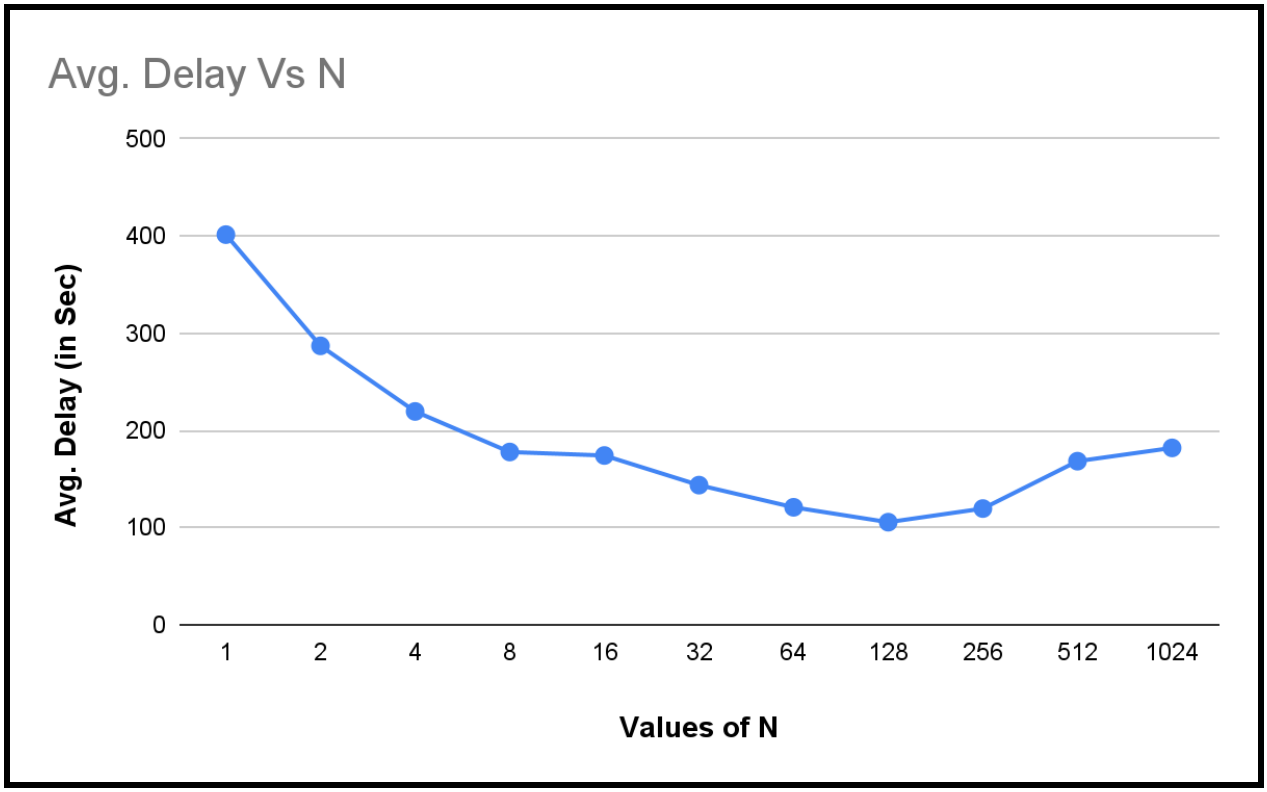
# IP Project 2: Go-Back-N

Group Member 1: Banpreet SIngh Chhabra 200369896
Group Member 2: Harikrishna Selvaraj 200366498

