Aiden Pratt
CS-6014
Assignment 1

question 1:

what is the average queuing delay experienced by the 1000-byte packets?

queue delay:
subtract 2.8ms from each of the other packets
then average those together and /5
for 1000 byte packets.
2.8ms is the fastest delay of the five packets
subtract 2.8ms from the other 4 packets and divide that answer by 5

=3.66ms queue delay for the 1000 byte packages on average

what are reasonable estimates of transmission and propagation delays that will be experienced by a packet of size 600 bytes sent through the link K?

first find the difference of the shortest delay between the given 500 and 1000byte packets
500 is 2.4 , 1000 is 2.8 , this equals .4ms as the difference
transmission delay = size/R (R being the device rate)
to find R we can do the size of 500 bytes/ .4 ms = 1250byte/ms
we can use this to determine the transmission delay for 600
transmission delay = size / R
so 600/1250 = .48ms transmission delay
from here we can find the propagation delay by calculating delay = propagation + transmission + processing + queuing
processing delay is 0 and queuing delay can be ignored as we are solving for the first package which will not have a queue
this leaves us with delay = propagation delay + transmission delay
the transmission delay for 500 is 500/1250 which = .40
using the 500 byte size,
2.4 = x + .40
2.4 - .4 = 2.0ms
propagation delay wil bel = 2.0ms as a constant for all packet sizes
for the 600 byte package this results in totaldelay = 2.0 + .48
The propagation delay for 600 byte package is 2.48ms

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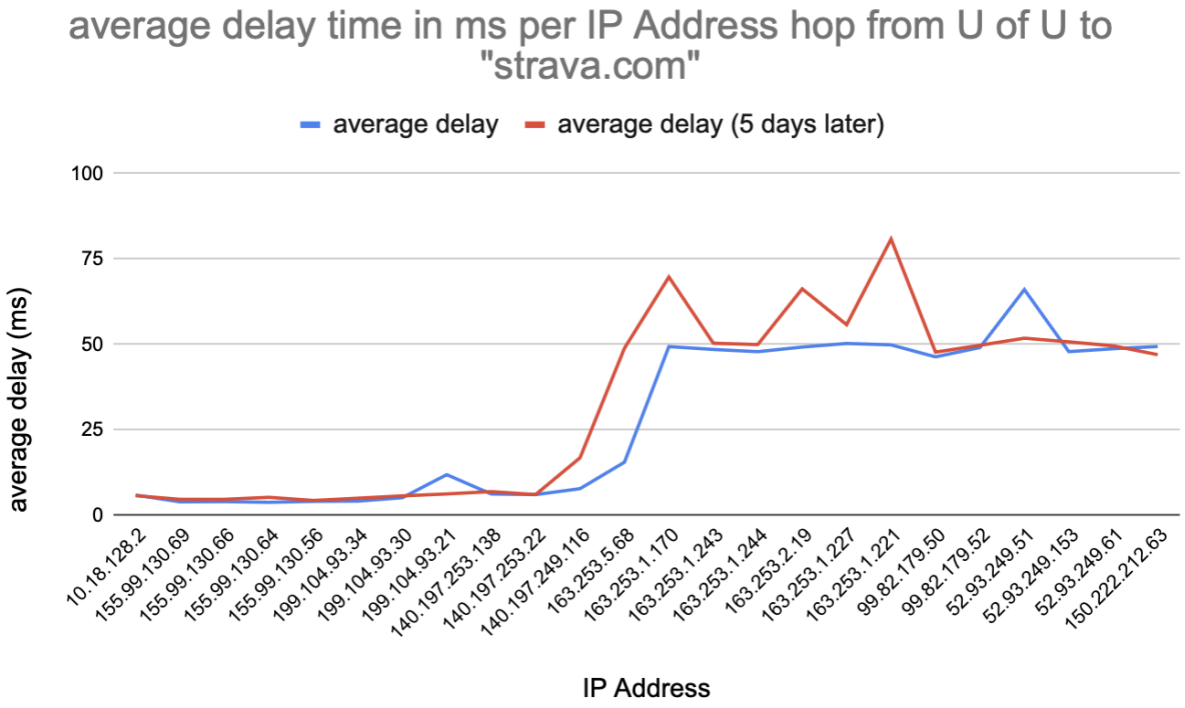
question 2:

part a:



for my output file from traceroute, some IP addresses may only provide one time in ms instead of the typical 3 given. In my code, I implemented a count which would increment with each line if there were multiple measurements in ms. I then utilized this count to calculate the average.

part b:

Suppose one of the three traceroute delay values between the source and a given router hop turns out to be unusually high. What are two possible causes for this unusually high delay?

If one of the three traceroute delay values between the source and a specific router hop is unexpectedly high, there are some potential noticeable causes for this. Firstly, the elevated delay may indicate a problem at that particular hop or a faulty connection between the two IP addresses. The traceroute command sends 3 UDP packets to calculate the average round trip.

Secondly, network congestion could be a contributing factor. If the router or network handling the hop is busy, the packet for that hop might be queued, causing a delay in its measured time. If the router is overwhelmed with packet processing and cannot efficiently handle the workload, it can result in a higher delay value for one of the three traceroute delays.

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question 3:

the average queuing delay for my ping to “https://european-union.europa.eu” is: **16.31643227665706ms**