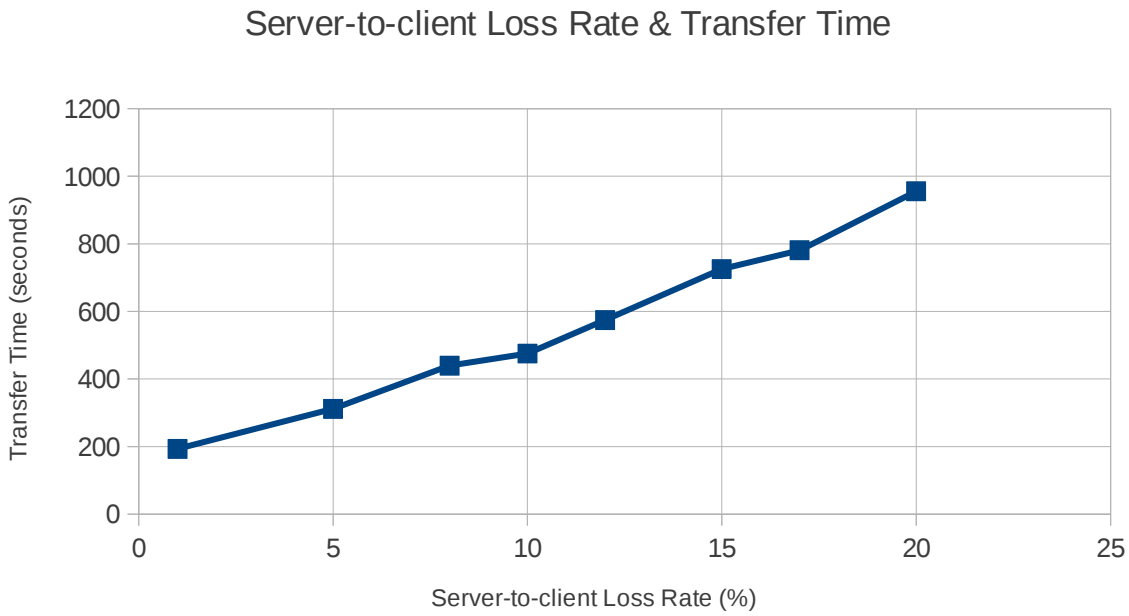
PERFORMANCE REPORT

I) Transfer Time and Sever-to-client loss percentage:

- Server-to-client loss percentage affects the transfer time of a file between a server and client. When the loss percentage increases, there is higher chance for the packet to be lost. Therefore, the total time for ACK increases (we wait until time out), and the total time for retransmission increases. Hence, we expect the transfer time to increase as the server-to-client loss percentage increases.
- Experiment setup:
    + File size: 1.4 MB
    + Client-to-server loss rate: 5%
    + Segment size: 500 bytes
    + Timeout interval: fixed 1 second
- Result table:

Server-to-client Loss Rate	Transfer time (second)
1	193.333
5	311.631
8	439.562
10	475.545
12	574.526
15	725.59
17	781.174
20	955.757

- Graph:



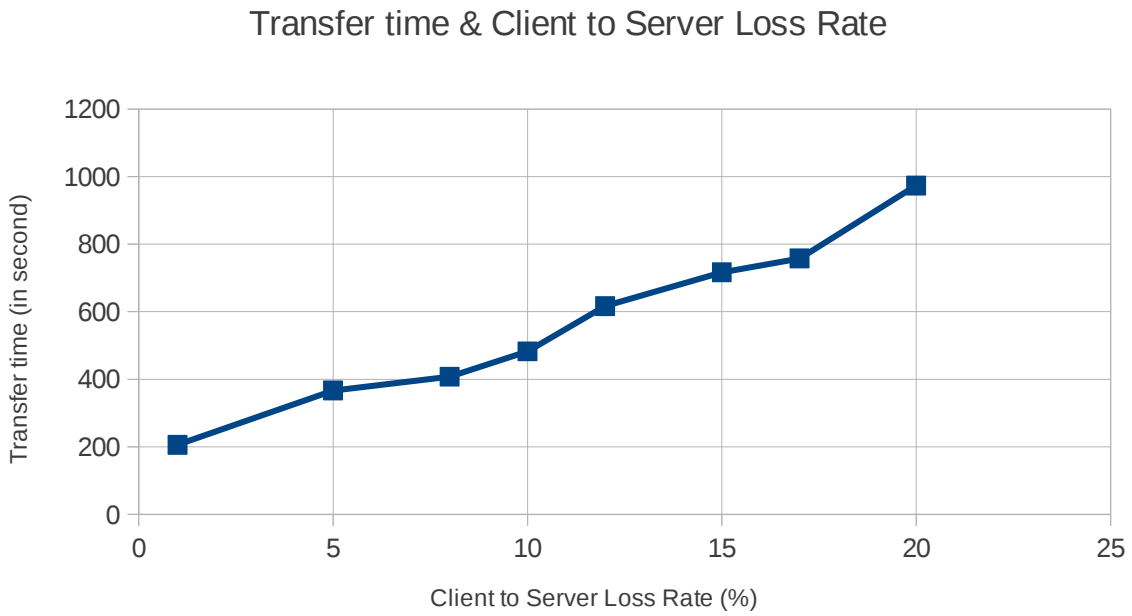
- Comment: As expected, the graph is increasing (i.e. the transfer time increases as the server-to-client loss rate increases).