## TASK 1:

**P = 0.05**
**MSS = 500**
**N = 1, 2, 4, … 1024**

| N | Delay 1 | Delay 2 | Delay 3 | Delay 4 | Delay 5 | Avg. Delay |
|---|---|---|---|---|---|---|
| 1 | 406.6665058 | 416.6878343 | 378.5538769 | 419.752655 | 385.615416 | 401.4552576 |
| 2 | 288.2062039 | 326.3507102 | 291.259671 | 262.0717809 | 267.142935 | 287.0062602 |
| 4 | 196.781177 | 247.0383627 | 228.9923582 | 225.928787 | 198.805234 | 219.5091838 |
| 8 | 161.7432699 | 173.7480049 | 194.8190019 | 175.7638509 | 182.829097 | 177.7806449 |
| 16 | 158.7473879 | 179.782361 | 179.8238571 | 173.7650318 | 178.7782311 | 174.1793738 |
| 32 | 144.7063508 | 156.78666 | 132.6471441 | 142.6749911 | 141.6802537 | 143.6990799 |
| 64 | 130.728076 | 118.6946132 | 119.6642282 | 111.6638348 | 123.6994913 | 120.8900487 |
| 128 | 111.8090858 | 95.67927289 | 105.772887 | 115.8798196 | 98.70512891 | 105.5692389 |
| 256 | 96.97974873 | 125.3218021 | 137.3811138 | 112.120095 | 126.1143179 | 119.5834155 |
| 512 | 165.2972429 | 169.2467768 | 172.6299779 | 161.941576 | 172.5105002 | 168.3252148 |
| 1024 | 180.4119451 | 179.635242 | 177.4701221 | 185.9326731 | 186.5540562 | 182.0008077 |



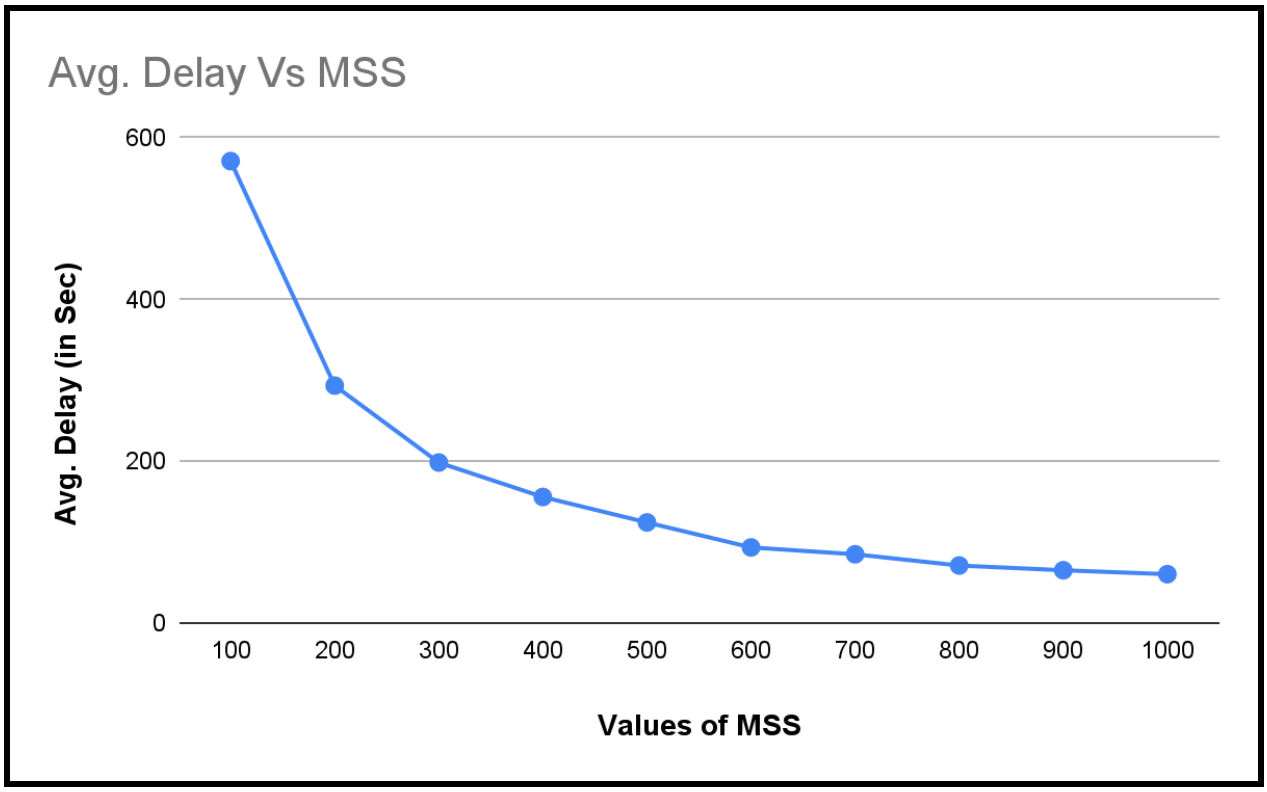

**Explanation:**

For smaller values of window size (N), more time is taken for sending and receiving acknowledgment and hence it leads to more Average delay time. Now for greater values of N, as the window size is big so more and big retransmissions are required and hence more time is taken for retransmitting the data because of errors and big window size. Hence it also leads to more average delay. Therefore there is 1 point (in our case, N=128), where there is an optimal solution and the least Average Delay in sending a 1MB file.

