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CS 421 Computer Networks – Programming Assignment 2

Implementing a Reliable Transfer Protocol over UDP

1. Max Packet Delay (D_{max}) vs Transmission Time

When maximum packet delay increases, transmission time of the whole file should slightly increase but in the figure, it decreases. Here, maximum packet delay represents the propagation delay.

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2. Packet Loss Probability vs Transmission Time

```
C:\Users\User\Code>java GBNSender C:\Users\User\Code\test.bin localhost 9999 10 150


Transmission time: 144 seconds
Error = 0

C:\Users\User\Code>
```
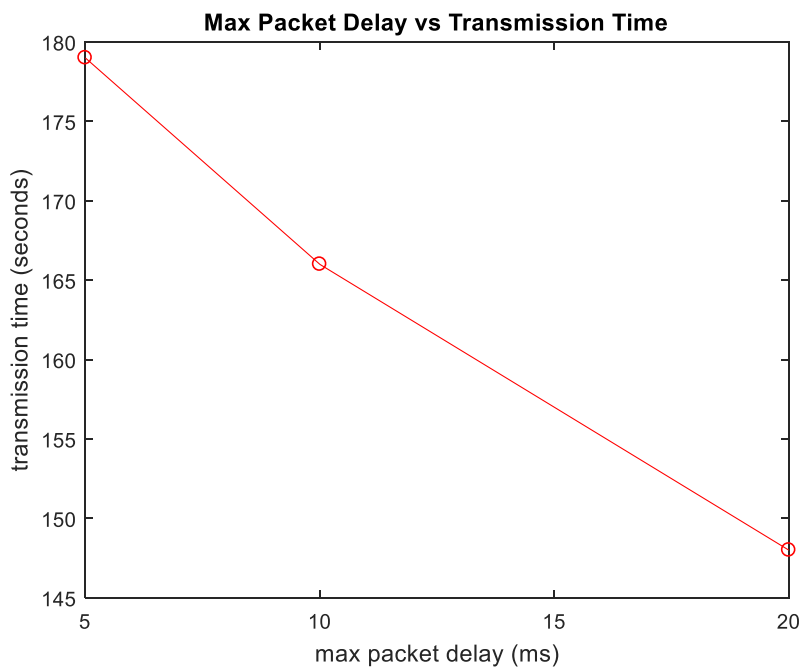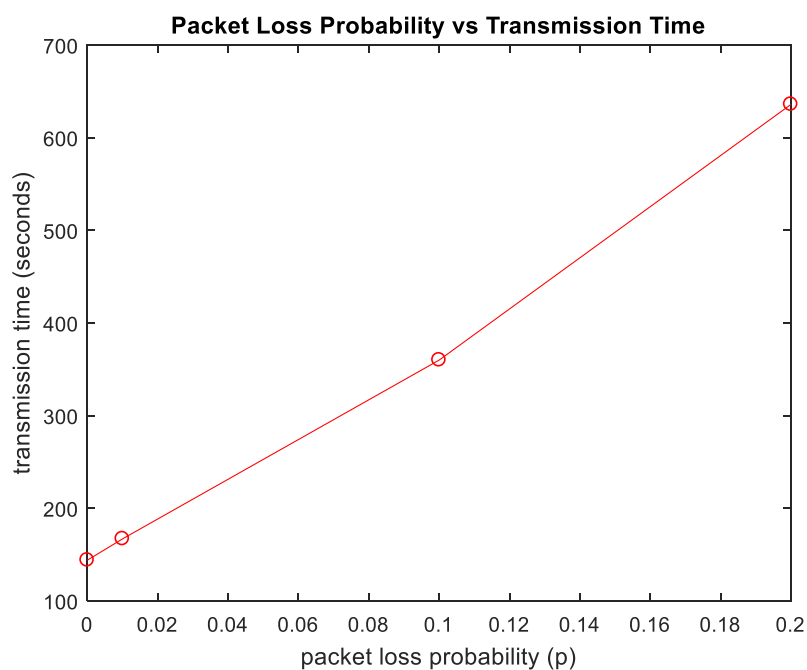
```
C:\Users\User\Code>java GBNSender C:\Users\User\Code\test.bin localhost 9999 10 150


Transmission time: 167 seconds
Error = 0

C:\Users\User\Code>_
```

```
C:\Users\User\Code>java GBNSender C:\Users\User\Code\test.bin localhost 9999 10 150


Transmission time: 360 seconds
Error = 0

C:\Users\User\Code>
```

```
C:\Users\User\Code>java GBNSender C:\Users\User\Code\test.bin localhost 9999 10 150


Transmission time: 636 seconds
Error = 0

C:\Users\User\Code>
```

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When packet loss probability increases, transmission time of the whole file also increases because there will be more lost packets and so more packet retransmission.

