ITS 413 Internet Technologies and Applications

Assignment: Phase 2 Report

By

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By submitting this report all members of the group listed above agree that each member has contributed approximately equal amounts to designing and performing experiments, as well as to preparing this report. All members agree that this report accurately reflects the experiments conducted by the group members, and is their own work (not works of other groups).

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Aims

- To understand how internet 5 layer model works with UDP.
- To understand how bottleneck occurs when using wireless link and wired link.
- To know some parameters that may effects with throughput.
- To understand and use Iperf.

Network Diagram
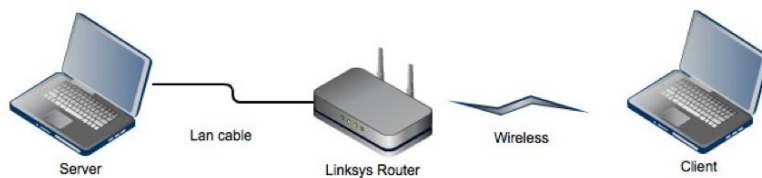
For the first experiment

We use LAN cable to connect between server with router and client connects with wireless. And we try to send data from client to sever and record the throughput that server return back. We send 1MB to 40MB increment with 1MB and 40MB to 100MB increment with 10 MB (send 3 times).

Equipment Specifications

	Server	Client	Router
Model	Dell studio14	Compaq presario	Linksys
OS	Linux Ubuntu 11.10	Linux Ubuntu 11.10	OpenWRT
CPU	Intel(R) Core(TM) 2 duo CPU 2.0 GHz	Intel(R) Core(TM) 2 duo CPU 2.0 GHz	Broad BCM5352 @ 200 MHz
RAM	4.00 GB DDR 2	3GB DDR 2	16 MB
Network interface	Broadcom NetLink (Gigabit) Ethanet	Intel(R) WiFi Link 5100 AGN	

Comment [s1]: Huh? The router has no network interface? Then how do the client and server connect to the router?

Parameters

- **Channel** if channel that we use has too many user it maybe cause a collision of frequency
- **Quality of LAN cable**
- **Obstacle** between client and access point
- **Access point** The process of the AP(if router work all the time/or non-stop sending data the through will be decrease)
- **Data** The data that we send from client to server can increase or decrease throughput.
- **Noise** in the environment.

Methods

For the method that we use to implement in this experiment is **shell script** to using iperf command. Shell script is a command that we can code it and use the For loop like Java language.

Example of shell script wired LAN

```
for i in {1..100}
do
      for j in {1..3}
      do
            echo ++++++++++++++Sending data "$i" MB
with "$j" round+++++++++++++++
            iperf -c 192.168.1.218 -u -b "$i"M
            sleep 5s
      done
done
```

Experiments and Results (wireless LAN)