## TASK 2:

**P =** **0.05**
**MSS =** **100, 200, … 1000**
**N =** **64**

| MSS | Delay 1 | Delay 2 | Delay 3 | Delay 4 | Delay 5 | Avg. Delay |
|---|---|---|---|---|---|---|
| **100** | 561.26914<br>81113434 | 600.87697<br>52979279 | 593.66245<br>6035614 | 555.35637<br>02106476 | 543.96655<br>39264679 | 571.0263007 |
| **200** | 311.03472<br>5189209 | 319.04375<br>91075897 | 296.83942<br>103385925 | 262.07178<br>09200287 | 278.45016<br>12186432 | 293.4879695 |
| **300** | 183.62927<br>722930908 | 198.76989<br>38846588 | 198.70159<br>482955933 | 192.73680<br>591583252 | 217.99310<br>58883667 | 198.3661355 |
| **400** | 163.33531<br>069755554 | 154.33727<br>81276703 | 157.40784<br>192085266 | 152.37656<br>784057617 | 151.40391<br>206741333 | 155.7721821 |
| **500** | 118.98492<br>288589478 | 110.04732<br>79953003 | 129.14681<br>196212769 | 133.16809<br>89265442 | 130.21355<br>79586029 | 124.3121439 |
| **600** | 100.89122<br>796058655 | 87.727946<br>04301453 | 104.89742<br>517471313 | 88.811678<br>17115784 | 84.761256<br>93321228 | 93.41790686 |
| **700** | 78.749707<br>69882202 | 97.849628<br>92532349 | 84.757435<br>79864502 | 71.639069<br>79560852 | 91.776314<br>02015686 | 84.95443125 |
| **800** | 69.646809<br>10110474 | 76.707185<br>02998352 | 51.415561<br>91444397 | 69.626488<br>68560791 | 87.799464<br>94102478 | 71.03910193 |
| **900** | 62.526117<br>08641052 | 62.552488<br>803863525 | 72.674076<br>795578 | 58.555493<br>116378784 | 69.644411<br>80229187 | 65.19051752 |
| **1000** | 58.492248<br>05831909 | 61.550532<br>10258484 | 65.588873<br>86322021 | 52.498563<br>051223755 | 63.587895<br>154953 | 60.34362245 |

