

Internet Technologies and Applications

(ITS 413)

Assignment 1

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Table of contents

Topic	Page
Spreadsheets :Sirindhralai Building 6th Floor	1
Map: Sirindhralai Building 6th Floor	2
Spreadsheets : Library	4
Map: Sirindhralai Building: Library	5
How we set up the test?	6
Task 2 : The first experiment: one client, one server	8
Task 2 : The second experiment: two client, one server	9
Results of the experiment 1	11
Results of the experiment 2	13
Conclusion for all experiments in task2	13

Task1

Sirindhralai Building 6th Floor

In the task1, we use inSSIDer to testing and use Intel® Ultimate N WiFi Link 5300.

For the security in wsiit is none.

The 6th floor, it has 2 access points.

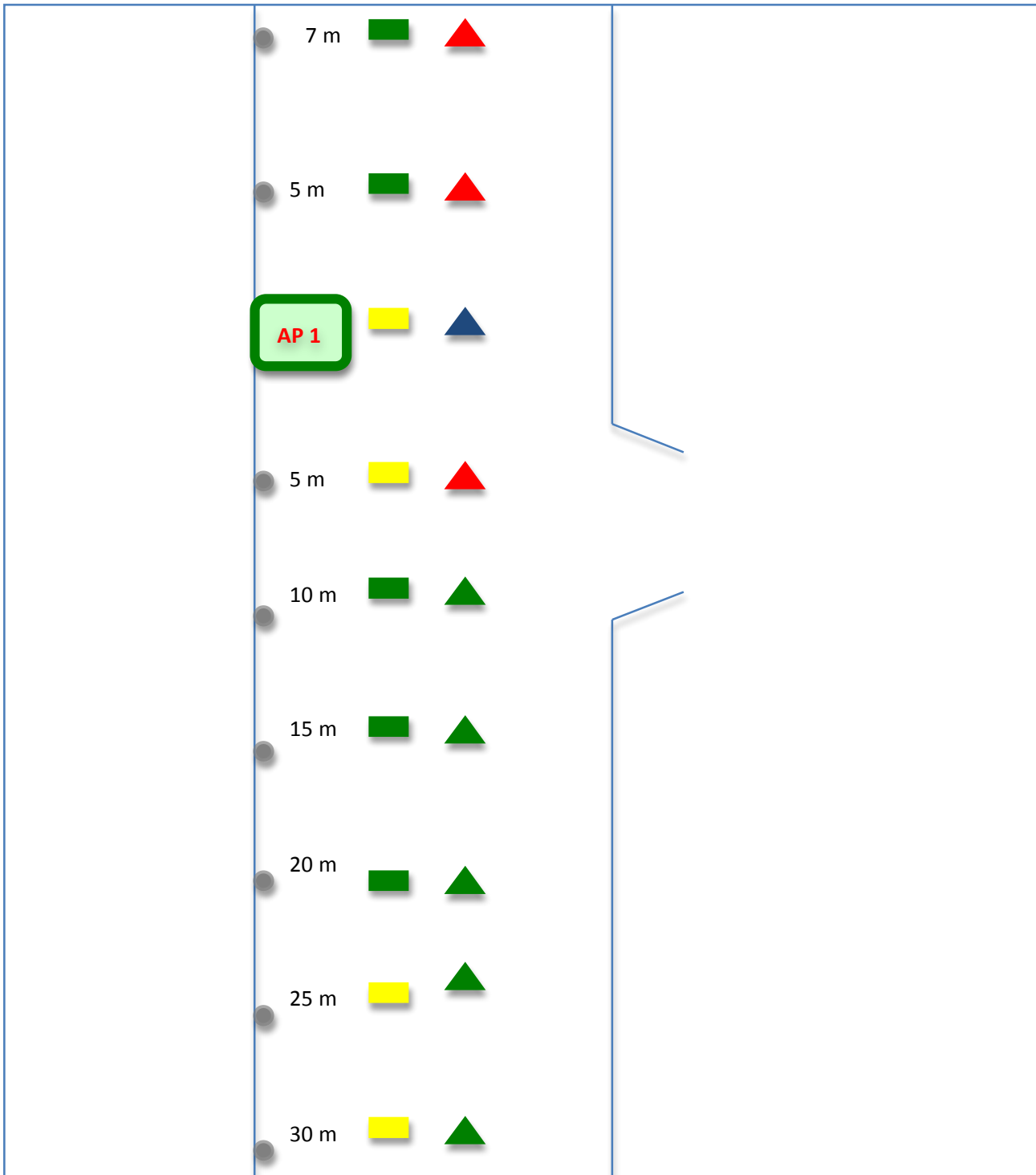
Access Point 1

Length (m)	ZYXEL COMMUNICATION		CISCO – Linksys.LLC	
	Signal Right (dB)	Signal Left (dB)	Signal Right (dB)	Signal Left (dB)
0	-36	-36	None	None
5	0	-42	-87	-87
7	0	-	-87	-
10	-	0	-	0
15	-	0	-	0
20	-	0	-	0
25	-	-38	-	0
30	-	-47	-	0

