CS3200: Introduction to Computer Networks
Assignment - 3

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1 Activity 1

(a) Noticeable change zones in 3D space: In the 3D space defined by bandwidth (B), packet loss rate (L), and delay (D), you'll notice a significant change in audio streaming experience in regions where delay (D) is high. This is because high delay can lead to buffering issues, causing interruptions in audio playback. However, bandwidth (B) and packet loss rate (L) can also impact the experience.

(b) Packet loss rate (L) can severely affect webpage load time. When packets are dropped, the client needs to re-request them, causing delays in loading webpages. A hyperplane separating a "good experience zone" from a "bad experience zone" would likely involve low packet loss rates leading to uninterrupted and quick webpage loading.

2 Activity 2

In this assignment we evaluate the performance of the following reliability protocols applied over UDP, through the process of transferring an image file.

We have written a bash script file that automates the process of running our python file over all combinations of parameters given. Finally we are able to obtain a 6x6 matrix containing the download times for each set of parameters.

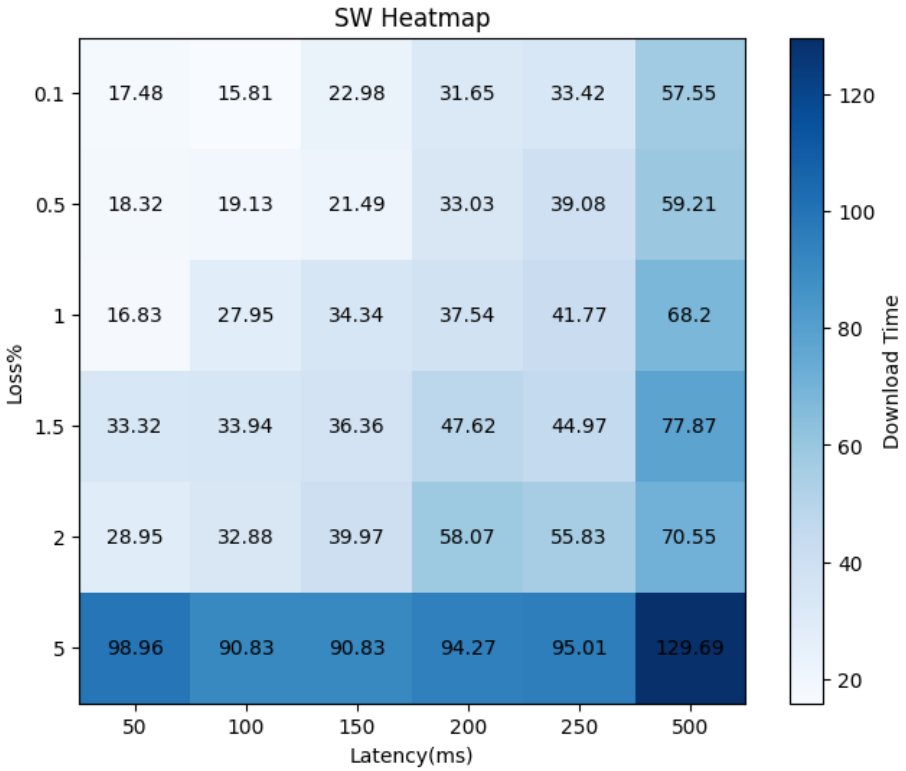
1. Stop and Wait
2. Go-Back-N
3. Selective Repeat

Parameters Used:

- Packet size = 25KB = 25600 bytes

- Window size = 8 packets
- Retransmission timeout = 1s
- Bandwidth = 1MB = 8000Kbit

