Experiment Results:

Set	Tiny Time				Small Time				Mid Time				Large Time			
	1	2	3	Avg	1	2	3	Avg	1	2	3	Avg	1	2	3	Avg
Baseline	257	228	470	318.333333	267	274	256	265.666667	788	608	508	634.666667	1371	1286	1881	1512.66667
No Delay 1	815	612	777	734.666667	1474	803	936	1071	6115	5999	5618	5910.66667	14580	12913	16623	14705.3333
No Delay 2	1177	1165	681	1007.66667	2017	2096	1789	1967.33333	11885	11899	11288	11690.6667	25713	27718	26929	26786.6667
No Delay 3	1818	1275	2269	1787.33333	2517	3589	4148	3418	19791	17727	17480	18332.6667	49097	45628	49628	48117.6667
No Delay 4	2132	2697	1994	2274.33333	5262	4840	4146	4749.33333	29168	26326	34416	29970	71724	79046	80900	77223.3333
No Delay 5	4956	2309	5347	4204	5970	9677	7582	7743	38487	43876	42134	41499	119127	123958	122615	121900
No Discard 1	2023	2161	2202	2128.66667	4629	5140	2345	4038	30898	15044	29582	25174.6667	80109	74477	78943	77843
No Discard 2	1031	1012	1049	1030.66667	2165	1509	2422	2032	15485	16125	16589	16066.3333	43102	41217	39758	41359
No Discrad 3	1067	1147	1074	1096	1815	3402	3016	2744.33333	16405	16884	16853	16714	43647	44419	44538	44201.3333
No Diacrad 4	1095	1046	1104	1081.66667	2221	2427	2959	2535.66667	18832	17112	17667	17870.3333	46486	45142	43162	44930
No Discard 5	980	1118	1117	1071.66667	2451	3081	2344	2625.33333	18597	17048	18061	17902	44841	43665	45791	44765.6667
Both 1	868	863	811	847.333333	2223	1457	1622	1767.33333	8958	12479	10127	10521.3333	24196	25105	24195	24498.6667
Both 2	1461	1243	1647	1450.33333	2477	1819	2209	2168.33333	14937	12896	14878	14237	35044	35548	38723	36438.3333
Both 3	2057	891	1856	1601.33333	3163	3922	3924	3669.66667	21213	21396	19234	20614.3333	54351	50565	52670	52528.6667
Both 4	887	956	811	884.666667	2071	2119	2560	2250	13131	13148	11267	12515.3333	27732	28999	27682	28137.6667
Both 5	917	1217	908	1014	2357	2397	1991	2248.33333	13663	12339	12299	12767	31871	29866	36138	32625
Both 6	1929	1347	2015	1763.66667	2793	3790	4225	3602.66667	20440	18514	21486	20146.6667	49382	53451	47784	50205.6667

File Size vs Transmission Time:

File Size (KB)	Average Transmission Time (ms)
14	1429.196078
32	2876.235294
205	17209.80392
524	45163.45098

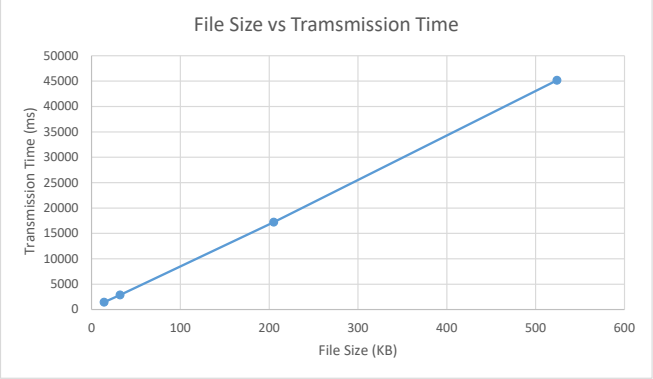

Figure 1

Packet Delay vs Transmission Time:

Tiny File Without Packet Loss	
Packet Delay (ms)	**Average Transmission Time (ms)**
10	2128.666667
20	1030.666667
30	1096
40	1081.666667
50	1071.666667