3. Timeout vs Transmission Time

```
C:\Users\User\Code>java GBNSender C:\Users\User\Code\test.bin localhost 9999 10 150

Transmission time: 168 seconds
Error = 0

C:\Users\User\Code>
```

```
C:\Users\User\Code>java GBNSender C:\Users\User\Code\test.bin localhost 9999 10 300

Transmission time: 177 seconds
Error = 0

C:\Users\User\Code>
```
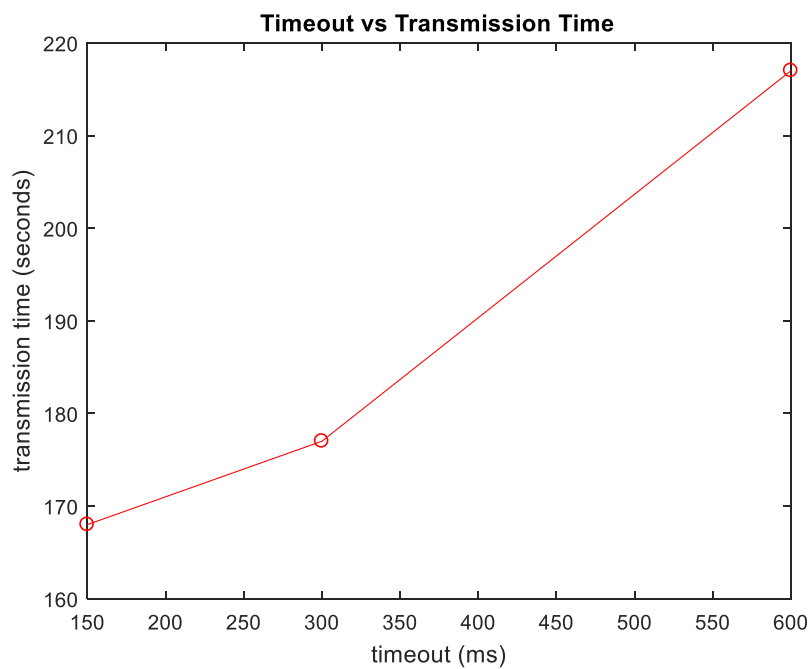
```
C:\Users\User\Code>java GBNSender C:\Users\User\Code\test.bin localhost 9999 10 600

Transmission time: 217 seconds
Error = 0

C:\Users\User\Code>
```

When timeout increases, transmission time of the whole file also increases because waiting time for retransmission of lost packets increases.

4. Window Size vs Transmission Time

```
C:\Users\User\Code>java GBNSender C:\Users\User\Code\test.bin localhost 9999 1 150

Transmission time: 421 seconds
Error = 0

C:\Users\User\Code>_
```

```
C:\Users\User\Code>java GBNSender C:\Users\User\Code\test.bin localhost 9999 5 150

Transmission time: 164 seconds
Error = 0

C:\Users\User\Code>
```

```
C:\Users\User\Code>java GBNSender C:\Users\User\Code\test.bin localhost 9999 10 150

Transmission time: 169 seconds
Error = 0

C:\Users\User\Code>
```
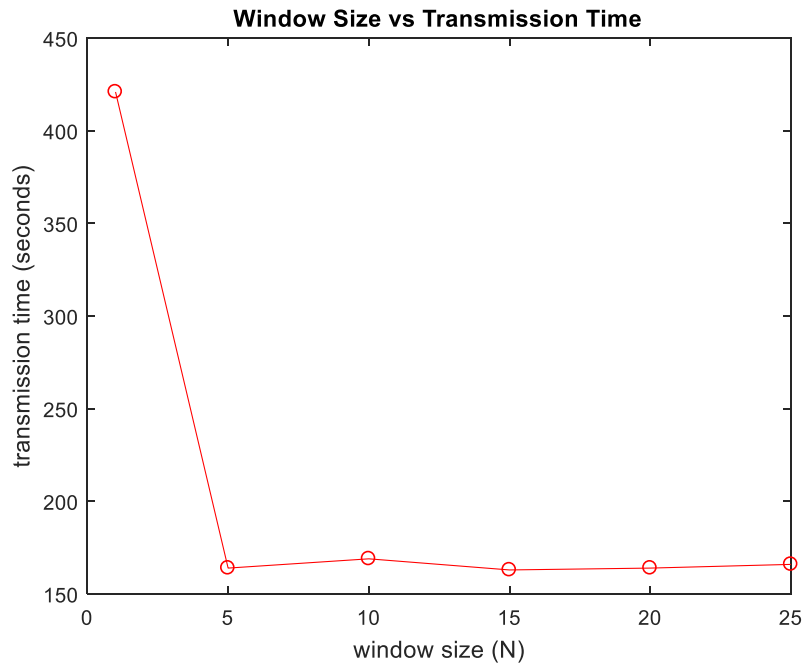
```
C:\Users\User\Code>java GBNSender C:\Users\User\Code\test.bin localhost 9999 15 150

Transmission time: 163 seconds
Error = 0

C:\Users\User\Code>
```

```
C:\Users\User\Code>java GBNSender C:\Users\User\Code\test.bin localhost 9999 20 150

Transmission time: 164 seconds
Error = 0

C:\Users\User\Code>
```

```
C:\Users\User\Code>java GBNSender C:\Users\User\Code\test.bin localhost 9999 25 150

Transmission time: 166 seconds
Error = 0

C:\Users\User\Code>
```

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Window Size vs Transmission Time

When window size increases, transmission time of the whole file does not change very much because number of lost packets in the window also increases when window size increases. Thus, total transmission time remains similar when window size increases. Actually, when window size is very small such as 1, transmission time is higher because after sending the small window, it waits for ACKs and does nothing. Therefore, for small values of window size, transmission time is large.