// -----------------------------------------------------------------------

// HEADER\_FORMAT

// Padding --> 0

// ACK Flag --> 1

// Receive Window --> 2..3

// Sequence --> 4..7

// Acknowledge --> 8..11

// Data starts -->12

// -----------------------------------------------------------------------

Packet sizes: 20(ip) + 8(udp) + 1 + 1 + 2 + 4 + 4 + 1460 = 1500

Data Size: 1460

Header size: 20

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Drop probability | Delay | Transmission time (s) | Total packets received | Total packets dropped | Slow start | Congestion Avoidance | Fast Recovery |
| 0 | 0 | 1.2046 | 749 | 0 | 19 | 1900 | 1898 |
| 5 | 0 | 1.24363 | 1111 | 362 | 41 | 1954 | 1953 |
| 10 | 0 | 1.18268 | 1480 | 731 | 18 | 1749 | 1747 |
| 20 | 0 | 1.24507 | 2097 | 1348 | 102 | 1468 | 1407 |
| 50 | 0 | 2.20225 | 2545 | 1796 | 1098 | 863 | 317 |
| 90 | 0 | 11.0316 | 8120 | 7371 | 6639 | 788 | 49 |

It has been observed that as the number of packet drops increases, states changes to slow start more and more due to timeout on the expected acknowledgement.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Drop probability | Delay | Transmission time (s) | Total packets received | Total packets dropped | Slow start | Congestion Avoidance | Fast Recovery |
| 0 | 1000 | 14.7082 | 749 | 0 | 383 | 2253 | 2160 |
| 0 | 2000 | 25.2106 | 749 | 0 | 184 | 2139 | 2017 |
| 0 | 3000 | 36.0675 | 749 | 0 | 143 | 2037 | 1969 |

As the delay is introduced at the client side, the transmission time increases as the server times out waiting for the packet acknowledgement. Server stay in congestion mode most of the times due to slow acknowledgments which considered an indication of network congestion.