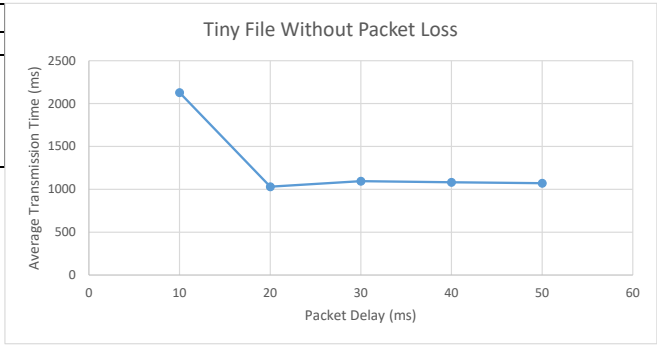

Figure 2

Small File Without Packet Loss	
Packet Delay (ms)	**Average Transmission Time (ms)**
10	4038
20	2032
30	2744.333333
40	2535.666667
50	2625.333333

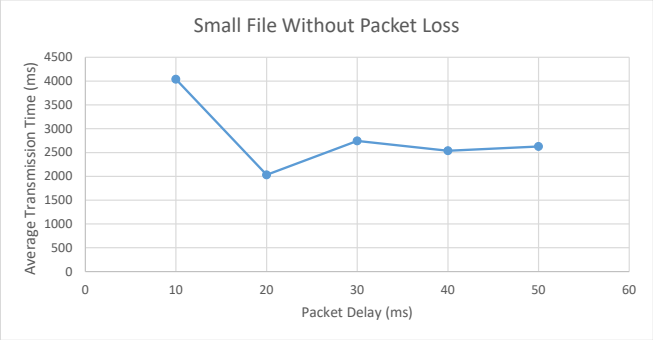

Figure 3

Medium File Without Packet Loss	
Packet Delay (ms)	**Average Transmission Time (ms)**
10	25174.66667
20	16066.33333
30	16714
40	17870.33333
50	17902

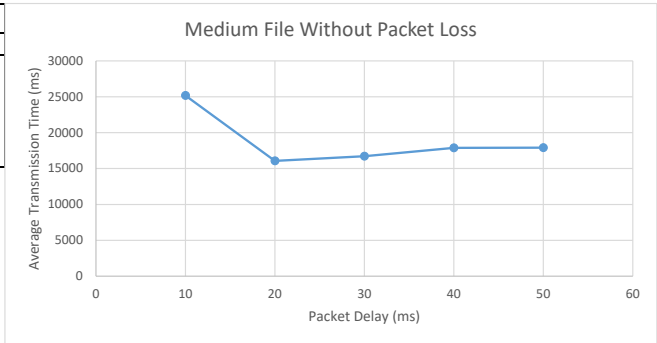

Figure 4

Large File Without Packet Loss	
Packet Delay (ms)	**Average Transmission Time (ms)**
10	77843
20	41359
30	44201.33333
40	44930
50	44765.66667

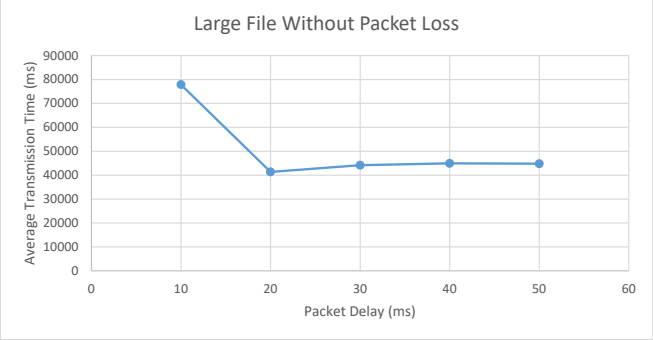

Figure 5

Tiny File With Packet Loss	
Packet Delay (ms)	**Average Transmission Time (ms)**
20	1299.666667
40	1220.777778

