

Performance of NSUU Protocol under different network conditions

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Protocol Specification

Window Size = 100

Message Length (in a packet) = 1024 Bytes

Timeout (in server-side if Ack not received) = 0.5 secs

Throughput, *measured as* bytes transferred over a fixed interval (**120secs**) and represented in Bytes/sec.

Throughput is compared against:

- Packet Delay
- Packet Loss
- Packet Duplication
- Packet Reordering
- Packet Corruption

Throughput = 952456.5 Bytes/sec, when no constraints are imposed over the network

Throughput Vs Packet Delay

Command used - netem delay 100ms

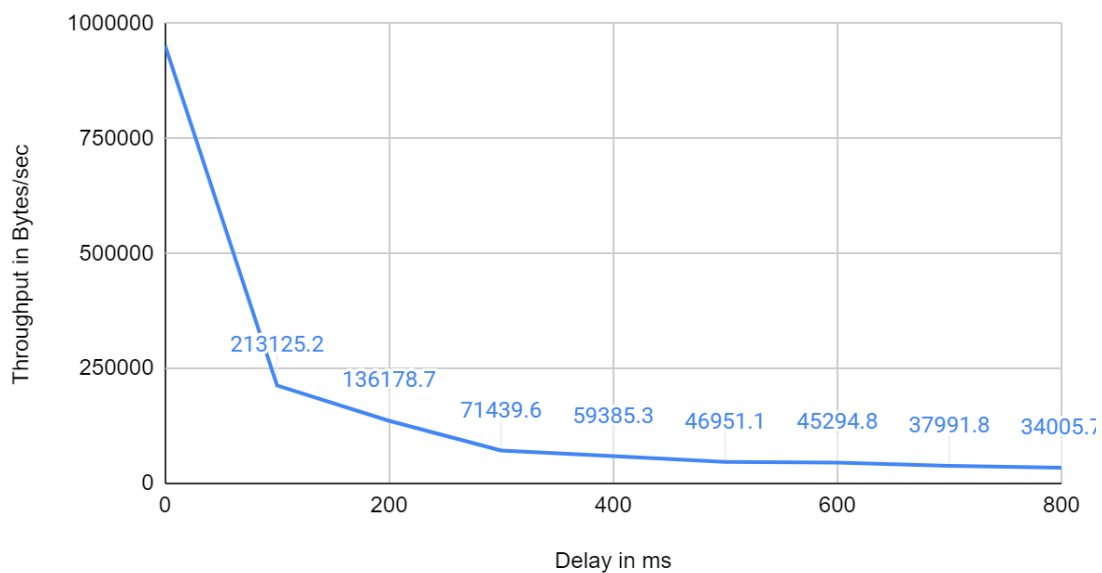
Description - It adds a fixed amount of 100ms delay to all packets

Note: *All other constraints are relaxed*

Delay in ms	Throughput in Bytes/sec
0	952456.5
100	213125.2
200	136178.7
300	71439.6
400	59385.3
500	46951.1
600	45294.8
700	37991.8
800	34005.7

