

Reno algorithm – 0%

```
oria@oria-VirtualBox:~/Documents/CN$ sudo tc qdisc add dev lo root netem loss 0%
[sudo] password for oria:
```

```
oria@oria-VirtualBox:~/Documents/CN$ ./TCP_Receiver -p 1234 -algo reno
Starting Receiver...
Waiting for TCP connection on port 1234...
Sender connected
File accepted
File accepted
File accepted
File accepted
File accepted
- * Statistics * -
-----
- Run #0 Data: Time=1032.19ms; Speed=1.94MB/s
-----
- Run #1 Data: Time=1014.69ms; Speed=1.97MB/s
-----
- Run #2 Data: Time=1033.88ms; Speed=1.93MB/s
-----
- Run #3 Data: Time=1025.52ms; Speed=1.95MB/s
-----
- Run #4 Data: Time=1025.15ms; Speed=1.95MB/s
-----
- Average time: 1026.29ms
- Average bandwidth: 1.95MB/s
-----
Sender sent exit message.
Receiver end.
```

```
2
oria@oria-VirtualBox:~/Documents/CN$ ./TCP_Sender -ip 127.0.0.1 -p 1234 -algo reno
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
2
```

Cubic algorithm – 0%

```

oria@oria-VirtualBox:~/Documents/CN$ ./TCP_Receiver -p 1234 -algo cubic
Starting Receiver...
Waiting for TCP connection on port 1234...
Sender connected
File accepted
File accepted
File accepted
File accepted
File accepted
- * Statistics * -
-----
- Run #0 Data: Time=1027.20ms; Speed=1.95MB/s
-----
- Run #1 Data: Time=1008.82ms; Speed=1.98MB/s
-----
- Run #2 Data: Time=1015.60ms; Speed=1.97MB/s
-----
- Run #3 Data: Time=1019.72ms; Speed=1.96MB/s
-----
- Run #4 Data: Time=1008.94ms; Speed=1.98MB/s
-----
- Average time: 1016.06ms
- Average bandwidth: 1.97MB/s
-----
Sender sent exit message.
Receiver end.

```

```

oria@oria-VirtualBox:~/Documents/CN$ ./TCP_Sender -ip 127.0.0.1 -p 1234 -algo cubic
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
2
oria@oria-VirtualBox:~/Documents/CN$ ./TCP_Sender -ip 127.0.0.1 -p 1234 -algo cubic

```

Reno algorithm – 2%

```

oria@oria-VirtualBox:~/Documents/CN$ sudo tc qdisc change dev lo root netem loss 2%
oria@oria-VirtualBox:~/Documents/CN$ ./TCP_Receiver -p 1234 -algo reno
Starting Receiver...
Waiting for TCP connection on port 1234...
Sender connected
File accepted
File accepted
File accepted
File accepted
File accepted
- * Statistics * -
-----
- Run #0 Data: Time=1023.99ms; Speed=1.95MB/s
-----
- Run #1 Data: Time=1009.25ms; Speed=1.98MB/s
-----
- Run #2 Data: Time=1026.33ms; Speed=1.95MB/s
-----
- Run #3 Data: Time=1284.72ms; Speed=1.56MB/s
-----
- Run #4 Data: Time=1009.08ms; Speed=1.98MB/s
-----
- Average time: 1070.67ms
- Average bandwidth: 1.87MB/s
-----
Sender sent exit message.
Receiver end.

```

```

2
oria@oria-VirtualBox:~/Documents/CN$ ./TCP_Sender -ip 127.0.0.1 -p 1234 -algo reno
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
2

```

Cubic algorithm – 2%

```

oria@oria-VirtualBox:~/Documents/CN$ ./TCP_Receiver -p 1234 -algo cubic
Starting Receiver...
Waiting for TCP connection on port 1234...
Sender connected
File accepted
File accepted
File accepted
File accepted
File accepted
- * Statistics * -
-----
- Run #0 Data: Time=1086.66ms; Speed=1.84MB/s
-----
-----
- Run #1 Data: Time=1032.32ms; Speed=1.94MB/s
-----
-----
- Run #2 Data: Time=1004.12ms; Speed=1.99MB/s
-----
-----
- Run #3 Data: Time=1039.89ms; Speed=1.92MB/s
-----
-----
- Run #4 Data: Time=1030.00ms; Speed=1.94MB/s
-----
-----
- Average time: 1038.60ms
- Average bandwidth: 1.93MB/s
-----
Sender sent exit message.
Receiver end.

