CS549 :Performance Analysis of Computer Network

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Mini Project - Topic number 4

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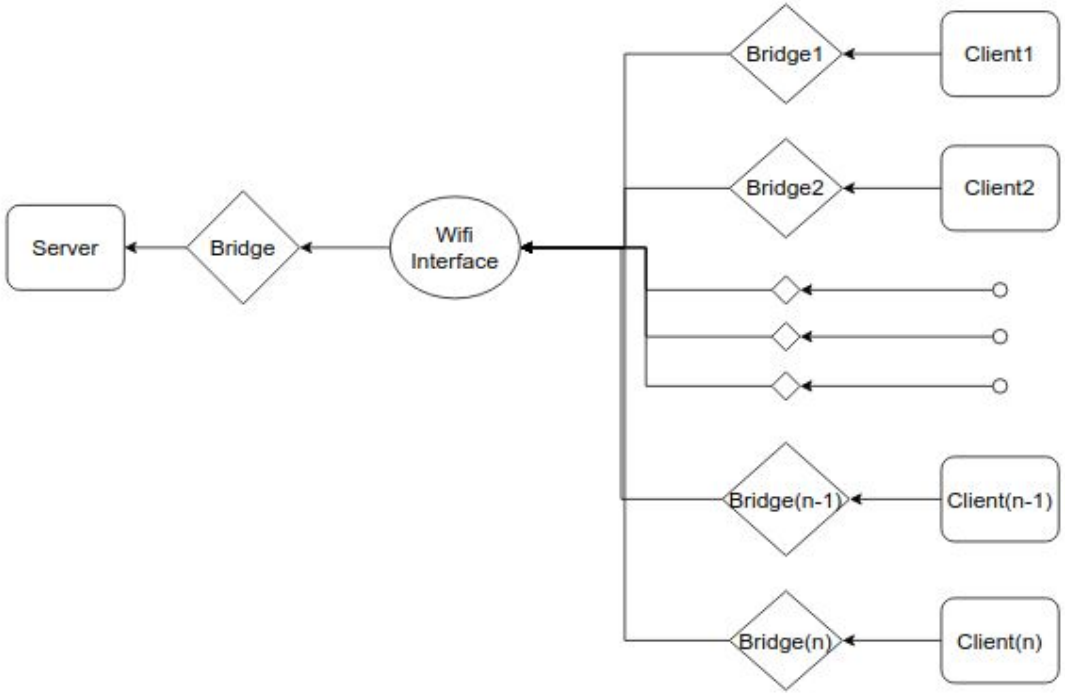
Problem Statement:

Create N+1 nodes on your Laptop where one node acts as a server and remaining as clients.
Write Client-Server code using UDP sockets. Vary the rate,loss and delay on the client MACVLANs and measure the performance.

Experiment Setup: Block Diagram



Experiment Setup : Measurements

Send large file(100MB) from client to server.

- Throughput(MB/s) = total byte received / total time taken.

  For measuring total byte -> added all data received.

  For measuring total time -> python module time used.

Experiment Setup : Factors

Primary factors	Levels
Delay	1,5,10,20,30,40,50,60,70,80
Rate	1,4,9,15,30,40,50,60,70,85
Loss	1,2,5,10,15,20,25,30,40,50