Access Point 2

Length (m)	ZYXEL COMMUNICATION		CISCO – Linksys.LLC	
	Signal Right (dB)	Signal Left (dB)	Signal Right (dB)	Signal Left (dB)
0	0	0	0	0
5	0	-38	0	0
10	0	-47	0	0
15	0	-	-87	-
20	-36	-	None	-
25	0	-	-87	-
27	0	-	-87	-

Map for the Access Point 1




Remark Strong: (-29) -> 0 dB represented by the green color.

Medium: (-59) -> (-30) dB represented by the yellow color.

Weak: less than (-60) dB represented by the red color.

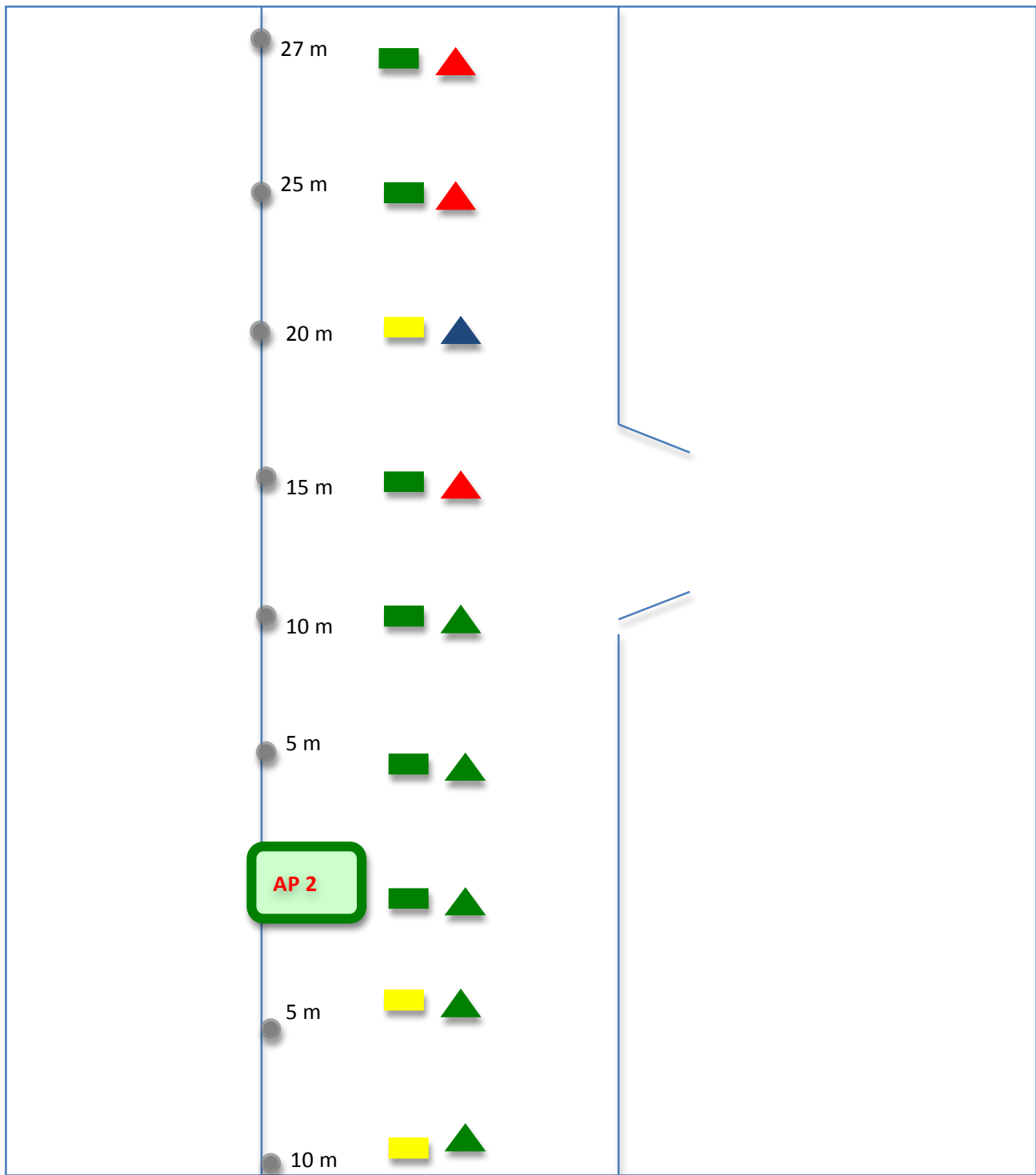
None: represented by blue color.

