

# **Computer Networks Assignment-3**

## **Performance of FSSP under different Network Conditions**

### **Submitted by:**

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### **Specifications:**

WINDOW SIZE = 1000

Each test ran for 60 seconds

Reliability test passed in each of the cases

<https://netbeez.net/blog/how-to-use-the-linux-traffic-control/>

Reliability can be tested using reliability\_test.py file.

Bandwidth can be tested using performance\_test.py file.

### **Throughput vs Packet Loss**

1. Packet loss: 0  
Packet corruption: 0  
Network delay: 0  
Bandwidth limit: no limit

Sent: 16176000 Bytes  
Bandwidth: 237116.778 B/s

2. Packet loss: 10%  
Packet corruption: 0  
Network delay: 0  
Bandwidth limit: no limit

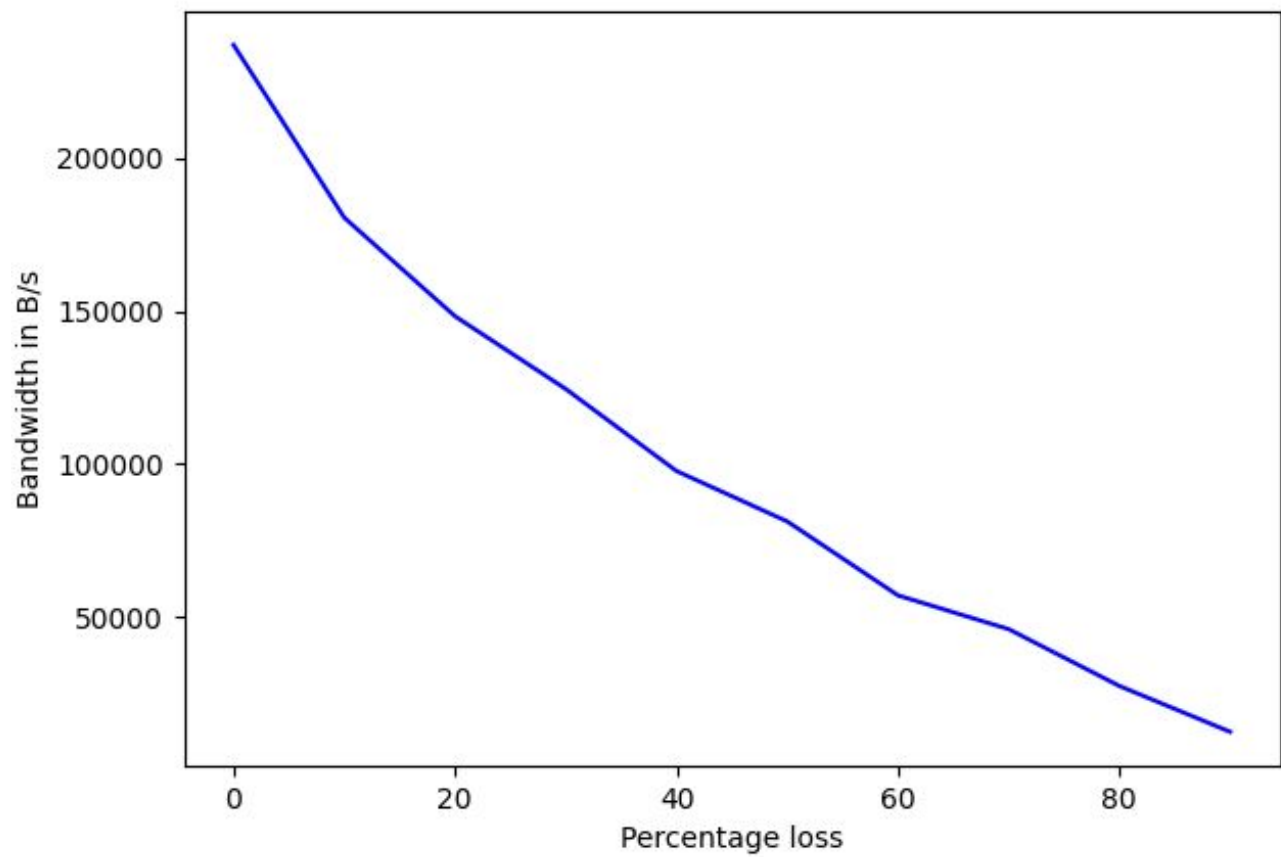
Sent: 12877440 Bytes  
Bandwidth: 180595.110 B/s

