CS656 assignment 2

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In this assignment, the emulator is in ubuntu-1804-002, the receiver is in ubuntu-1804-004, the sender is in ubuntu-1804-008. I set the TIMEOUT = 0.1s. All the transmission time units are in seconds (s).

- Small.txt

Case	Maximum Delay(ms)	Packet Discard Probability	test1	test2	test3	Average
Baseline	0	0	0.54127	0.469476	0.468168	0.4929715
No Delay 1	0	0.1	2.0858335	1.894544	1.306268	1.762215058
No Delay 2	0	0.2	2.8872025	2.709378	3.051474	2.882684787
No Delay 3	0	0.3	4.7670381	4.580226	3.793988	4.380417426
No Delay 4	0	0.4	6.0679777	4.38175	5.547109	5.332278887
No Delay 5	0	0.5	9.8200736	8.107491	11.30432	9.743963242
No Discard 1	10	0	0.6061192	0.624883	0.383682	0.538227876
No Discard 2	20	0	0.6415665	0.647688	0.670186	0.653146903
No Discard 3	30	0	0.6997602	0.695336	0.720583	0.705226183
No Discard 4	40	0	0.8891892	0.889786	0.88681	0.888595025
No Discard 5	50	0	1.151756	1.126438	1.15756	1.145251354
Delay and Discard 1	20	0.1	2.5133002	2.238952	1.656296	2.136182865
Delay and Discard 2	20	0.2	3.5945928	3.208496	3.637156	3.480081479
Delay and Discard 3	20	0.3	5.8362181	5.569433	4.51694	5.307530244
Delay and Discard 4	40	0.1	2.8780973	2.925277	2.09705	2.633474827
Delay and Discard 5	40	0.2	4.4303069	4.050273	4.469838	4.316806078
Delay and Discard 6	40	0.3	7.0730116	6.707685	5.3725	6.384398778

- Medium.txt

Case	Maximum Delay(ms)	Packet Discard Probability	test1	test2	test3	Average
Baseline	0	0	2.99926	3.283689	3.423417	3.235453844
No Delay 1	0	0.1	10.247	9.485101	10.68396	10.13868149
No Delay 2	0	0.2	17.027	19.81684	15.66914	17.50432237
No Delay 3	0	0.3	29.8857	25.9098	23.41209	26.40254331
No Delay 4	0	0.4	37.049	33.34533	38.79375	36.39604084
No Delay 5	0	0.5	48.1203	53.76299	47.47653	49.78660758
No Discard 1	10	0	3.17046	2.843831	3.004172	3.00615557
No Discard 2	20	0	3.28967	3.332107	3.19648	3.272752126
No Discard 3	30	0	3.92879	3.835592	3.726297	3.830225309
No Discard 4	40	0	4.82873	4.833009	4.853548	4.838430882
No Discard 5	50	0	5.95967	5.65735	5.97309	5.863370021
Delay and Discard 1	20	0.1	12.0684	11.28624	12.77686	12.04383381
Delay and Discard 2	20	0.2	21.0514	24.347	19.58631	21.6615665
Delay and Discard 3	20	0.3	36.9894	31.81153	29.45077	32.75056799
Delay and Discard 4	40	0.1	15.1634	14.42797	16.25845	15.28326392
Delay and Discard 5	40	0.2	25.3738	29.95221	24.28903	26.53836497
Delay and Discard 6	40	0.3	45.0748	38.59039	36.33859	40.00124478

- Large.txt

Case	Maximum Delay(ms)	Packet Discard Probability	test1	test2	test3	Average
Baseline	0	0	7.058365	8.5582426	7.842582	7.819729805
No Delay 1	0	0.1	26.44426	24.606211	27.21436	26.08827639
No Delay 2	0	0.2	39.10153	43.834304	42.95179	41.96253896
No Delay 3	0	0.3	69.91429	61.786162	67.81134	66.50393097
No Delay 4	0	0.4	94.95765	97.780697	94.11287	95.61706996
No Delay 5	0	0.5	135.7943	134.54145	132.8479	134.3945638
No Discard 1	10	0	8.090145	7.6616051	7.73968	7.830476602
No Discard 2	20	0	8.310053	8.183758	8.263713	8.252507925
No Discard 3	30	0	9.287721	9.2769806	9.267436	9.277379195
No Discard 4	40	0	12.17632	12.145633	12.17922	12.16705902
No Discard 5	50	0	15.54002	14.603117	15.13422	15.09245213
Delay and Discard 1	20	0.1	31.75077	30.037996	32.86346	31.55074302
Delay and Discard 2	20	0.2	53.79268	52.747886	51.88477	52.80844704
Delay and Discard 3	20	0.3	86.71017	76.411076	83.63829	82.25317907
Delay and Discard 4	40	0.1	40.2082	37.754394	41.1578	39.70679609
Delay and Discard 5	40	0.2	59.44481	67.081543	61.08382	62.5367221
Delay and Discard 6	40	0.3	105.9165	92.619871	102.0432	100.1931674