 The rectangle represented by the ZYXEL COMMUNICATION

 The triangle represented by the CISCO - Linksys.LLC

Map for the Access Point 2

Right



Remark Strong: (-29) -> 0 dB represented by the green color.

Medium: (-59) -> (-30) dB represented by the yellow color.

Weak: less than (-60) dB represented by the red color.

None: represented by blue color.

 ZYXEL COMMUNICATION represented by rectangle.

 CISCO – Linksys.LLC represented by the triangle.

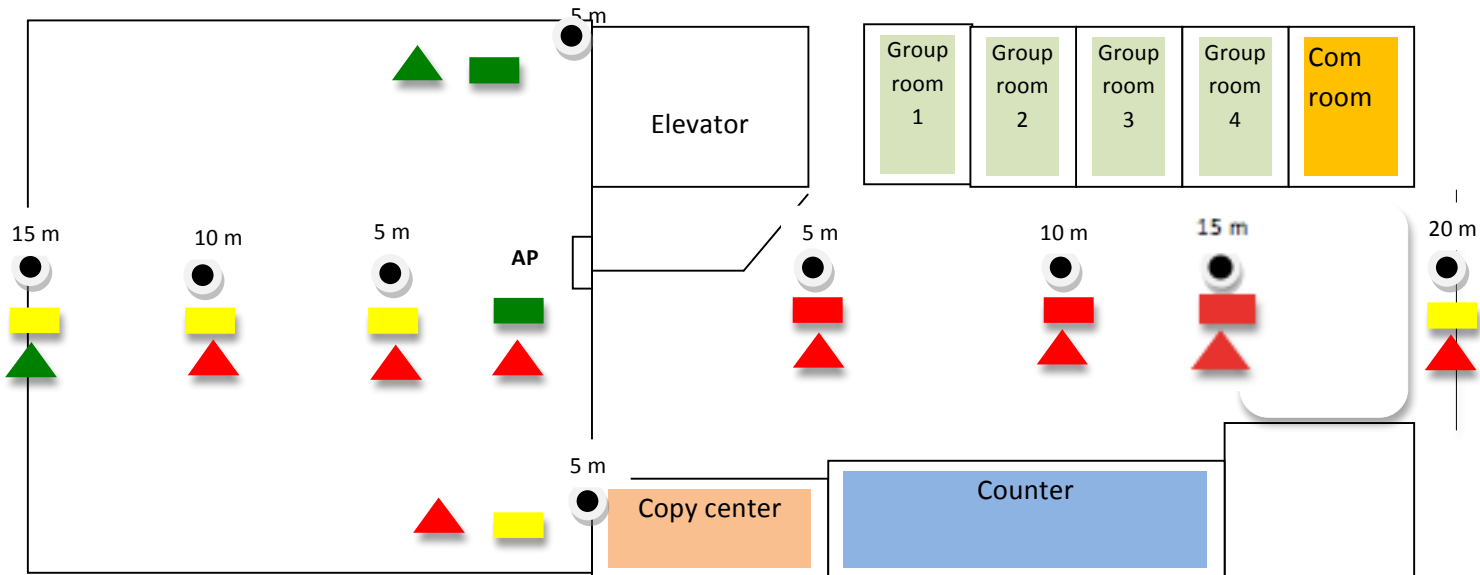
Left

Sirindhralai Building: Library

In the library, it has only 1 access point.

Length (m)	ZYXEL COMMUNICATION				CISCO – Linksys.LLC			
	Signal Right (dB)	Signal Left (dB)	Signal Front (dB)	Signal Back (dB)	Signal Right (dB)	Signal Left (dB)	Signal Front (dB)	Signal Back (dB)
0	0	0	0	0	-85	-85	-85	-85
5	-50	0	-50	-60	-79	0	-85	-82
10	-	-	-50	-80	-	-	-86	-82
15	-	-	-56	-79	-	-	0	-82
20	-	-	-	-50	-	-	-	-82

Map for an access point in the library



Remark Strong: (-29) -> 0 dB represented by the green color.

