Project 1 Report

# Step 2 and 3

The plots of Total Time (nanoseconds) for each Mode and File Size for each scenario can be observed in the plots and figures below: [Furthermore, the client timeout was three seconds for all scenarios and modes.]

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Part 2 (Packet size = 5000 bytes) (Same room)** | | | | |
|
|  | **File Size** | **Total Time (nano seconds)** | **Total Data Loss (bytes received)** | |
| Mode 0 | 10 MB | 32604356600 | 9998499 |  |
| 50 MB | 1.36294E+11 | 49323757 |  |
| 100 MB | 93152504400 | 23029552 |  |
| Mode 1 | File Size |  |  |  |
| 10 MB | 33206647300 | 9560092 |  |
| 50 MB | 30816488600 | 8388322 |  |
| 100 MB | 1.0946E+11 | 32893420 |  |
| Mode 2 | File Size |  |  |  |
| 10 MB | 30060159600 | 9990392 |  |
| 50 MB | 1.49262E+11 | 49950315 |  |
| 100 MB | 52010085000 | 10743819 |  |
|  |  |  |  |  |
|  |  |  |  |  |
| **Part 2 (Packet size = 5000 bytes) (Server on campus and Client off campus)** | | | | |
|
|  | **File Size** | **Total Time (nano seconds)** | **Total Data Loss (bytes received)** | |
| Mode 0 | 10 MB | 33021274800 | 2044728 |  |
| 50 MB | 33774676700 | 8054965 |  |
| 100 MB | 10764556600 | 1122812 |  |
| Mode 1 | File Size |  |  |  |
| 10 MB | 40172909000 | 1179764 |  |
| 50 MB | 21757067600 | 619876 |  |
| 100 MB | 7148818400 | 324935 |  |
| Mode 2 | File Size |  |  |  |
| 10 MB | 16146499000 | 624875 |  |
| 50 MB | 27459903300 | 839832 |  |
| 100 MB | 87074689900 | 6303763 |  |
|  |  |  |  |  |
| **Part 2 (Packet size = 5000 bytes) (Server on campus and client with weak signal)** | | | | |
|
|  | **File Size** | **Total Time (nano seconds)** | **Total Data Loss (bytes received)** | |
| Mode 0 | 10 MB | 1.14672E+11 | 8471045 |  |
| 50 MB | NULL | NULL |  |
| 100 MB | NULL | NULL |  |
| Mode 1 | File Size |  |  |  |
| 10 MB | 5330276600 | 249950 |  |
| 50 MB | 7413015800 | 289942 |  |
| 100 MB | 8857241400 | 159968 |  |
| Mode 2 | File Size |  |  |  |
| 10 MB | 6992371600 | 154983 |  |
| 50 MB | 23497955800 | 160028 |  |
| 100 MB | 28515226900 | 170198 |  |

The percentage of data received for each mode and scenario can be observed in the table and plots below:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Part 2 (Packet size = 5000 bytes) (Same room)** | | | | |
|
|  | **File Size** | **Percentage Data Received (bytes received)** | **Total Data Loss (bytes received)** |  |
| Mode 0 | 10 MB | 99.98499 | 9998499 |  |
| 50 MB | 98.647514 | 49323757 |  |
| 100 MB | 23.029552 | 23029552 |  |
| Mode 1 | File Size |  |  |  |
| 10 MB | 95.60092 | 9560092 |  |
| 50 MB | 16.776644 | 8388322 |  |
| 100 MB | 32.89342 | 32893420 |  |
| Mode 2 | File Size |  |  |  |
| 10 MB | 99.90392 | 9990392 |  |
| 50 MB | 99.90063 | 49950315 |  |
| 100 MB | 10.743819 | 10743819 |  |
|  |  |  |  |  |
|  |  |  |  |  |
| **Part 2 (Packet size = 5000 bytes) (Server on campus and Client off)** | | | | |
|
|  | **File Size** | **Percentage Data Received (bytes received)** | **Total Data Loss (bytes received)** |  |
| Mode 0 | 10 MB | 20.44728 | 2044728 |  |
| 50 MB | 16.10993 | 8054965 |  |
| 100 MB | 1.122812 | 1122812 |  |
| Mode 1 | File Size |  |  |  |
| 10 MB | 11.79764 | 1179764 |  |
| 50 MB | 1.239752 | 619876 |  |
| 100 MB | 0.324935 | 324935 |  |
| Mode 2 | File Size |  |  |  |
| 10 MB | 6.24875 | 624875 |  |
| 50 MB | 1.679664 | 839832 |  |
| 100 MB | 6.303763 | 6303763 |  |
|  |  |  |  |  |
| **Part 2 (Packet size = 5000 bytes) (Server on campus and client with weak signal)** | | | | |
|
|  | **File Size** | **Percentage Data Received (bytes received)** | **Total Data Loss (bytes received)** |  |
| Mode 0 | 10 MB | 84.71045 | 8471045 |  |
| 50 MB | NULL | NULL |  |
| 100 MB | NULL | NULL |  |
| Mode 1 | File Size |  |  |  |
| 10 MB | 2.4995 | 249950 |  |
| 50 MB | 0.579884 | 289942 |  |
| 100 MB | 0.159968 | 159968 |  |
| Mode 2 | File Size |  |  |  |
| 10 MB | 1.54983 | 154983 |  |
| 50 MB | 0.320056 | 160028 |  |
| 100 MB | 0.170198 | 170198 |  |
|  |  |  |  |  |

The cells filled with “NULL” denote trials which were unsuccessful in transmitting data after 3 trials. Each trial involved restarting both the server and the client, and using a different port number. In addition, these connections lasted in multiple trials for more than seven minutes.

# Experimenting with Packet Delay

The variance and Mean for Scenarios 1 and 3 is below:

**Scenario 1**

|  |  |
| --- | --- |
| Variance (nanoseconds) | **8.0226E+15** |
| Mean  (nanoseconds) | **62295162.58** |

**Scenario 3**

|  |  |
| --- | --- |
| Variance (nanoseconds) | **5.64076E+15** |
| Mean  (nanoseconds) | **62279678.15** |

The histograms of the packet delay for each scenario can be observed below.

The packet pair technique was used to compute the bottleneck capacity using the following equation:

Using excel, the bottleneck capacity was computed over many values, and averaged, to find the following results:

|  |  |  |
| --- | --- | --- |
|  | **Scenario 1** | **Scenario 3** |
| Mean bottleneck capacity | 12458.62295 | 12455.46 |