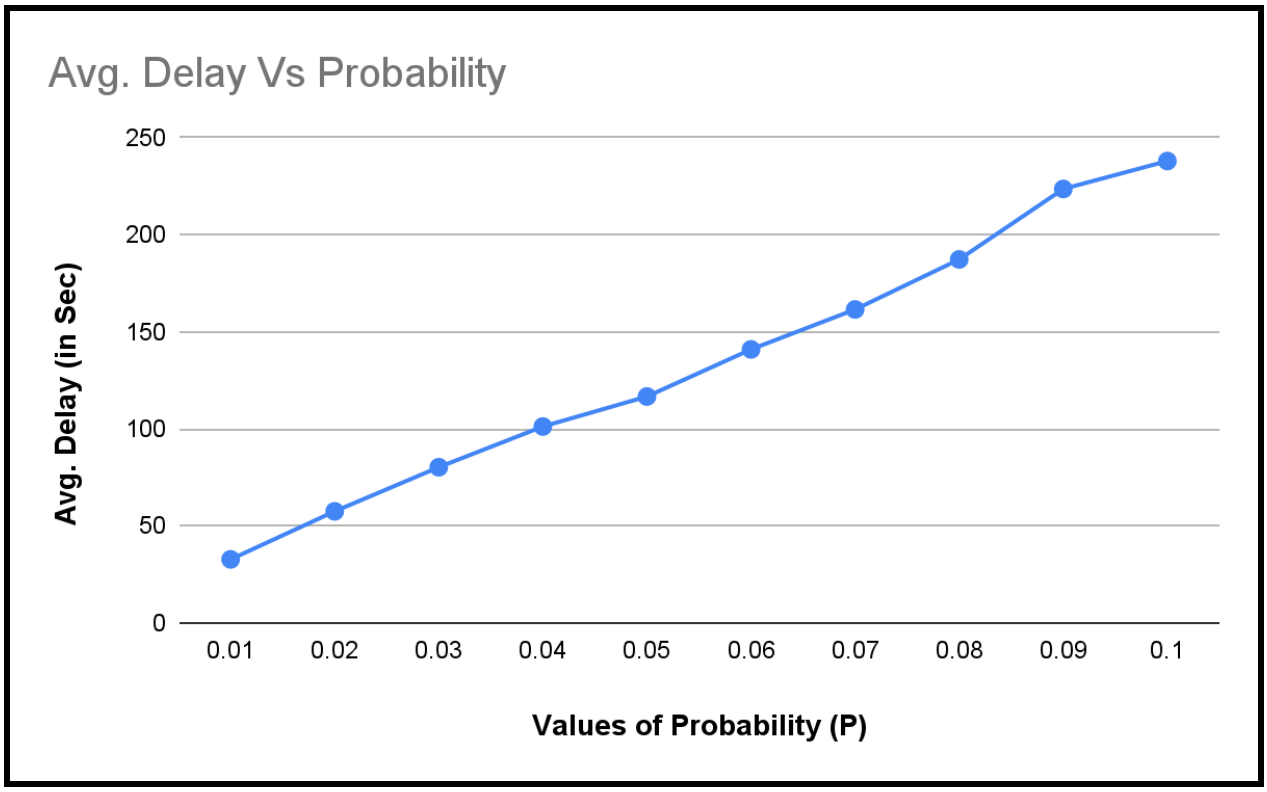



**Explanation:**
Greater values of MSS (Max Segment Size) signifies more data can be sent in a single segment. Hence, for greater MSS value, less number of overall segments have to be transmitted and hence it results in less Average delay as MSS value increases.

## TASK 3:

**P =** **0.01, 0.02, … 0.10**
**MSS =** **500**
**N =** **64**

| P | Delay 1 | Delay 2 | Delay 3 | Delay 4 | Delay 5 | Avg. Delay |
|---|---|---|---|---|---|---|
| **0.01** | 25.157441<br>85447693 | 27.131440<br>87791443 | 40.202253<br>103256226 | 32.154324<br>769973755 | 39.221270<br>0843811 | 32.77334614 |
| **0.02** | 68.392971<br>03881836 | 50.281494<br>140625 | 58.341569<br>900512695 | 65.338254<br>69017029 | 45.228152<br>99034119 | 57.51648855 |
| **0.03** | 76.393011<br>09313965 | 92.534190<br>89317322 | 81.494555<br>9501648 | 75.383888<br>00621033 | 75.404424<br>90577698 | 80.24201417 |
| **0.04** | 93.520192<br>14630127 | 97.704689<br>0258789 | 97.694774<br>15084839 | 104.54847<br>78881073 | 112.58753<br>108978271 | 101.2111329 |
| **0.05** | 110.62614<br>798545837 | 119.75013<br>089179993 | 129.77956<br>986427307 | 94.915295<br>83930969 | 128.24553<br>394317627 | 116.6633357 |
| **0.06** | 147.47376<br>990318298 | 138.29244<br>184494019 | 142.39522<br>409439087 | 133.26327<br>204704285 | 143.28190<br>517425537 | 140.9413226 |
| **0.07** | 159.56608<br>295440674 | 173.65450<br>382232666 | 159.46783<br>018112183 | 165.50005<br>769729614 | 149.34931<br>111335754 | 161.5075572 |
| **0.08** | 189.64034<br>271240234 | 163.57785<br>79711914 | 179.58101<br>511001587 | 197.74832<br>51094818 | 205.85756<br>492614746 | 187.2810212 |
| **0.09** | 203.88549<br>56626892 | 235.16861<br>414909363 | 229.67659<br>378051758 | 229.66816<br>806793213 | 219.49685<br>502052307 | 223.5791453 |
| **0.10** | 233.42062<br>902450562 | 239.42682<br>38544464 | 237.42429<br>089546204 | 247.56187<br>796592712 | 231.99273<br>39553833 | 237.9652711 |




**Explanation:**

Probability value signifies the probability of package being dropped. So, as the probability value increases, more and more packets will be dropped and hence more retransmission will be required. Hence this leads to more Average delta times in sending packets with a higher probability value.