## Explanation of My Simulator ABP

- The Simulator class initiates the ABP simulation environment, it takes the header length, package length, channel capacity, propagation delay, BER, and number of packages to send.
- The sender method in the Simulator class simulates the sending packages process. It uses BER to derive 1. package has no error rate, 2. package has error rate, and 3. package loss rate, which is used to simulation a package state in each transmission. My send method ensures that there are 10000 packages in total correctly transmitted to receiver. The send method in charge of updating the total time of the transmission. If package loss, it up dates time with timeout value and retransmit the package again. If the package error, it up date time with NACK time and retransmit the package again. Only if the package success, it up date time with ACK time without retransmission. (NACK time = ACK time)
- The getThroughput method returns the throughput of the simulation system. It uses total packages being sent, which is 10000 , dividing by the total number of seconds to return the through put of the simulation system.
- The plotResult method generates a data frame that contains the result of the data table below and the plotted diagram.

## Summary of Result Data Table

| $\delta/\tau$ | 2τ=10ms | | | 2τ=500ms | | |
|---|---|---|---|---|---|---|
| | BER=0.0 | BER=1e-4 | BER=1e-5 | BER=0.0 | BER=1e-4 | BER=1e-5 |
| 2.5 | 80.297981 | 160.000000 | 162.854137 | 1.990233 | 3.200063 | 3.626113 |
| 5 | 80.297981 | 80.004000 | 114.199376 | 1.990233 | 1.600000 | 2.454530 |
| 7.5 | 80.297981 | 53.334229 | 87.441274 | 1.990233 | 1.066691 | 1.872196 |
| 10 | 80.297981 | 40.002000 | 71.112271 | 1.990233 | 0.800000 | 1.502258 |
| 12.5 | 80.297981 | 32.000962 | 60.381229 | 1.990233 | 0.640054 | 1.273211 |

# Plots

**Finding of the plot**

Propagation delay will have a significant effect on the throughput of ABP. With increasing propagation delay, the throughput will decrease. With ABP system's timeout value increases the system with small BER will have a large throughput than system with larger BER.