CENG 519 - Network Security - Project Phase 1 Report

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1 Processor Design

The processor subscribes to inpktsec and inpktinsec through NATS. When handling the message, it gets the message data and message subject then applies a random delay drawn from an exponential distribution with a specified mean, and republishes the delayed frames to related subscriber according to message subject. The delay is calculated as follows:

$$\text{delay} = \texttt{random.expovariate}\left(\frac{1}{\text{mean\_value}}\right)$$

Python's random library's expovariate function is a exponential distribution. lambd is 1.0 divided by the desired `mean_value`.

2 Experiment and Results

For evaluation, the processor was run with `mean_value` arguments starting from 5e-6 and increasing by a factor of 10 up to 5e-1. Additionally, values such as 1e-6, 0.1, and 10 were included for more accurate comparison. For each delay setting, the average RTT of approximately 50 ping packets was recorded.

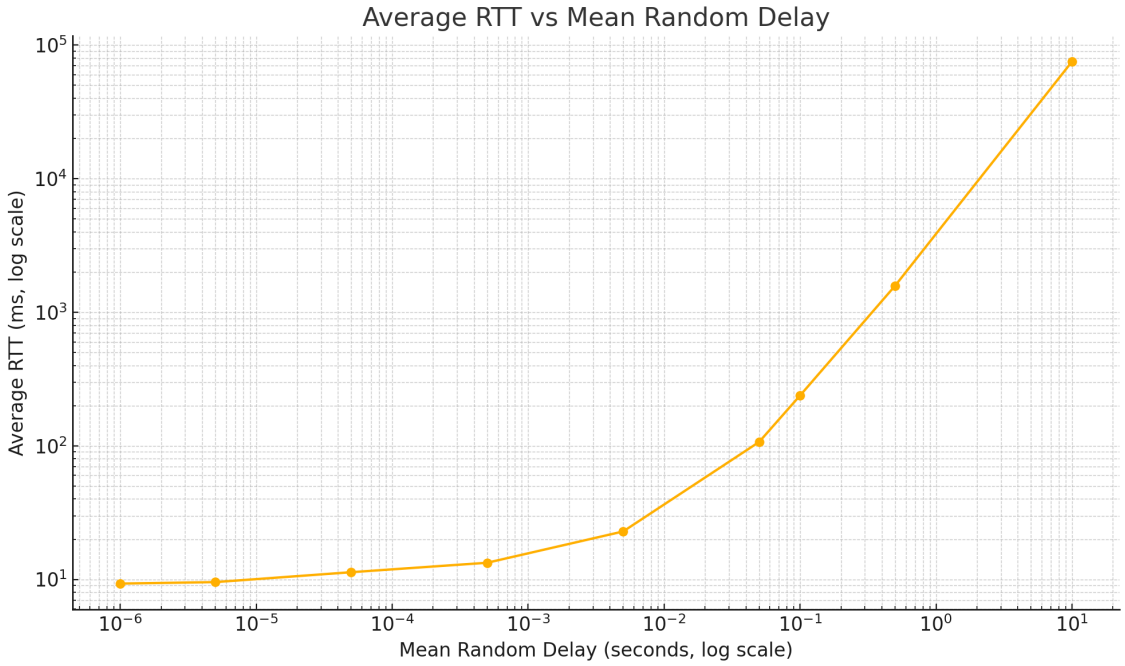

Figure: Average RTT vs Mean Delay applied by processor.

3 Conclusion

The results show that as the mean of the random delay increases, the average RTT rises significantly, especially beyond 10^{-2} seconds. For very small delays, RTT remains close to the base network latency, but larger delays cause RTT to grow rapidly, reaching over 75 seconds at a 10-second mean. This confirms the processor correctly models delay and highlights its impact on network performance.

4 GitHub Repository

Project code and this report are available at:
`https://github.com/ANILKE/middlebox/tree/phase1`