2.1 Stop and Wait

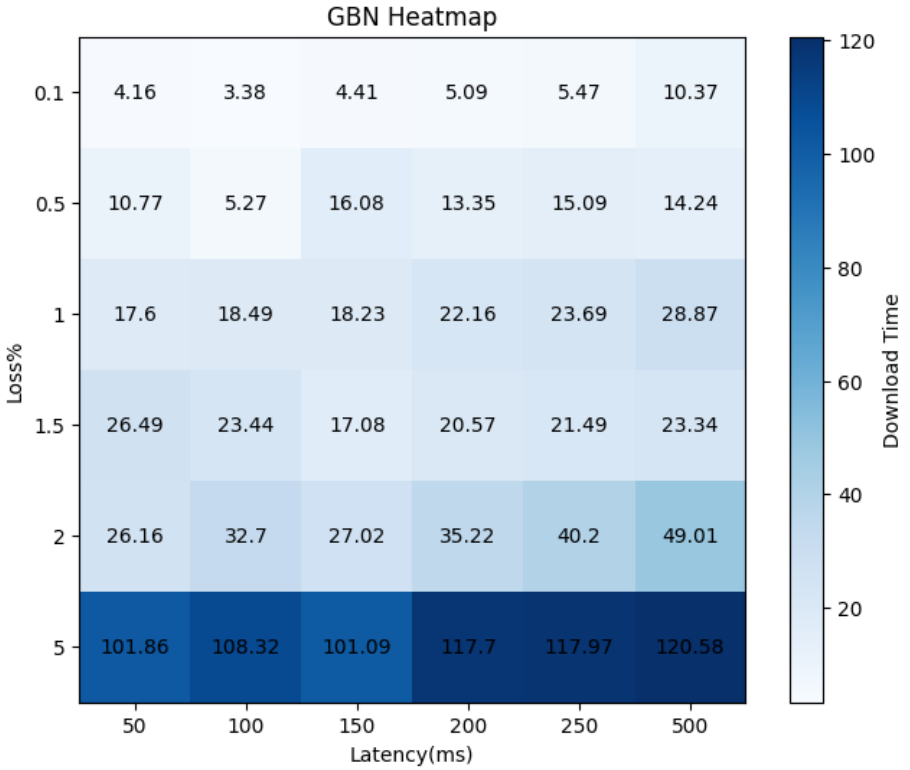


Insights:

1. Download times are significantly higher than its other counterparts. It's proportional to the delay or latency, as each cycle of transmission adds 'delay' amount of time. Hence increasing trend from left to right.

2. We see an increase in download times from left to right and top to bottom due to hindering effects of higher latency and higher packet loss %.

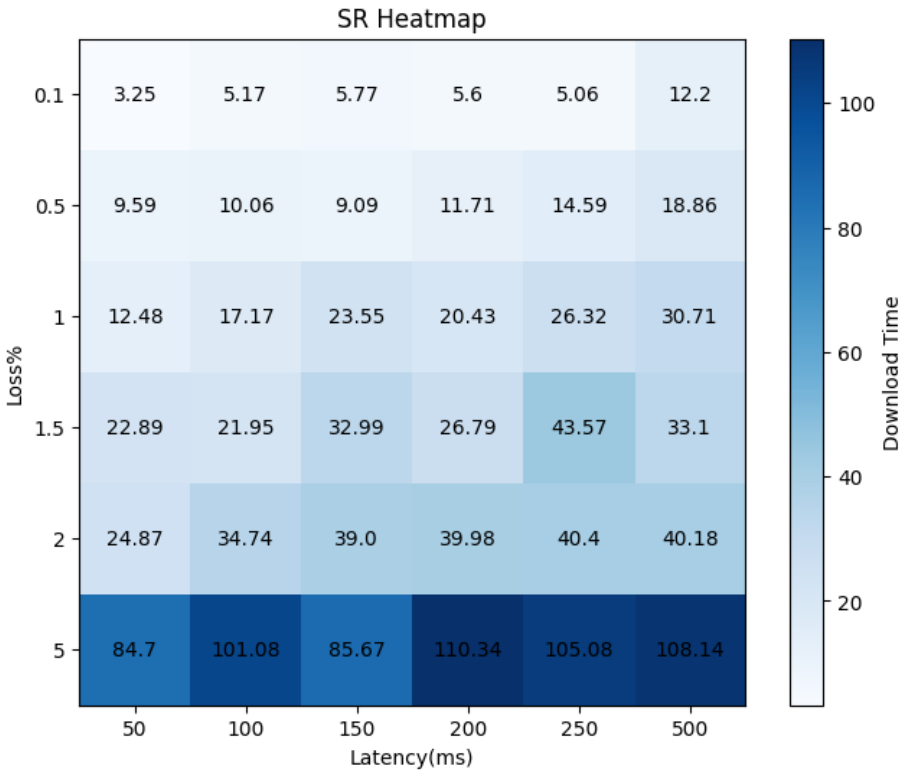
2.2 Go-Back-N



Insights:

1. We see an increase in download times from left to right and top to bottom.
2. GBN performs much better than Stop-and-Wait at all parameters.

2.3 Selective Repeat



Insights:

1. By the values of times, we observe that Selective Repeat is superior to Stop and Wait protocol, and performs better than Go-back-N in most cases.
2. We see an increase in download times from left to right and top to bottom.
3. Due to not always retransmitting the entire window like Go-Back-N, it's more efficient as seen.