```

```

oria@oria-VirtualBox:~/Documents/CN$ ./TCP_Sender -ip 127.0.0.1 -p 1234 -algo cubic
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
2
oria@oria-VirtualBox:~/Documents/CN$ ./TCP_Sender -ip 127.0.0.1 -p 1234 -algo cubic

```


Cubic algorithm – 5%

```
oria@oria-VirtualBox:~/Documents/CN$ sudo tc qdisc change dev lo root netem loss 5%
```

```
oria@oria-VirtualBox:~/Documents/CN$ ./TCP_Receiver -p 1234 -algo cubic
Starting Receiver...
Waiting for TCP connection on port 1234...
Sender connected
File accepted
File accepted
File accepted
File accepted
File accepted
- * Statistics * -
-----
- Run #0 Data: Time=1032.38ms; Speed=1.94MB/s
-----
- Run #1 Data: Time=1022.43ms; Speed=1.96MB/s
-----
- Run #2 Data: Time=1030.91ms; Speed=1.94MB/s
-----
- Run #3 Data: Time=1026.62ms; Speed=1.95MB/s
-----
- Run #4 Data: Time=1216.88ms; Speed=1.64MB/s
-----
- Average time: 1065.84ms
- Average bandwidth: 1.88MB/s
-----
Sender sent exit message.
Receiver end.
```

```
oria@oria-VirtualBox:~/Documents/CN$ ./TCP_Sender -ip 127.0.0.1 -p 1234 -algo cubic
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
2
oria@oria-VirtualBox:~/Documents/CN$ ./TCP_Sender -ip 127.0.0.1 -p 1234 -algo cubic
```

Reno algorithm – 5%

```

oria@oria-VirtualBox:~/Documents/CN$ ./TCP_Receiver -p 1234 -algo reno
Starting Receiver...
Waiting for TCP connection on port 1234...
Sender connected
File accepted
File accepted
File accepted
File accepted
File accepted
- * Statistics * -
-----
- Run #0 Data: Time=1032.19ms; Speed=1.94MB/s
-----
-----
- Run #1 Data: Time=1014.69ms; Speed=1.97MB/s
-----
-----
- Run #2 Data: Time=1033.88ms; Speed=1.93MB/s
-----
-----
- Run #3 Data: Time=1025.52ms; Speed=1.95MB/s
-----
-----
- Run #4 Data: Time=1025.15ms; Speed=1.95MB/s
-----
- Average time: 1026.29ms
- Average bandwidth: 1.95MB/s
-----
Sender sent exit message.
Receiver end.

```

```

2
oria@oria-VirtualBox:~/Documents/CN$ ./TCP_Sender -ip 127.0.0.1 -p 1234 -algo reno
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
2

```

Reno algorithm – 10%

```

oria@oria-VirtualBox:~/Documents/CN$ sudo tc qdisc change dev lo root netem loss 10%
oria@oria-VirtualBox:~/Documents/CN$ ./TCP_Receiver -p 1234 -algo reno
Starting Receiver...
Waiting for TCP connection on port 1234...
Sender connected
File accepted
File accepted
File accepted
File accepted
File accepted
- * Statistics * -
-----
- Run #0 Data: Time=1054.51ms; Speed=1.90MB/s
-----
- Run #1 Data: Time=1039.55ms; Speed=1.92MB/s
-----
- Run #2 Data: Time=1031.08ms; Speed=1.94MB/s
-----
- Run #3 Data: Time=1246.56ms; Speed=1.60MB/s
-----
- Run #4 Data: Time=1065.20ms; Speed=1.88MB/s
-----
- Average time: 1087.38ms
- Average bandwidth: 1.84MB/s
-----
Sender sent exit message.
Receiver end.

```

```

2
oria@oria-VirtualBox:~/Documents/CN$ ./TCP_Sender -ip 127.0.0.1 -p 1234 -algo reno
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
2

```

Cubic algorithm – 10%

```

oria@oria-VirtualBox:~/Documents/CN$ ./TCP_Receiver -p 1234 -algo cubic
Starting Receiver...
Waiting for TCP connection on port 1234...
Sender connected
File accepted
File accepted
File accepted
File accepted
File accepted
- * Statistics * -
-----
- Run #0 Data: Time=1263.59ms; Speed=1.58MB/s
-----
- Run #1 Data: Time=1005.06ms; Speed=1.99MB/s
-----
- Run #2 Data: Time=1106.42ms; Speed=1.81MB/s
-----
- Run #3 Data: Time=1039.06ms; Speed=1.92MB/s
-----
- Run #4 Data: Time=1031.73ms; Speed=1.94MB/s
-----
- Average time: 1089.17ms
- Average bandwidth: 1.84MB/s
-----
Sender sent exit message.
Receiver end.