Plot

Throughput vs. Delay



Throughput Vs Packet Loss

Command used - netem loss 10%

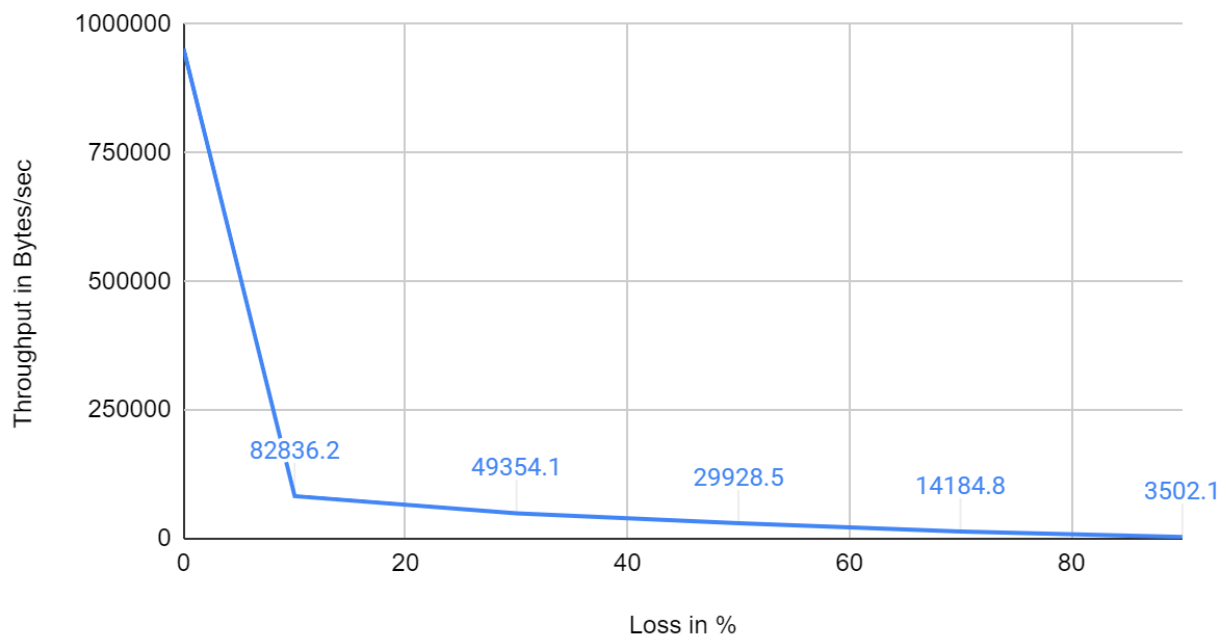
Description - This causes 10 percent (i.e 10 out of 100) packets to be randomly dropped

Note: *All other constraints are relaxed*

Loss in %	Throughput in Bytes/sec
0	952456.5
10	82836.2
30	49354.1
50	29928.5
70	14184.8
90	3502.1

Plot

Throughput vs. Packet Loss



Throughput Vs Packet Duplication

Command used - netem duplicate 10%

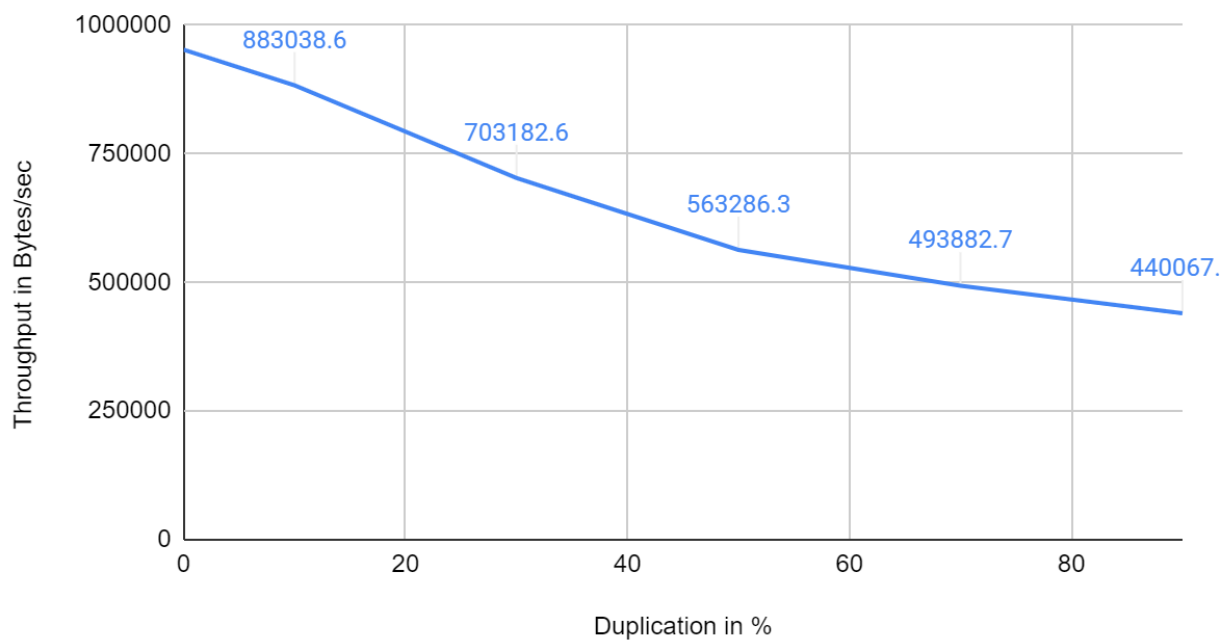
Description - This causes 10 percent packets to be randomly duplicated