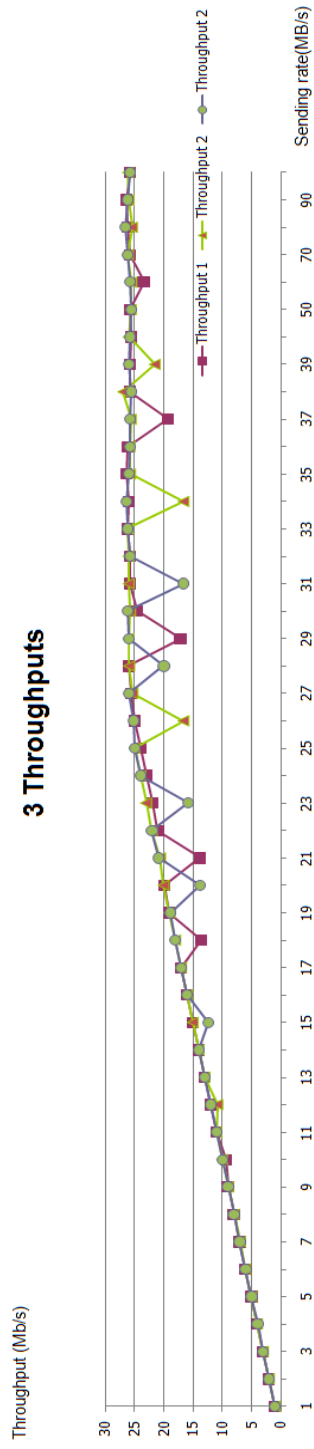| Data	Throughput 1	Throughput 2	Throughput 3	Avg.
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	3.95	3.98
5	5	5	5	5
6	6	6	6	6
7	7	6.92	7	6.97
8	8	8	8	8
9	9	9	9.01	9
10	9.32	10	10	9.77
11	11	11	11	11
12	12	10.8	12	11.6
13	13	13	13	13
14	14	14	14	14
15	15	15	12.3	14.1
16	16	16	16	16
17	17	17	17	17
18	13.6	18	18	16.5
19	19	19	18.9	19
20	19.9	20	13.8	17.9
21	13.8	20.6	20.9	18.4
22	21	22	22	21.7
23	21.9	23	15.8	20.2
24	23	24	23.9	23.6
25	23.9	25	24.9	24.6
26	24.9	16.6	25.2	22.2
27	25.6	25.3	25.9	25.6
28	26	25.9	20	24
29	17.1	26	25.9	23
30	24.6	25.7	26.2	25.5
31	25.7	26	16.6	22.8
32	25.8	26	25.8	25.9
33	26.2	26.2	26.2	26.2
34	26	16.6	26.4	23
35	26.4	25.7	25.9	26
36	26.2	25.8	25.8	25.9
37	19.2	25.6	25.8	23.5
38	25.8	26.9	25.6	26.1
39	25.7	21.5	26	24.4
40	25.6	26	25.8	25.8
50	25.8	25.6	25.5	25.6
60	23.4	25.5	25.7	24.9
70	25.8	26.1	26.2	26
80	26.1	25.4	26.5	26.5
90	26.3	26	26.1	26.1
100	25.8	26.1	25.8	25.9
MAX	26.4	26.9	26.5	26.5

In this experiment we try to send a multiple values of data from client to server and record the throughput that archive from links. After we finish experiment, we represent our records in form of a graph.
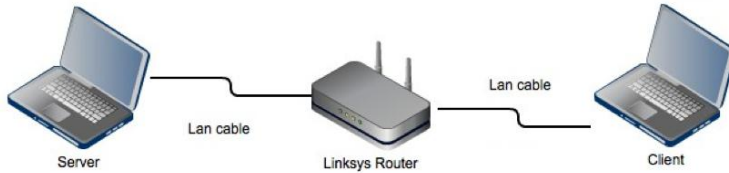
The Maximum throughput is 26.9

Average Throughput

Throughput (Mb/s)

Sending rate(MB/s)

—◆— Average

3 Throughputs

Throughput (Mb/s)

—■— Throughput 1   —▲— Throughput 2   —●— Throughput 2
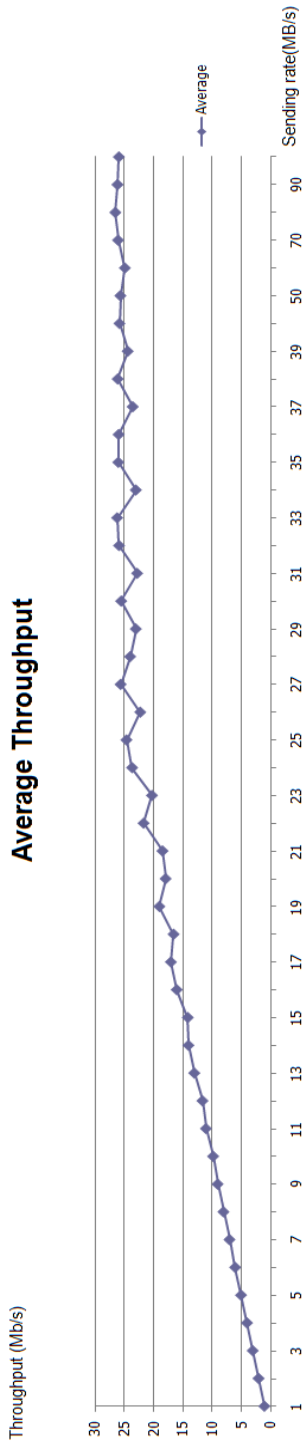
Sending rate(MB/s)

Network Diagram

For the second experiment

We use LAN cable to connect between server with router and client with router. And we try to send data from client to sever and record the throughput that server return back. We send 1MB to 100MB increment with 1MB (every 1MB increment send 3 times).