```

```

oria@oria-VirtualBox:~/Documents/CN$ ./TCP_Sender -ip 127.0.0.1 -p 1234 -algo cubic
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
1
Press 1 to send or 2 to exit
2
oria@oria-VirtualBox:~/Documents/CN$ ./TCP_Sender -ip 127.0.0.1 -p 1234 -algo cubic

```


בונים

5 times with TCP Reno in both Sender and Receiver

```

oria@oria-VirtualBox:~/Documents/CN$ sudo tc qdisc del dev lo root netem
oria@oria-VirtualBox:~/Documents/CN$ ./TCP_Receiver -p 1234 -algo reno
Starting Receiver...
Waiting for TCP connection on port 1234...
Sender connected
File accepted
File accepted
File accepted
File accepted
File accepted
- * Statistics * -
-----
- Run #0 Data: Time=1031.50ms; Speed=1.94MB/s
-----
- Run #1 Data: Time=1020.68ms; Speed=1.96MB/s
-----
- Run #2 Data: Time=1071.66ms; Speed=1.87MB/s
-----
- Run #3 Data: Time=1229.82ms; Speed=1.63MB/s
-----
- Run #4 Data: Time=1159.87ms; Speed=1.72MB/s
-----
- Average time: 1102.71ms
- Average bandwidth: 1.81MB/s
-----
Sender sent exit message.
Receiver end.

```

5 times with TCP Reno in Sender and TCP Cubic in Receiver

```

oria@oria-VirtualBox:~/Documents/CN$ ./TCP_Receiver -p 1234 -algo cubic
Starting Receiver...
Waiting for TCP connection on port 1234...
Sender connected
File accepted
File accepted
File accepted
File accepted
File accepted
- * Statistics * -
-----
- Run #0 Data: Time=1011.45ms; Speed=1.98MB/s
-----
- Run #1 Data: Time=1040.45ms; Speed=1.92MB/s
-----
- Run #2 Data: Time=1033.52ms; Speed=1.94MB/s
-----
- Run #3 Data: Time=1020.06ms; Speed=1.96MB/s
-----
- Run #4 Data: Time=1017.65ms; Speed=1.97MB/s
-----
- Average time: 1024.63ms
- Average bandwidth: 1.95MB/s
-----
Sender sent exit message.
Receiver end.

```

5 times with TCP Cubic in Sender and TCP Reno in Receiver

```

oria@oria-VirtualBox:~/Documents/CN$ ./TCP_Receiver -p 1234 -algo reno
Starting Receiver...
Waiting for TCP connection on port 1234...
Sender connected
File accepted
File accepted
File accepted
File accepted
File accepted
- * Statistics * -
-----
- Run #0 Data: Time=1017.91ms; Speed=1.96MB/s
-----
- Run #1 Data: Time=1017.46ms; Speed=1.97MB/s
-----
- Run #2 Data: Time=1027.02ms; Speed=1.95MB/s
-----
- Run #3 Data: Time=1025.86ms; Speed=1.95MB/s
-----
- Run #4 Data: Time=1028.05ms; Speed=1.95MB/s
-----
- Average time: 1023.26ms
- Average bandwidth: 1.95MB/s
-----
Sender sent exit message.
Receiver end.

```

5 times with TCP Cubic in both Sender and Receiver

```

oria@oria-VirtualBox:~/Documents/CN$ ./TCP_Receiver -p 1234 -algo cubic
Starting Receiver...
Waiting for TCP connection on port 1234...
Sender connected
File accepted
File accepted
File accepted
File accepted
File accepted
- * Statistics * -
-----
- Run #0 Data: Time=1018.64ms; Speed=1.96MB/s
-----
- Run #1 Data: Time=1013.60ms; Speed=1.97MB/s
-----
- Run #2 Data: Time=1041.39ms; Speed=1.92MB/s
-----
- Run #3 Data: Time=1030.36ms; Speed=1.94MB/s
-----
- Run #4 Data: Time=1030.94ms; Speed=1.94MB/s
-----
- Average time: 1026.99ms
- Average bandwidth: 1.95MB/s
-----
Sender sent exit message.
Receiver end.

```