II) Transfer Time and Client-to-server loss percentage:

- Client-to-server loss percentage affects the transfer time of a file between a server and client. When the loss percentage increases, there is higher chance for the ACK packet is lost. Therefore, the total time for ACK increases (we wait until time out), and the total time for retransmission increases (because when ACK is lost, server is not sure if the packet is received or not, so it has to retransmit the packet). Hence, we expect the transfer time to increase as the client-to-server loss percentage increases.
- Experiment setup:
    + File size: 1.4 MB
    + Server-to-client loss rate: 5%
    + Segment size: 500 bytes
    + Timeout interval: fixed 1 second
- Result table:

Client-to-server Loss Rate	Transfer time (second)
1	205.899
5	366.663
8	407.644
10	482.666
12	616.702
15	716.706
17	757.685
20	973.719

- Graph:



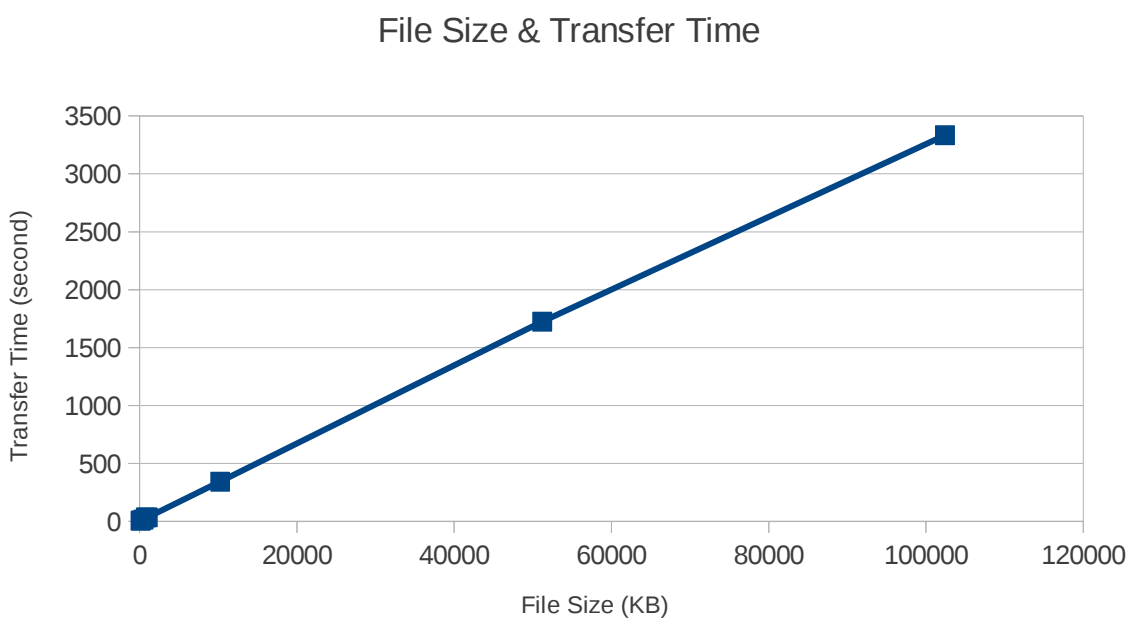
- Comment: As expected, the graph is increasing (i.e. the transfer time increases as the client-to-server loss rate increases).