- Average Transmission Time:

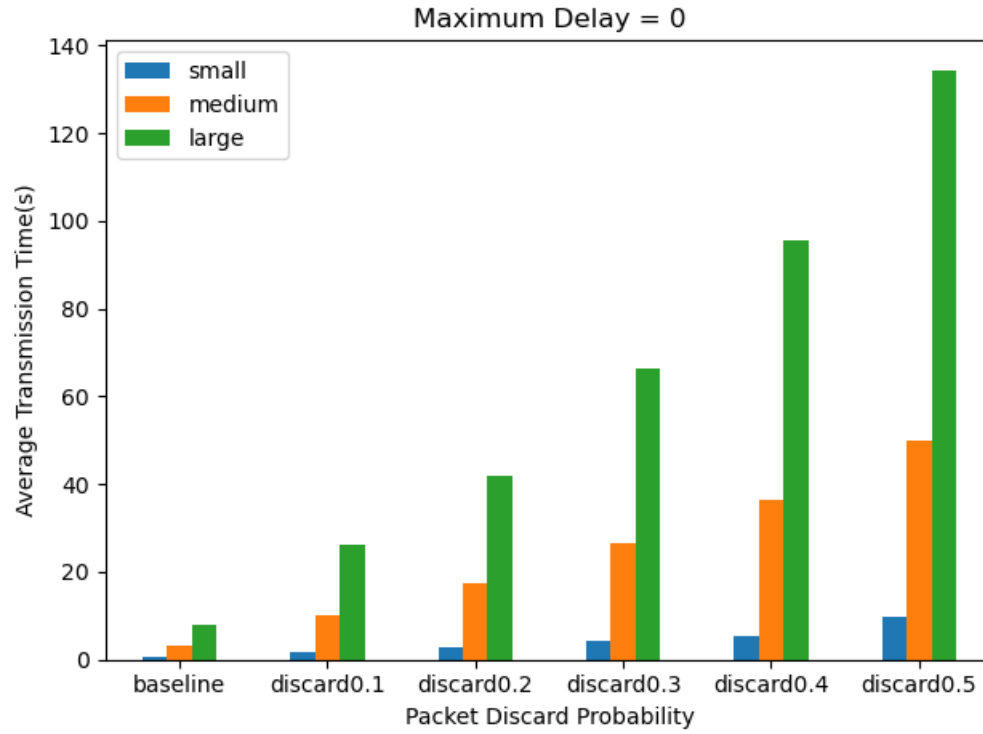| Case	Maximum Delay(ms)	Packet Discard Probability	Small	Medium	Large
Baseline	0	0	0.4929715	3.235453844	7.8197298
No Delay 1	0	0.1	1.762215058	10.13868149	26.0882764
No Delay 2	0	0.2	2.882684787	17.50432237	41.962539
No Delay 3	0	0.3	4.380417426	26.40254331	66.503931
No Delay 4	0	0.4	5.332278887	36.39604084	95.61707
No Delay 5	0	0.5	9.743963242	49.78660758	134.394564
No Discard 1	10	0	0.538227876	3.00615557	7.8304766
No Discard 2	20	0	0.653146903	3.272752126	8.25250793
No Discard 3	30	0	0.705226183	3.830225309	9.27737919
No Discard 4	40	0	0.888595025	4.838430882	12.167059
No Discard 5	50	0	1.145251354	5.863370021	15.0924521
Delay and Discard 1	20	0.1	2.136182865	12.04383381	31.550743
Delay and Discard 2	20	0.2	3.480081479	21.6615665	52.808447
Delay and Discard 3	20	0.3	5.307530244	32.75056799	82.2531791
Delay and Discard 4	40	0.1	2.633474827	15.28326392	39.7067961
Delay and Discard 5	40	0.2	4.316806078	26.53836497	62.5367221
Delay and Discard 6	40	0.3	6.384398778	40.00124478	100.193167

Analysis

- Combination
First, I draw the figure 1 to show all the average transmission time in small.txt, medium.txt and large.txt. As we can see, there will take a pretty longer time when we transfer larger file with a larger packet discard probability. On the situation of same delay and the same packet discard probability, the lager the file, the longer the transmission time. The packet discard probability would be the most impact part of transmission time. If we apply both delay and discard probability, the transmission time will become large.