3. Packet loss: 50%  
Packet corruption: 0  
Network delay: 0  
Bandwidth limit: no limit

Sent: 6312960 Bytes  
Bandwidth: 81245.6332 B/s

4. Packet loss: 90%  
Packet corruption: 0  
Network delay: 0  
Bandwidth limit: no limit

Sent: 1326720 Bytes  
Bandwidth: 12421.8702 B/s



## Throughput vs Network Delay

1. Packet loss: 0  
Packet corruption: 0  
Network delay: 200ms  
Bandwidth limit: no limit

Sent: 15487680 Bytes

Bandwidth: 226825.911 B/s

2. Packet loss: 0

Packet corruption: 0

Network delay: 400ms

Bandwidth limit: no limit

Sent: 12827520 Bytes

Bandwidth: 184090.854 B/s

3. Packet loss: 0

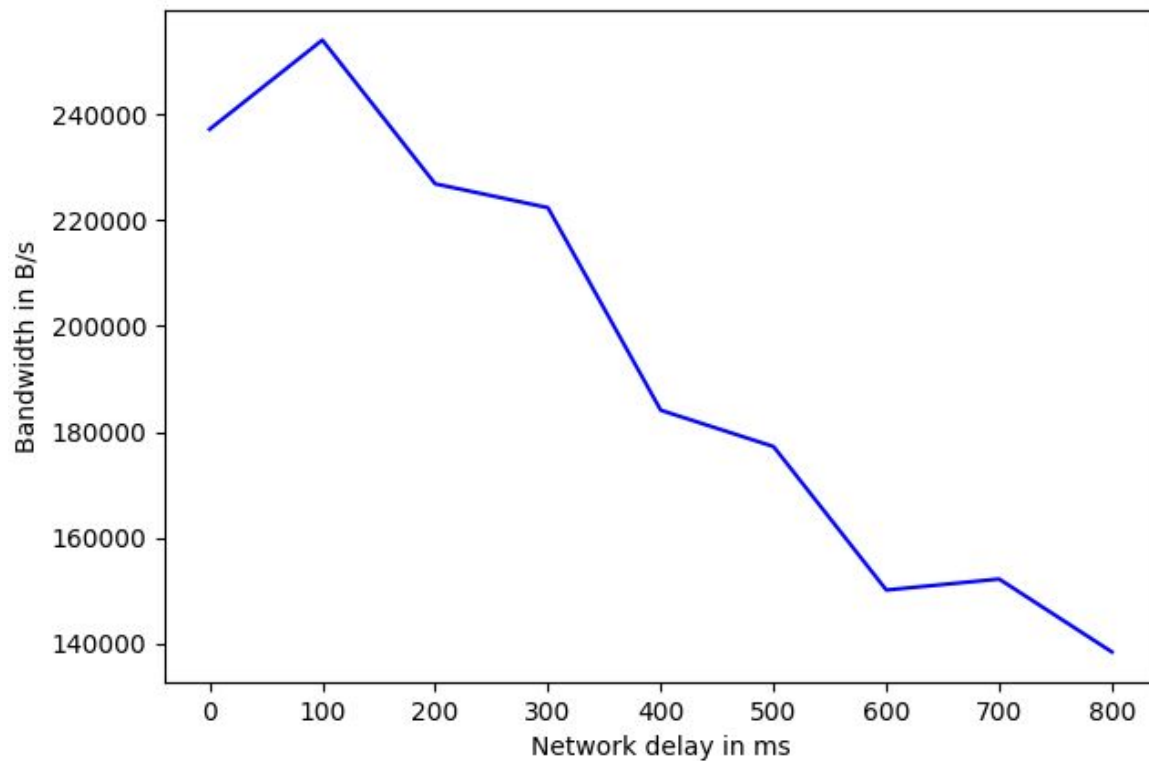
Packet corruption: 0

Network delay: 600ms

Bandwidth limit: no limit

Sent: 10411200 Bytes

Bandwidth: 150151.464 B/s



## Throughput vs Packet Corruption

1. Packet loss: 0  
Packet corruption: 2.5 %  
Network delay: 0  
Bandwidth limit: no limit

Sent: 14429760 Bytes

Bandwidth: 209300.501 B/s

2. Packet loss: 0  
Packet corruption: 10 %  
Network delay: 0  
Bandwidth limit: no limit

Sent: 12472320 Bytes  
Bandwidth: 178223.894 B/s

3. Packet loss: 0  