Note: *All other constraints are relaxed*

Duplication in %	Throughput in Bytes/sec
0	952456.5
10	883038.6
30	703182.6
50	563286.3
70	493882.7
90	440067.4

Plot

Throughput vs. Packet Duplication



Throughput Vs Packet Reordering

Command used - netem delay 200ms reorder 25% 50%

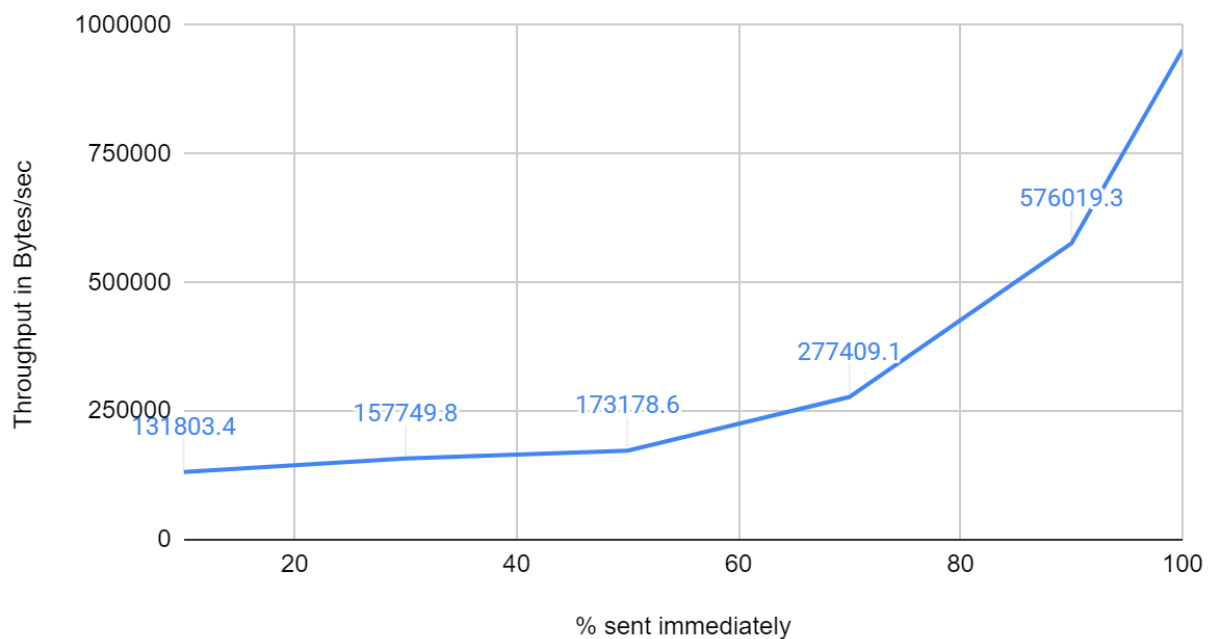
Description - 25% of packets (with a correlation of 50%) will get sent immediately, others will be delayed by 200ms.

Note: *All other constraints are relaxed*

% sent immediately	Throughput in Bytes/sec
100	952456.5
90	576019.3
70	277409.1
50	173178.6
30	157749.8
10	131803.4

Plot

Throughput vs. Packet Reordering



Throughput Vs Packet Corruption

Command used - netem corrupt 10%

Description - Causes 10 percent (i.e 10 out of 100) packets to be randomly corrupted

Note: *All other constraints are relaxed*

Corruption in %	Throughput in Bytes/sec
0	952456.5
10	80846.4
30	48344.3
50	27528.6
70	16144.8
90	3492.5

Plot

Throughput vs. Packet Corruption

