# CSC/ECE 573 Section 001

# Fall 2019

# PROJECT #2

**Selective Repeat ARQ Protocol**

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**Task 1**

**Size of the file Transferred**: 1054.08 KB ~ 1.1MB

**Round Trip Time:** 0.05 s

**Transferred File**: clientTest.txt

To maintain the host and server on two different hosts separated by router hops we configured server and client in PC and on VCL to carry out the mentioned tasks.

**Traceroute (on MAC):**

This can also be obtained by using traceroute 152.7.99.61 (ip address of the server) from the terminal on MAC (client machine).

A screenshot of a social media post

Description automatically generated

**Effect of window size N**

MSS (Maximum Segment Size) = 500  
Packet Loss Probability = 0.05

Varying N (Window Size) from 1 to 1024

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Window Size (N)** | **RTT 1** | **RTT 2** | **RTT 3** | **RTT 4** | **RTT 5** | **Average RTT** |
| 1 | 22.8476 | 24.6989 | 40.6935 | 35.5197 | 35.3081 | 31.8136 |
| 2 | 11.4954 | 29.6333 | 31.0795 | 24.2814 | 16.9599 | 22.6899 |
| 4 | 16.3647 | 8.6628 | 12.1782 | 10.9358 | 12.2662 | 12.0815 |
| 8 | 12.5979 | 15.8324 | 11.0788 | 13.1794 | 13.8653 | 13.3108 |
| 16 | 13.5802 | 12.0911 | 7.5276 | 9.8520 | 5.4486 | 9.6999 |
| 32 | 23.2697 | 26.6363 | 21.3393 | 22.6232 | 21.7614 | 23.4671 |
| 64 | 22.3765 | 24.8646 | 20.4877 | 21.4404 | 26.1050 | 23.0548 |
| 128 | 27.9271 | 22.8457 | 23.8685 | 21.4588 | 22.8786 | 23.7957 |
| 256 | 26.7656 | 26.8785 | 26.7328 | 25.8795 | 25.5476 | 26.3608 |
| 512 | 27.8654 | 26.4377 | 25.3465 | 27.7643 | 26.4659 | 26.7760 |
| 1024 | 26.3534 | 29.5434 | 27.4540 | 26.7639 | 26.8454 | 27.3920 |

**Results:**

As the window size increases within a constrained set of values, a greater number of packets will be in the pipeline. This would eventually result in a reduced RTT as more number of packets are pipelined. The window size was gradually increased from 1 to 1024 bytes and the time delay corresponding to each of the transition has been observed and documented above. We can observe that, as the window size increases, the time delay decreases and gradually reaches a constant.

**Task 2: Effect of MSS**

N (Window size) = 64

Packet Loss Probability = 0.05

Varying MSS from 100 to 1000 in the increments of 100

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **MSS** | **RTT 1** | **RTT 2** | **RTT 3** | **RTT 4** | **RTT 5** | **Average RTT** |
| 100 | 75.2351 | 73.2312 | 82.5491 | 77.6296 | 74.9921 | 76.7274 |
| 200 | 42.6723 | 38.7690 | 45.6892 | 39.5624 | 37.8934 | 40.9173 |
| 300 | 30.5629 | 29.5893 | 24.5802 | 25.4539 | 23.5689 | 26.7511 |
| 400 | 19.4926 | 20.3274 | 21.7890 | 22.1245 | 18.8944 | 20.5256 |
| 500 | 16.2361 | 17.5678 | 13.7825 | 14.2985 | 13.7923 | 15.1354 |
| 600 | 10.5793 | 15.7659 | 16.6843 | 12.6874 | 11.9465 | 13.5327 |
| 700 | 10.5764 | 9.5647 | 8.6893 | 9.4563 | 10.2634 | 9.7100 |
| 800 | 8.7347 | 9.3257 | 7.6843 | 8.3474 | 9.3276 | 8.6840 |
| 900 | 8.5673 | 8.3276 | 9.8635 | 8.3256 | 7.3933 | 8.4955 |
| 1000 | 8.6843 | 7.4543 | 7.5734 | 8.7538 | 7.2134 | 7.9358 |

**Results:**

As the value of MSS increases, the average RTT decreases. This is because smaller MSS causes larger packet transfers, and hence there is a possibility of a greater number of packet losses and greater number of retransmissions. Larger MSS value leads to lesser number of retransmissions, hence the average delay decreases exponentially

**Task 3: Effect of Loss Probability p**

MSS = 500

N = 64

Varying P value from 0.01 to 0.10 in the increments of 0.1

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Loss Probability (p)** | **RTT 1** | **RTT 2** | **RTT 3** | **RTT 4** | **RTT 5** | **Average RTT** |
| 0.01 | 9.6574 | 8.7643 | 9.6543 | 7.6740 | 8.4354 | 8.8371 |
| 0.02 | 13.6857 | 14.3278 | 12.8487 | 13.8640 | 14.6435 | 13.8739 |
| 0.03 | 13.8855 | 16.4540 | 14.6783 | 13.8684 | 14.8796 | 14.7532 |
| 0.04 | 15.7438 | 14.8643 | 15.4544 | 15.2567 | 14.8723 | 15.2383 |
| 0.05 | 15.7548 | 16.7483 | 14.7684 | 15.8725 | 16.1633 | 15.8615 |
| 0.06 | 16.3277 | 15.3476 | 15.6784 | 16.4376 | 17.5730 | 16.2729 |
| 0.07 | 17.2757 | 16.3265 | 17.7680 | 18.3286 | 16.3276 | 17.2053 |
| 0.08 | 18.4338 | 17.3287 | 17.3286 | 18.3290 | 19.3249 | 18.1490 |
| 0.09 | 18.3287 | 19.3287 | 18.8648 | 20.8363 | 19.3286 | 19.3374 |
| 0.1 | 21.8747 | 20.5835 | 21.5217 | 19.3427 | 20.8465 | 20.8338 |

**Results:**

We can say that as the probability loss increases the average RTT also increases which is the indication that as the probability increases there is a packet loss, retransmission takes place and hence the average delay increases.