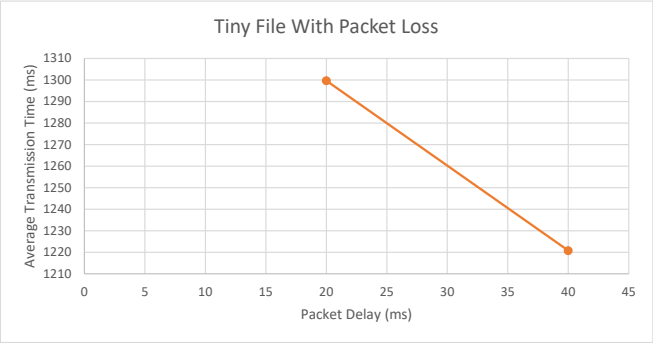

Figure 6

Small File With Packet Loss	
Packet Delay (ms)	**Average Transmission Time (ms)**
20	2535.111111
40	2700.333333

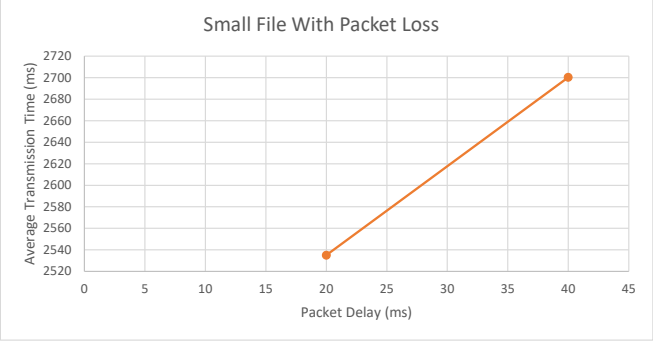

Figure 7

Medium File With Packet Loss	
Packet Delay (ms)	**Average Transmission Time (ms)**
20	15124.22222
40	15143

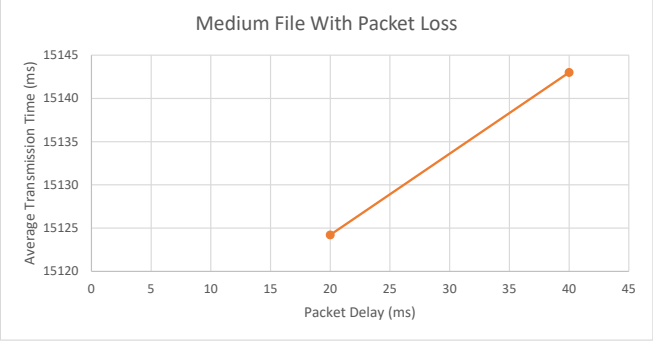

Figure 8

Large File With Packet Loss	
Packet Delay (ms)	**Average Transmission Time (ms)**
20	37821.88889
40	36989.44444

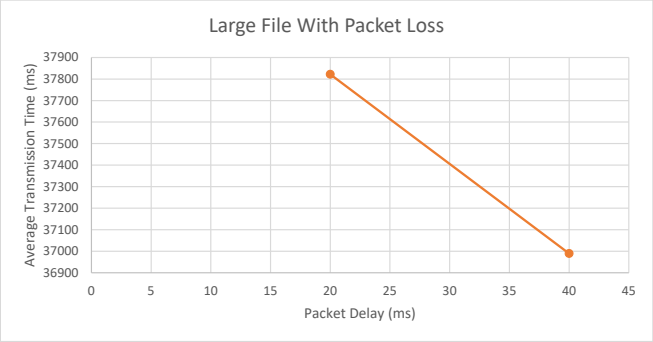

Figure 9

Packet Loss vs Transmission Time:

Tiny File Without Packet Delay	
Packet Loss	**Average Transmission Time (ms)**
0.1	734.6666667
0.2	1007.666667
0.3	1787.333333
0.4	2274.333333
0.5	4204

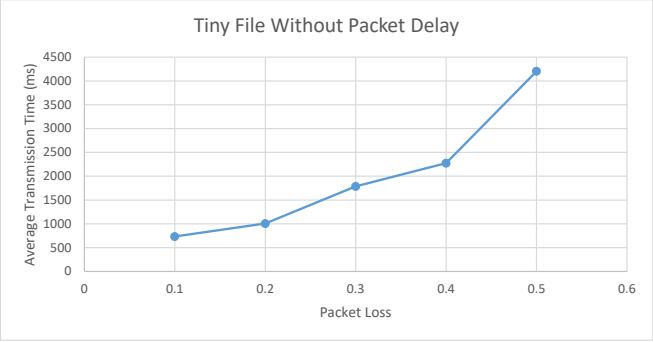

Figure 10

Small File Without Packet Delay	
Packet Loss	**Average Transmission Time (ms)**
0.1	1071
0.2	1967.333333
0.3	3418
0.4	4749.333333
0.5	7743