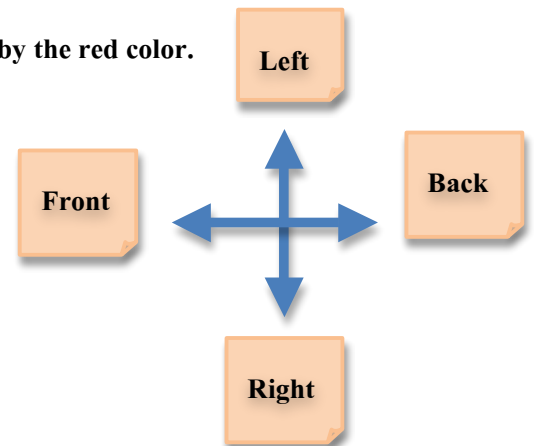
Medium: (-59) -> (-30) dB represented by the yellow color.

Weak: less than or equal to (-60) dB represented by the red color.

None: represented by blue color.

 ZYXEL COMMUNICATION represented by the rectangle.

 CISCO - Linksys.LLC represented by the triangle.



How we set up the test?

For first experiment (one client, one server)

- 1.)Set the wireless type of access point e.g. G-only, B-only.
- 2.)Set iperf server by follow command “iperf -u -s ”
- 3.)Set iperf client by follow command “iperf -c IP address of server -u -b Bandwidth”.
- 4.)Repeat the step 3 and then you can change the bandwidth that you want to test.

For second experiment (two clients, one server)

- 1.)Set the wireless type of access point e.g. Mix, G-only, B-only.
- 2.)Set iperf server by follow command “iperf -u -s -p 1111” for first port and “iperf -u -s -p 2222” for second port.
- 3.)Set iperf client by follow command “iperf -c IP address of server -u -p 1111 -b Bandwidth”.
- 4.)Repeat the step 3 and then you can change the bandwidth that you want to test.

For our experiment we increase the size of bandwidth by 5 Mb/s for each time until we get maximum throughput. Then we focused on the bandwidth there is maximum throughput. For example the maximum of throughput is 13.1 Mb/s after that we looked at the bandwidth of this throughput, suppose that the bandwidth is 15Mb/s. Then focus on the range of bandwidth: 13Mb/s, 14Mb/s, 15Mb/s, 16Mb/s, and 17Mb/s. Then find the maximum throughput in this range

Server mode

```
Administrator: Command Prompt - iperf -u -s -p 1111
C:\Users\Buffalo\Desktop>iperf -u -s -p 1111
-----
Server listening on UDP port 1111
Receiving 1470 byte datagrams
UDP buffer size: 8.00 KByte (default)
-----
[112] local 192.168.1.100 port 1111 connected with 192.168.1.102 port 62648
[ ID] Interval      Transfer      Bandwidth      Jitter      Lost/Total Datagrams
[112] 0.0-10.0 sec  5.96 MBytes   5.01 Mbits/sec  4.237 ms    1/ 4253 (0.024%)
[112] local 192.168.1.100 port 1111 connected with 192.168.1.102 port 61040
[ ID] Interval      Transfer      Bandwidth      Jitter      Lost/Total Datagrams
[112] 0.0-10.0 sec  8.96 MBytes   7.49 Mbits/sec  1.860 ms    594/ 6985 (8.5%)
[112] local 192.168.1.100 port 1111 connected with 192.168.1.102 port 54237
[ ID] Interval      Transfer      Bandwidth      Jitter      Lost/Total Datagrams
[112] 0.0-10.0 sec  5.83 MBytes   4.89 Mbits/sec  3.574 ms    32/ 4194 (0.76%)
[112] local 192.168.1.100 port 1111 connected with 192.168.1.102 port 50925
[ ID] Interval      Transfer      Bandwidth      Jitter      Lost/Total Datagrams
[112] 0.0-10.0 sec  10.1 MBytes   8.44 Mbits/sec  2.241 ms    3/ 7187 (0.042%)
[112] local 192.168.1.100 port 1111 connected with 192.168.1.102 port 50926
[ ID] Interval      Transfer      Bandwidth      Jitter      Lost/Total Datagrams
[112] 0.0-10.2 sec  9.02 MBytes   7.41 Mbits/sec  2.671 ms    178/ 6613 (2.7%)
[112] local 192.168.1.100 port 1111 connected with 192.168.1.102 port 50927
[ ID] Interval      Transfer      Bandwidth      Jitter      Lost/Total Datagrams
[112] 0.0- 9.9 sec  7.06 MBytes   5.96 Mbits/sec  4.222 ms    915/ 5951 (15%)
[112] local 192.168.1.100 port 1111 connected with 192.168.1.102 port 60571
[ ID] Interval      Transfer      Bandwidth      Jitter      Lost/Total Datagrams
[112] 0.0-10.0 sec  11.0 MBytes   9.22 Mbits/sec  6.359 ms    247/ 8100 (3%)
[112] local 192.168.1.100 port 1111 connected with 192.168.1.102 port 59286
```