III) Transfer Time and File size:

- The file size affects the transfer time of a file between a server and client. Fix the maximum segment size. If the file size increases but still within the maximum segment size, the transfer time does not change much because only 1 packet is sent. However, when the file size increases and exceeds the maximum segment size, there are more packets to be sent to transfer the file completely. Hence, we expect the transfer time to increase as the file size increases.
- Experiment setup:
    + Server-to-client loss rate: 5%
    + Client-to-server loss rate: 5%
    + Segment size: 5000 bytes (because it takes too long for 500 bytes in this experiment)
    + Timeout interval: fixed 1 second
- Result table:

File size	Transfer time (second)
100 KB	5.008
200 KB	8.015
500 KB	16.036
800 KB	34.058
1 MB	35.079
10 MB	343.191
50 MB	1724.248
100 MB	3333.128

- Graph:



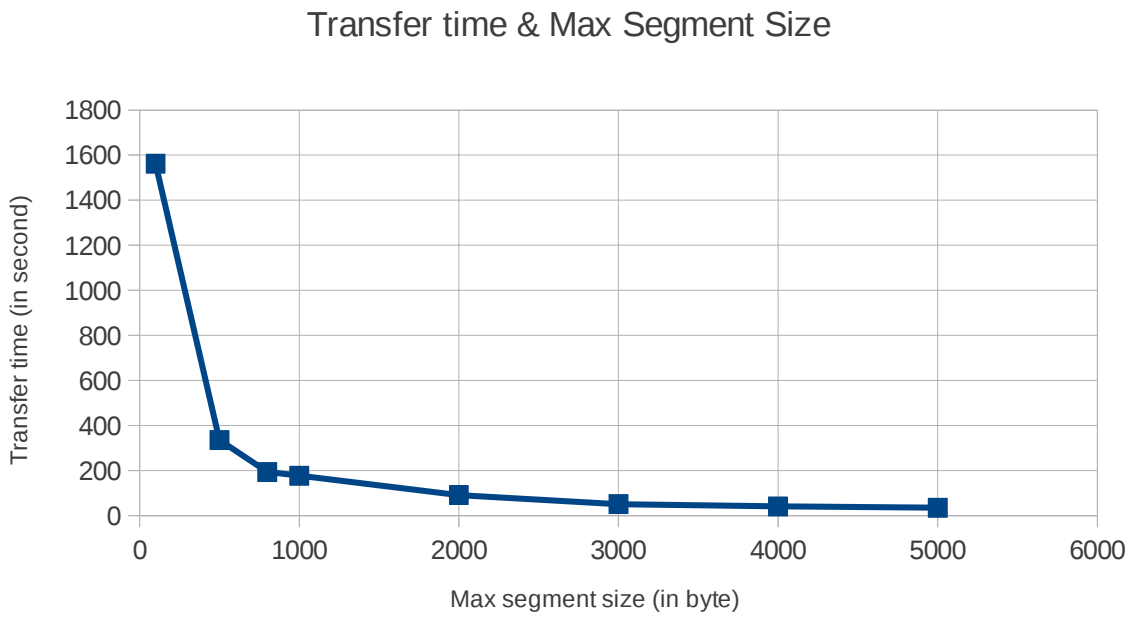
- Comment: When the file size excceeds the maximum segment size and increases, the transfer time increases as well (almost linearly).

IV) Transfer Time and Maximum Segment Size:

- The maximum segment size affects the transfer time of a file between a server and client. Fix the file size. If the file size is within the maximum segment size, the transfer time does not change much when the maximum segment size increases because only 1 packet is sent. However, when the maximum segment size increases and the file size is sufficiently large, there are less packets to be sent to transfer the file completely (because each packet now carries more data). Hence, we expect the transfer time to decrease as the maximum segment size increases.
- Experiment setup:
    + Server-to-client loss rate: 5%
    + Client-to-server loss rate: 5%
    + File size: 1.4 MB
    + Timeout interval: fixed 1 second
- Result table:

Maximum Segment Size (byte)	Transfer time (second)
100	1561.755
500	335.615
800	193.39
1000	177.32
2000	91.473
3000	51.142
4000	41.117
5000	35.115

- Graph:



- Comment: When the file size is sufficiently large and the maximum segment size increases, the transfer time decreases rapidly.