TCP NEWRENO PERFORMANCE OVER A LOSSY SATELLITE LINK

Introduction

Transmission Control Protocol (TCP) is the Backbone of reliable data transfer on the internet. However, traditional TCP mechanism face Significant performance change over high-latency & high-loss environment such as satellite communication links

This project explores the performance of TCP NewReno under such conditions and estimates the expected throughput and packet loss behavior.

2. Scenario Overview

Given Parameters:

- TCP Version: NewReno
- Packet Loss Rate (P): 10%.
- Round-Trip Time (RTT): 600 milliseconds (0.6 secs)
- Maximum Segment Size (MSS): 1KB (1024 bytes)
- Number of packets transmitted: 1000 packets

1. HOW MANY PACKETS LOST IN 1000?

Loss rate = 10%.

estimation of no. of packets lost during transmission:

Lost Packets = 10% x 1000 = 100 packets

Out of 1000 packets, 100 packets are expected to be lost during the transmission

2. WHAT IS EXCEPTED THROUGHPUT USING A TCP THROUGHPUT FORMULA?

TCP Reno / NEW Reno through formula

$$\text{Throughput} \leq \frac{1.22 \times MSS}{RTT \times \sqrt{P}}$$

where:

- MSS = 1024 bytes
- RTT = 0.6 sec
- $\sqrt{P} = \sqrt{0.1} \simeq 0.3162$

$$\text{Throughput} \leq \frac{1.22 \times 1024}{0.6 \times 0.3162} \simeq \frac{1249.28}{0.18972}$$

$$\simeq 6586.7 \text{ bytes}$$

$$\text{Throughput} \simeq \frac{6586.7}{1024} \simeq 6.43 \text{ KBPS}$$

The expected throughput is approximately 6.43 KBPS

3. WHAT IS RETRANSMISSION DELAY

Retransmission delay refers to time lost in a network due to the need to resend packets that were either lost, corrupted, or not acknowledge by receiver within a certain time frame.

~~RTT =~~

In this scenario, it is ≥ 600