Experiments and Results (wired LAN)

Data	Throughput 2	Throughput 2	Throughput 3	AVG
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9
10	10	10	10	10
11	11	11	11	11
12	12	12	12	12
13	13	13	13	13
14	14	14	14	14
15	15	15	15	15
16	16	16	16	16
17	17	17	17	17
18	18	18	18	18
19	19	19	19	19
20	20	20	20	20
21	21	21	21	21
22	22	22	22	22
23	23	23	23	23
24	24	24	24	24
25	25	25	25	25
26	26	26	26	26
27	27	27	27	27
28	28	28	28	28

In this experiment we try to send a multiple values of data from client to server and record the throughput that archive from links. After we finish experiment, we represent our records in form of a graph.
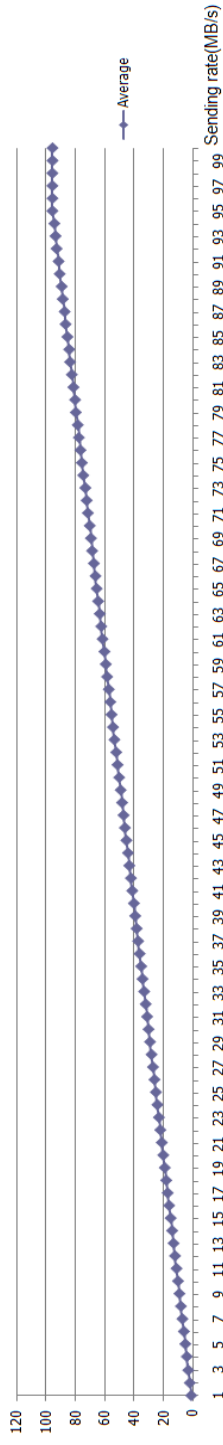
The maximum Throughput is 95.4

29	29	29	29	29
30	30	30	30	30
31	31	31	31	31
32	32	32	32	32
33	33	33	33	33
34	34.1	34.1	34.1	34.1
35	35	35	35	35
36	36.1	36.1	36.1	36.1
37	37.1	37.1	37.1	37.1
38	38.1	38.1	38.1	38.1
39	39.1	39.1	39.1	39.1
40	40	40	40	40
41	41.1	41.1	41.1	41.1
42	42	42	42	42
43	43.1	43.1	43.1	43.1
44	44	44	44	44
45	45.1	45.1	45.1	45.1
46	46.1	46.1	46.1	46.1
47	47	47	47	47
48	48	48	48	48
49	49	49	49	49
50	50	50	50	50
51	51.1	51.1	51.1	51.1
52	52	52	52	52
53	53.2	53.2	53.2	53.2
54	54.2	54.2	54.2	54.2
55	55.2	55.2	55.2	55.2
56	56	56	56	56
57	57.1	57.1	57.1	57.1
58	58.2	58.2	58.2	58.2
59	59.1	59.1	59.1	59.1
60	60	60	60	60
61	61.3	61.3	61.3	61.3
62	62.2	62.2	62.2	62.2
63	63.2	63.2	63.2	63.2
64	64.3	64.3	64.3	64.3
65	65.3	65.3	65.3	65.3
66	66.1	66.1	66.1	66.1
67	67.2	67.2	67.2	67.2
68	68.4	68.4	68.4	68.4
69	69.2	69.2	69.2	69.2
70	70	70	70	70
71	71.3	71.3	71.3	71.3
72	72.1	72.1	72.1	72.1
73	73	73	73	73
74	74.4	74.4	74.4	74.4
75	75.4	75.4	75.4	75.4

76	76.4	76.3	76.4	76.36667
77	77.4	77.4	77.4	77.4
78	78.4	78.4	77.7	78.16667
79	79.5	79.5	79.5	79.5
80	79.9	80	80	79.96667
81	81.1	81.1	81.1	81.1
82	82.2	82.2	82.2	82.2
83	83.4	83.4	83.4	83.4
84	84	84	84	84
85	85.2	85.2	85.2	85.2
86	86.5	86.4	86.5	86.46667
87	87.1	87.1	87.1	87.1
88	88.4	88.4	88.4	88.4
89	89.1	89.1	89.1	89.1
90	90.4	90.5	90.5	90.46667
91	91.2	91.2	91.2	91.2
92	92.6	92.5	92.6	92.56667
93	93.3	93.3	93.3	93.3
94	94.1	94	94.1	94.06667
95	95.4	95.4	95.4	95.4
96	95.4	95.3	95.4	95.36667
97	95.4	95.4	95.4	95.4
98	95.4	95.4	95.4	95.4
99	95.3	95.3	95.3	95.3
100	95.3	95.3	95.4	95.33333
Max	**95.4**	**95.4**	**95.4**	**95.4**

