket and Traffic Sink is really small. This little time different between bucket arrival and sink arrival, is because the bucket send packet immediately without delay. Please refer to section 3.1.1 for bucket usage summary.

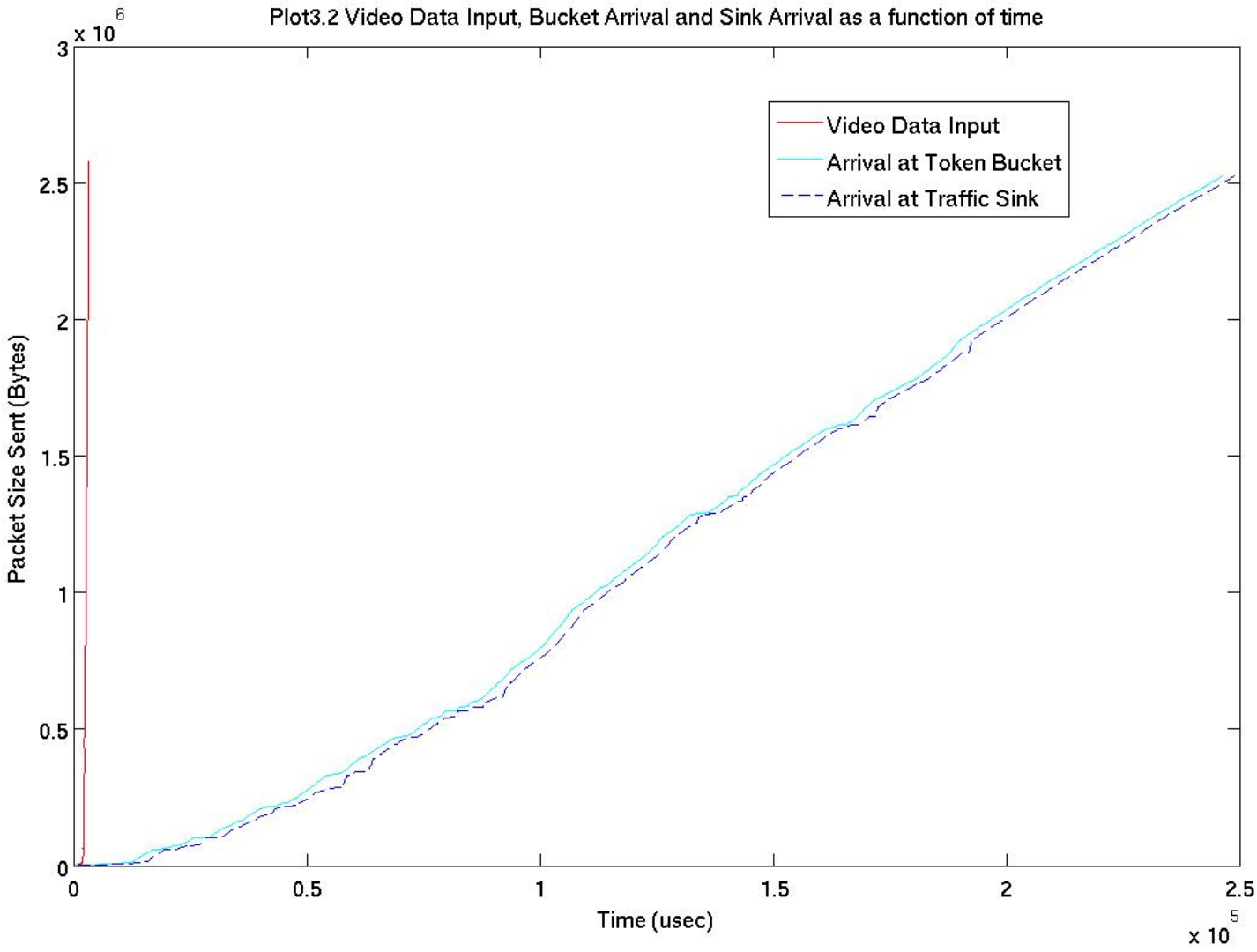


Plot 3.1.1 Discussion:

This plot shows the content of the token bucket and the backlog in the buffer as a function of time. X-axis is the time and y-axis is the number of tokens(For token bucket) and the number of bytes (for backlog). In this lab, bucket sent packets immediately so that no tokens were used and no backlog in buffer. As the result, the number of tokens remained 10000 at all time and the content of backlog remained zero, which were represented as the two straight lines in the above diagram.