Average Transmission Time
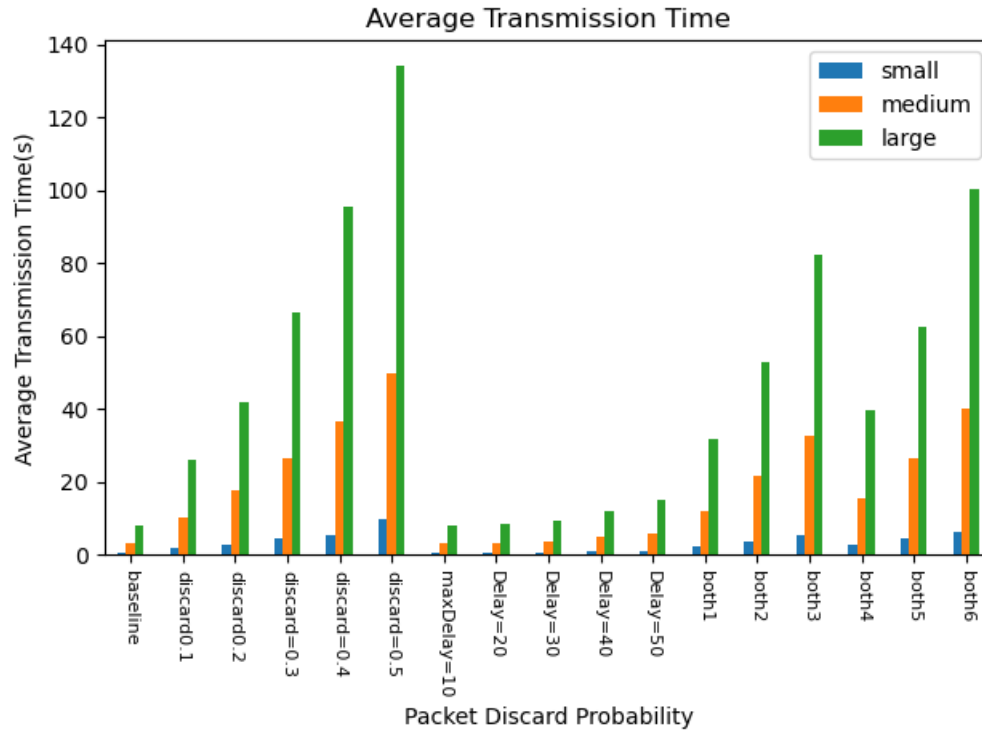
- Without Delay

  Second, I draw the figure 2 to show the trend when increasing the packet discard probability by 0.1 without packet delay. I found that increasing the packet discard probability would increase the transmission time exponentially.

Case	Maximum Delay(ms)	Packet Discard Probability	Small	Medium	Large
Baseline	0	0	0.4929715	3.235453844	7.8197298
No Delay 1	0	0.1	1.762215058	10.13868149	26.0882764
No Delay 2	0	0.2	2.882684787	17.50432237	41.962539
No Delay 3	0	0.3	4.380417426	26.40254331	66.503931
No Delay 4	0	0.4	5.332278887	36.39604084	95.61707
No Delay 5	0	0.5	9.743963242	49.78660758	134.394564

Maximum Delay = 0

- Without discard
  Third, I draw the figure 3 to show the trend when increasing the packet delay probability by 10 without packet discard. I found that increasing the packet delay probability would increase the transmission time linearly.

Case	Maximum Delay(ms)	Packet Discard Probability	Small	Medium	Large
Baseline	0	0	0.4929715	3.235453844	7.8197298
No Discard 1	10	0	0.538227876	3.00615557	7.8304766
No Discard 2	20	0	0.653146903	3.272752126	8.25250793
No Discard 3	30	0	0.705226183	3.830225309	9.27737919
No Discard 4	40	0	0.888595025	4.838430882	12.167059
No Discard 5	50	0	1.145251354	5.863370021	15.0924521

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Packet Discard Probability = 0