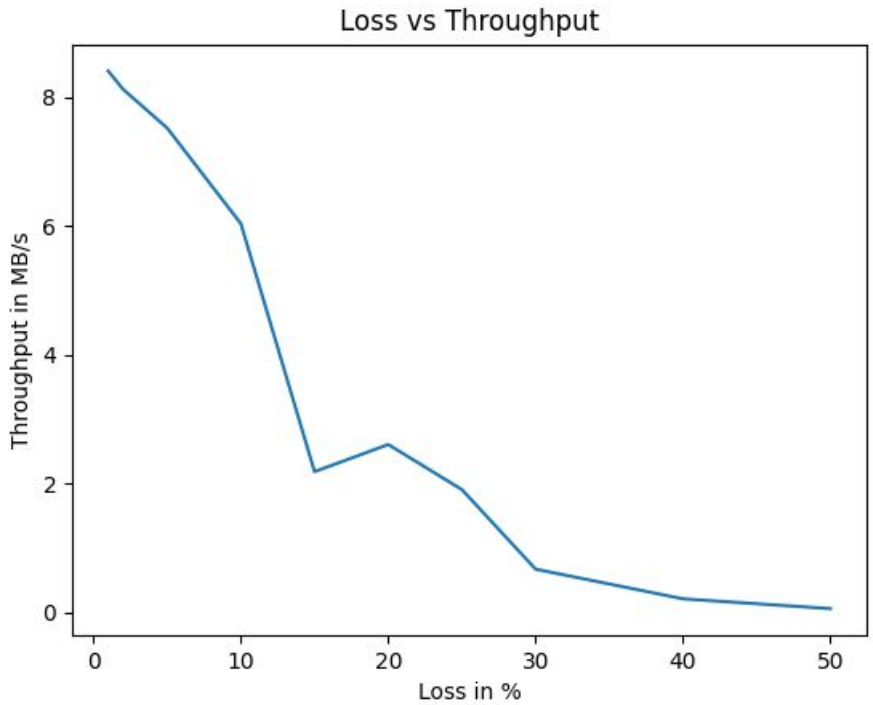
Secondary Factors	RAM, Operating System

Experiment Setup : Script for Automation

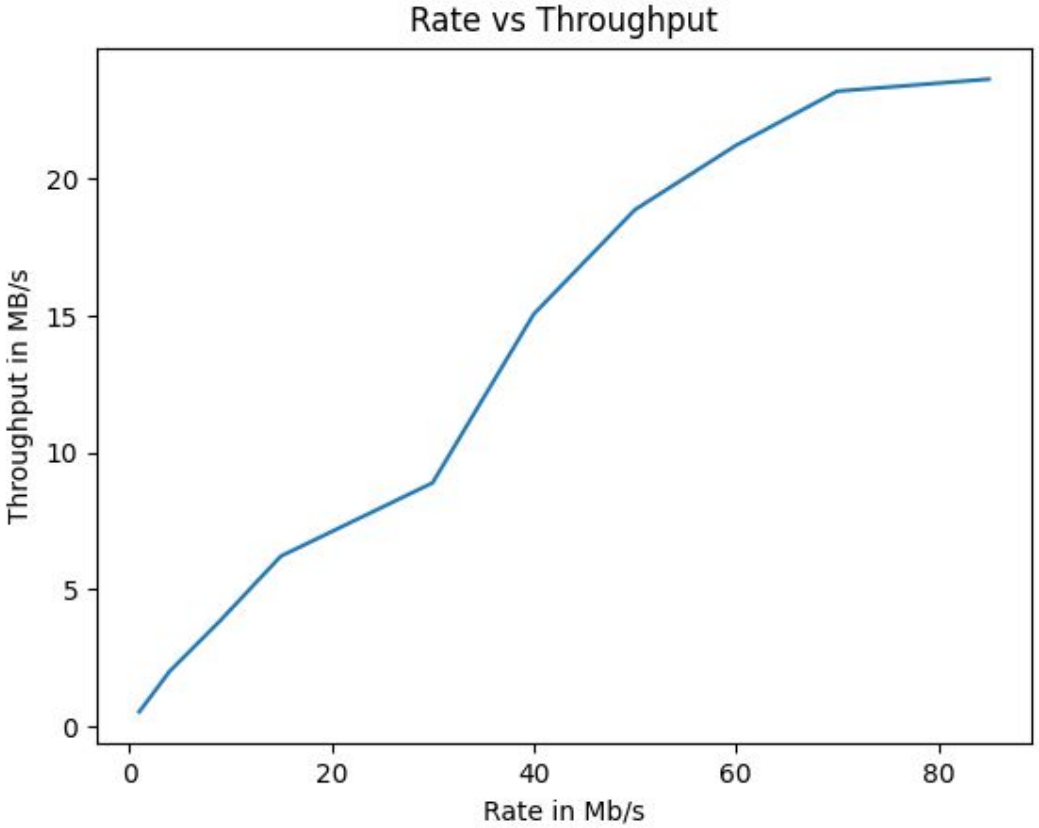
```
./run.sh 1ms 20mbit 2% 5;
while [ $(ps -aef | grep server.py | wc -l) -ne 1
]
do
  sleep 1;
done
So on ...
```

Result:

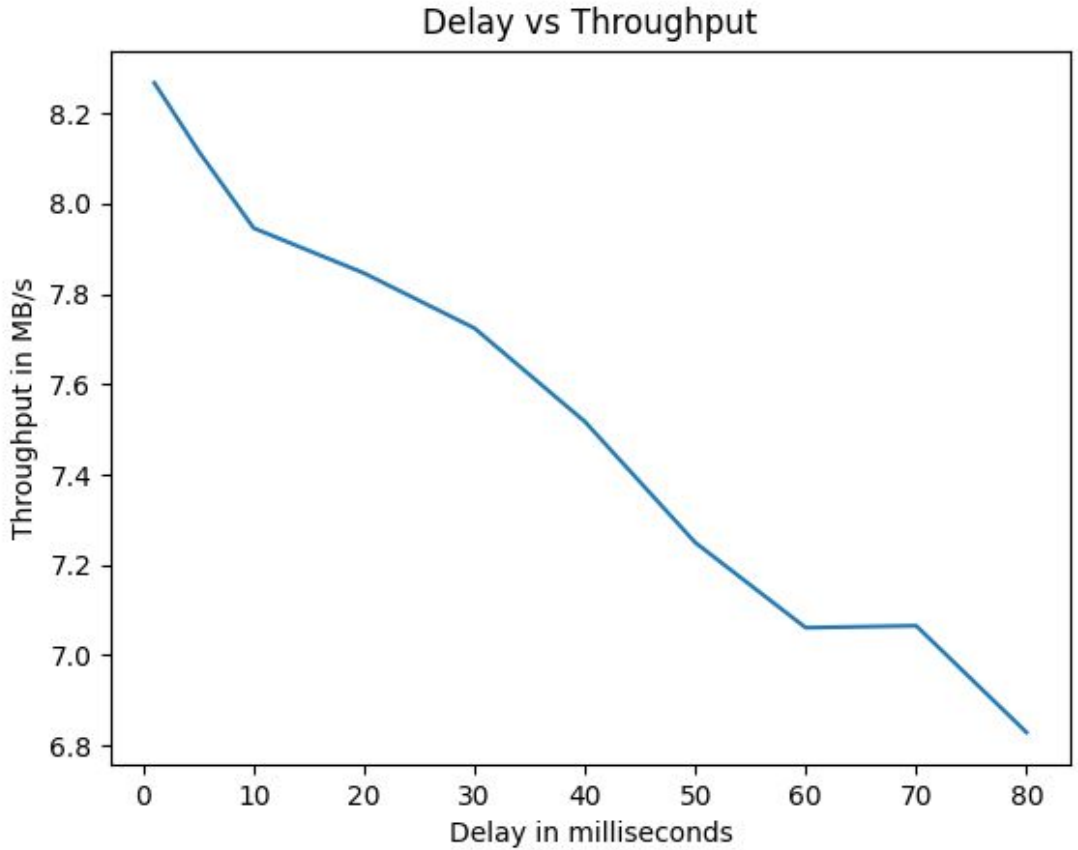
Graph: Loss vs Throughput



Graph: Rate vs Throughput



Graph: Delay vs Throughput



Data Table:Varying the Delay

Delay(ms)	Rate(Mb/s)	Loss(%)	No. of Client	Throughput(MB/s)
1	20	2	5	8.2679
5	20	2	5	8.1166
10	20	2	5	7.9460
20	20	2	5	7.8461
30	20	2	5	7.7242
40	20	2	5	7.5172
50	20	2	5	7.2492
60	20	2	5	7.0606
70	20	2	5	7.0650
80	20	2	5	6.8286

Data Table:Varying the Loss

Delay(ms)	Rate(Mb/s)	Loss(%)	No. of Client	Throughput(MB/s)
5	20	1	5	8.4064
5	20	2	5	8.1254
5	20	5	5	7.5209
5	20	10	5	6.0357
5	20	15	5	2.1821
5	20	20	5	2.6040
5	20	25	5	1.9038
5	20	30	5	0.6674
5	20	40	5	0.2064
5	20	50	5	0.0542

Data Table:Varying the Rate

Delay(ms)	Rate(Mb/s)	Loss(%)	No. of Client	Throughput(MB/s)
5	1	2	5	0.5344
5	4	2	5	2.0156
5	9	2	5	3.8639
5	20	2	5	6.2213
5	30	2	5	8.8993
5	40	2	5	15.0587
5	50	2	5	18.8710
5	60	2	5	21.2220
5	70	2	5	23.1999
5	85	2	5	23.6423

Inference:

We infer following things by doing experiments :

- Increase in the loss, decreases the throughput.
- Increase in the rate, increases the throughput.
- Increase in the delay, decreases the throughput.

Conclusion

We have successfully conducted the experiments and concluded that increase in loss decrease throughput and increase in delay decrease throughput and increase in rate at client interface increase throughput.

Contribution

- Vinay kumar - B17068

  Configuration, Client script, Plotting script, Slide preparation.

- Deepak kumar - B17039

  Automation , Varying factor, Server script, File generator script.

References

- https://www.cs.unm.edu/~crandall/netsfall13/TCtutorial.pdf
- Quick Guide to Virtual Networking.

  https://students.iitmandi.ac.in/moodle/mod/resource/view.php?id=21921

- https://www.chuanjin.me/2016/08/03/transfer-file/