Exercise 3.3 Evaluate the reference implementation for the Ethernet and Video Trace Files

Video Trace File:

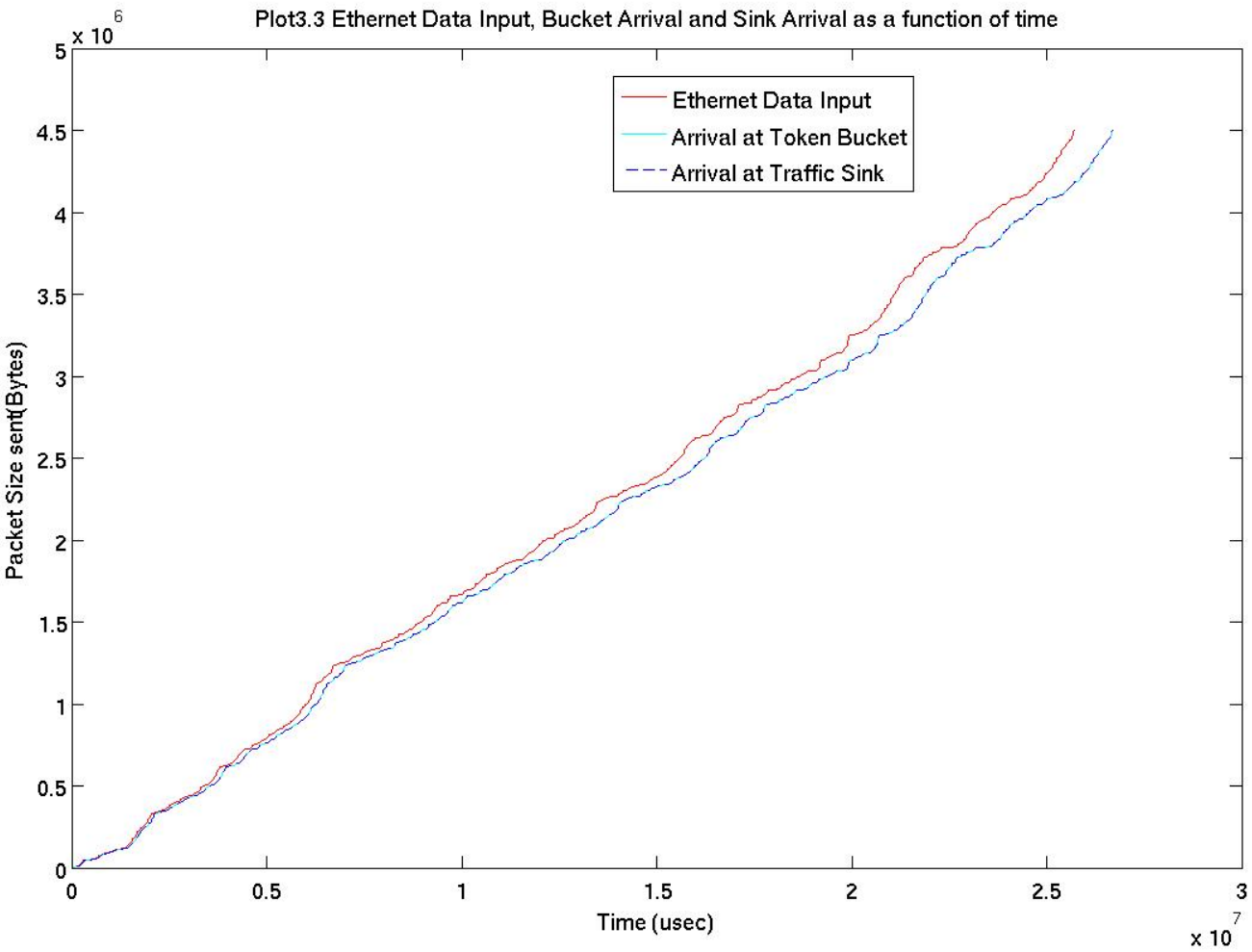


Plot 3.2 Discussion:

Most movie frames' size exceeded max packet size, so these frames are broken down into a lot more smaller packets. In another word, significantly more packets were received at bucket receiver and sink receiver, therefore larger delay in this case. The rest discussion remains the same to plot 3.1.

Token bucket plot: The content of the token bucket and the backlog in the Buffer as a function of time is same with plot 3.1.1 as no tokens were used and no backlog was created. Please refer to 3.1.1

Ethernet Traffic:



Plot3.3 Discussion:
The discussion is similar to plot 3.2, but the ethernet input trace has a few packets that exceed the max packet size, therefore the delay is a lot smaller than movie data, and the result plot 3.3 is more closer to poisson data(plot 3.1). The rest discussion remains the same as plot 3.1 discussion.

Token bucket plot: The content of the token bucket and the backlog in the Buffer as a function of time is same with plot 3.1.1 as no tokens were used and no backlog was created. Please refer to 3.1.1

Source code:
For part 3.1 source code please refer to src_3.1/ folder
For matlab script please refer to src_matlab/ folder