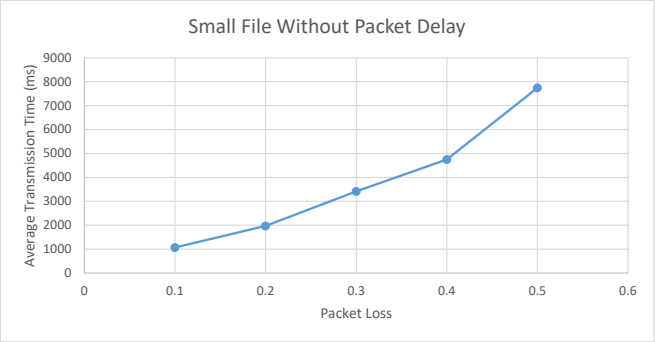

Figure 11

Medium File Without Packet Delay	
Packet Loss	**Average Transmission Time (ms)**
0.1	5910.666667
0.2	11690.66667
0.3	18332.66667
0.4	29970
0.5	41499

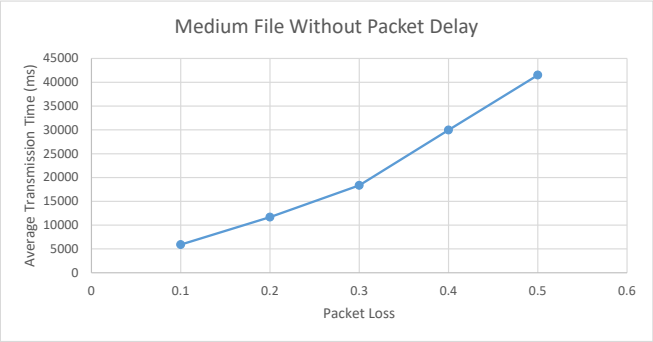

Figure 12

Large File Without Packet Delay	
Packet Loss	**Average Transmission Time (ms)**
0.1	14705.33333
0.2	26786.66667
0.3	48117.66667
0.4	77223.33333
0.5	121900

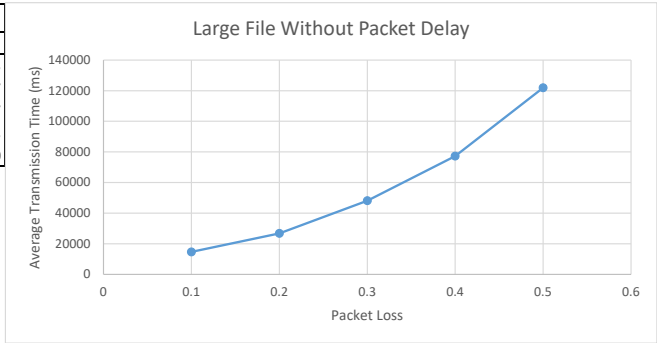

Figure 13

Tiny File With Packet Delay	
Packet Loss	**Average Transmission Time (ms)**
0.1	866
0.2	1232.166667
0.3	1682.5

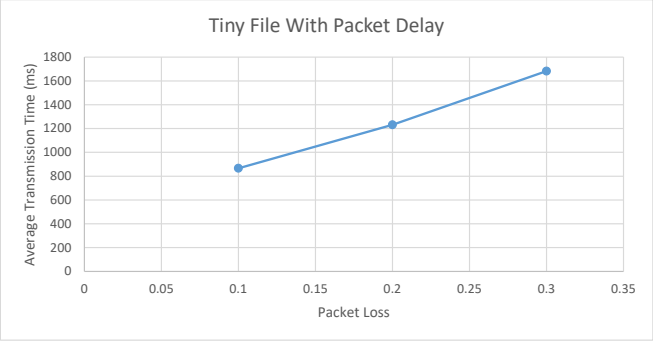

Figure 14

Small File With Packet Delay	
Packet Loss	**Average Transmission Time (ms)**
0.1	2008.666667
0.2	2208.333333
0.3	3636.166667