Average Throughput

Throughput (Mb/s)

Average

Sending rate(MB/s)
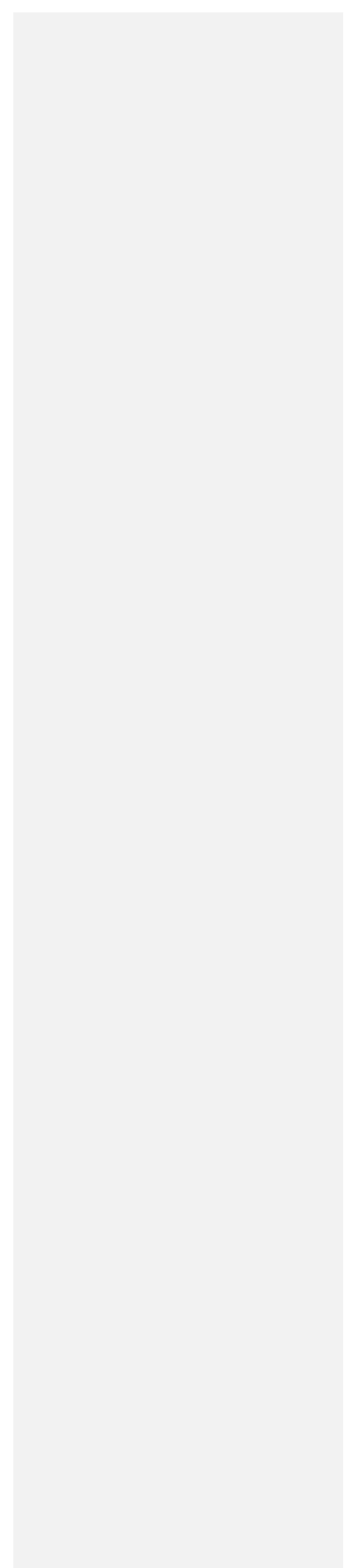
3 Throughputs

Throughput (Mb/s)

Throughput 1   Throughput 2   Throughput 2

Sending rate(MB/s)
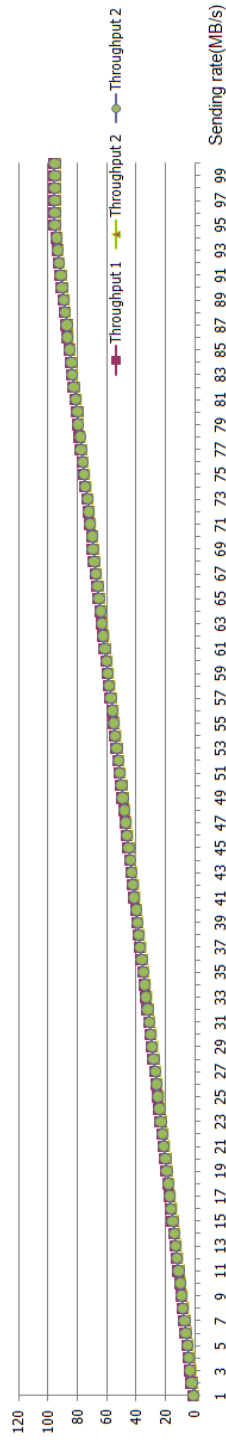
Conclusion

After we did the first experiment we can conclude that although server connect with access point via LAN cable that data rate is 100Mb/s but client connect with wireless that data rate at 54 Mb/s so the throughput will less than 54 Mb/s for sure because the throughput that we record will interference by some parameter such as channel because if someone use the same channel as our the collision of frequency will occur.

For the second experiment we can conclude that server connect with LAN cable to both server and client with 100Mb/s of data rate. So the throughput that server send back to client is very stable because in the LAN cable some parameters such as noise and obstacle cannot interfere.