Packet corruption: 15 %  
Network delay: 0  
Bandwidth limit: no limit

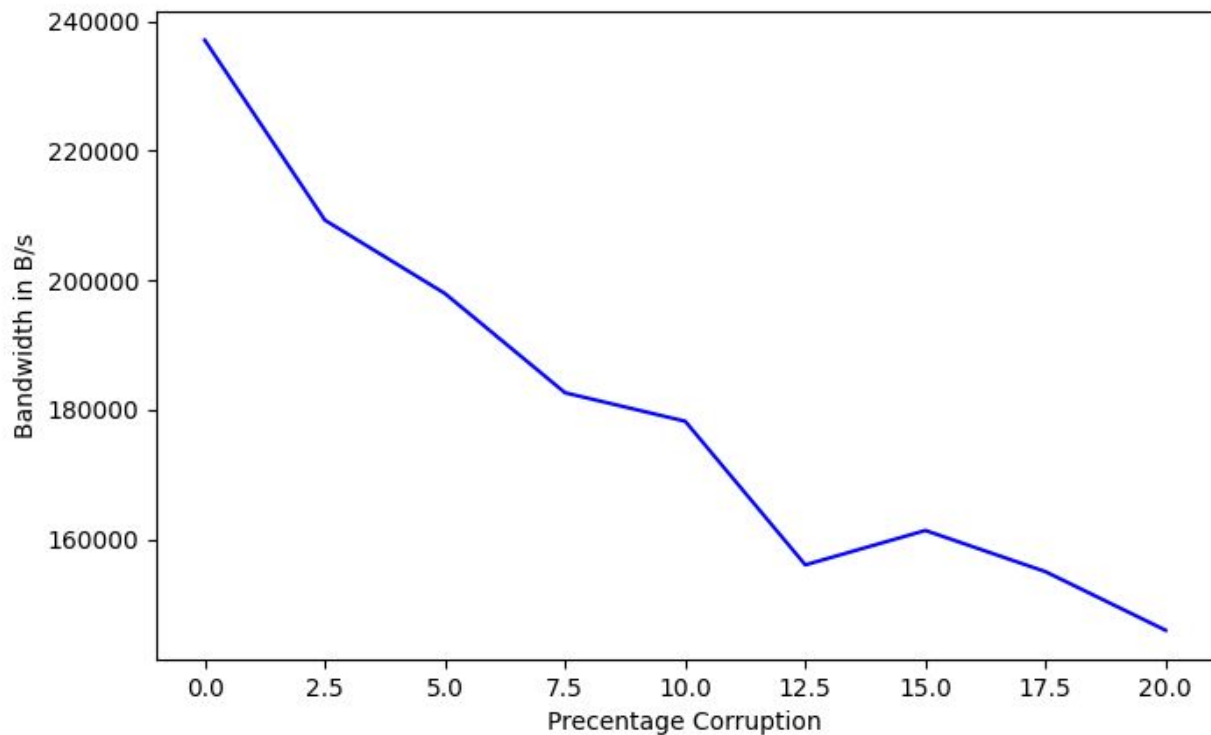
Sent: 11274240 Bytes  
Bandwidth: 161345.688 B/s

4. Packet loss: 0  
Packet corruption: 50 %  
Network delay: 0  
Bandwidth limit: no limit

Sent: 6362860 Bytes  
Bandwidth: 88673.7321 B/s

5. Packet loss: 0  
Packet corruption: 90 %  
Network delay: 0  
Bandwidth limit: no limit

Sent: 1294380 Bytes  
Bandwidth: 11628.2286 B/s



### Additional Tests:

```
sudo tc qdisc add dev lo root tbf rate 1mbit burst 32kbit latency 400ms
```

tbf: use the token buffer filter to manipulate traffic rates

rate: sustained maximum rate

burst: maximum allowed burst

latency: packets with higher latency get dropped

<this is bandwidth limiting test>

bandwidth: 32260.7955 B/s

sent: 2888620 Bytes

## Useful Commands:

To check all active rules: `tc qdisc show dev lo`

To delete all active rules: `tc qdisc del dev lo root`

Add packet loss: `tc qdisc add dev lo root netem loss 10%`

Add packet delay: `tc qdisc add dev lo root netem delay 200ms`

Add packet corruption: `sudo tc qdisc add dev lo root netem corrupt 20%`