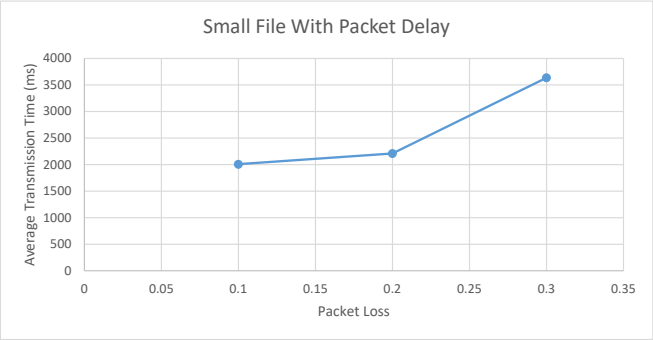

Figure 15

Medium File With Packet Delay	
Packet Loss	**Average Transmission Time (ms)**
0.1	11518.33333
0.2	13502
0.3	20380.5

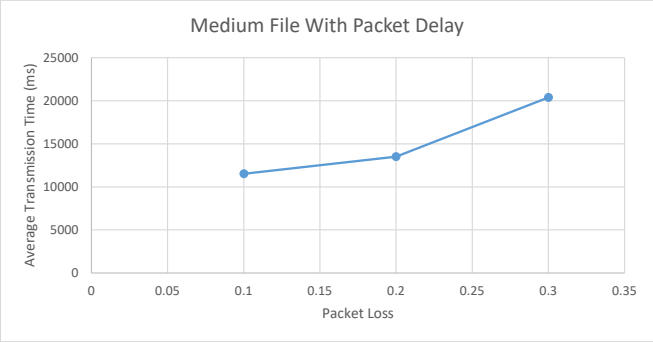

Figure 16

Large File With Packet Delay	
Packet Loss	**Average Transmission Time (ms)**
0.1	26318.16667
0.2	34531.66667
0.3	51367.16667

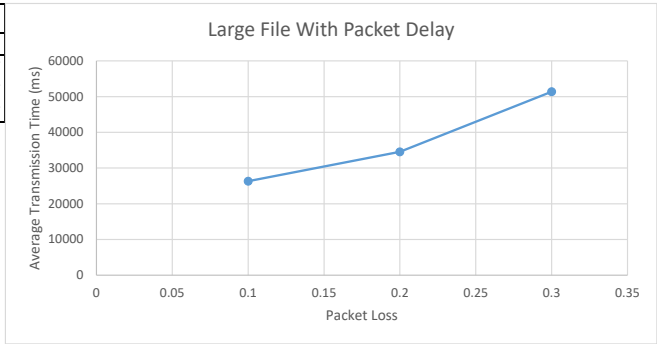

Figure 17

GBN Experiment Report

This experiment is conducted by running the GBN algorithm on four different type files, and each file run three times with different constraints. The results and the comparison plots are displayed above.

To begin with, based on figure 1, it is easy to see that as file size increases, no matter how to change the probability of packet loss and packet delay, the transmission will still increase, and the correlation is about linear. This makes sense since as file size increases, the number of packets will increase since the size of the packet is fixed, thus takes more time to transmit from sender to receiver assume each packet takes the same amount of minimum time.

In addition, for the relationship between packet delay and transmission time, based on figure 2 to 5, with the no packet loss in different cases, it can be observed that “10ms-delay” case causes the longest the transmission time, and another delay seems has very little effect on transmission time; similar observation can be seen from figure 6 to 9, that the relationship seems to have no pattern.

What's more, as for the relationship between the probability of packet loss and transmission time, based on figure 10 to 13 with no packet delay on each situation, it is clear to see that as the probability of packet loss increases, the transmission time increases dramatically. The correlation of this relationship is almost quadratic. The same pattern can be seen in figure 14 to 17, as well. Under the effect of packet loss, the probability of packet loss still has a positive relationship with transmission time. This makes sense since the probability of packet loss increases; the sender needs to retransmit the dropped packets to continue, thus causes longer transmission time.

In conclusion, based on the above findings, it is reasonable to conclude that the probability of packet loss has the most significant effect on transmission time; the second significant cause is the file size, and the third is the packet delay. The result may not be accurate due to the experiment only be conducted three times in each scenario. The results will be more accurate if the experiment can be conducted more times.