Client mode

```
C:\Windows\system32\cmd.exe
C:\Users\cm\Desktop>iperf -uc -b 10m 192.168.102
C:\Users\cm\Desktop>iperf -u -b -c 10m 192.168.102
C:\Users\cm\Desktop>iperf -u -b 10m -c 192.168.102
C:\Users\cm\Desktop>iperf -u -b 10m -c 192.168.1.102
C:\Users\cm\Desktop>iperf -b 10m -u -c 192.168.1.102
C:\Users\cm\Desktop>iperf -u -b 10m -c 192.168.1.102
C:\Users\cm\Desktop>iperf -u -b 10m -c 192.168.1.102
C:\Users\cm\Desktop>iperf -u -b 10m -c 192.168.1.102
C:\Users\cm\Desktop>iperf -u -b 10m -c 192.168.1.102
C:\Users\cm\Desktop>iperf -c 192.168.1.102 -u -b 10m
C:\Users\cm\Desktop>iperf -c 192.168.1.102 -u -b 1m
C:\Users\cm\Desktop>iperf -c 192.168.1.102 -u -b 1m
C:\Users\cm\Desktop>iperf -c 192.168.1.102 -u -b 12m
```

Task 2

The first experiment: one client, one server

Mixture

Bandwidth(MB/s)	Transfer Rate(Mbytes)	Throughput(MB/s)	Jitter(ms)	Lost Frame
5	5.96	5.05	3.719	0
10	10.1	8.48	2.485	0
15	15.7	13.1	3.109	0
20	15.4	12.9	3.090	0
25	14.2	11.9	1.461	0
30	14.6	12.2	2.635	0
35	14.5	12.2	3.407	0
Try to focus on the maximum throughput.				
13	13.9	11.7	2.088	0
14	9.17	7.17	3.653	0
15	15.7	13.1	3.109	0
16	14.7	12.3	3.934	0
17	15.3	12.8	3.639	0

IEEE 802.11b only

Bandwidth(MB/s)	Transfer Rate(Mbytes)	Throughput(MB/s)	Jitter(ms)	Lost Frame
5	3.51	2.91	14.848	0
10	3.37	2.71	33.401	0
15	3.41	2.86	14.024	0
20	3.46	2.86	13.815	0
25	3.49	2.89	13.171	0
30	3.58	2.95	17.648	0
35	3.60	2.99	16.051	0
Try to focus on the maximum throughput.				
33	3.77	3.16	12.896	0
34	3.56	2.94	16.896	0
35	3.60	2.99	16.507	0
36	3.38	2.83	12.330	0
37	3.02	2.83	13.349	0

IEEE 802.11g only

Bandwidth(MB/s)	Transfer Rate(Mbytes)	Throughput(MB/s)	Jitter(ms)	Lost Frame
5	5.95	5.08	3.912	0
10	11.9	10.0	1.840	0
15	13.3	11.2	2.157	3
20	10.4	8.70	1.686	5
25	11.1	9.26	1.697	4
30	11.6	9.70	2.836	4
35	11.0	9.22	2.402	6
Try to focus on the maximum throughput.				
13	15.3	12.8	1.889	0
14	12.8	10.6	1.573	0
15	13.0	10.9	1.072	7
16	12.8	10.7	2.047	6
17	10.1	8.30	13.103	0

The second experiment: two clients, one server

Mixture

Bandwidth (MB/s)	Client1	Client2	Total
	Throughput (MB/s)	Throughput (MB/s)	Throughput (MB/s)
5	4.89	3.06	7.95
10	7.41	2.55	9.96
15	5.96	2.64	8.6
20	5.68	2.27	7.92
25	6.87	2.74	9.61
30	8.02	2.83	10.85
35	5.85	2.6	8.45
40	7.37	2.7	10.07
45	4.21	2.47	6.68
50	1.76	1.15	2.91
55	7.64	2.79	10.43
60	6.8	2.59	9.39
Try to focus on the maximum throughput.			
28	5.44	1.73	7.17
29	3.79	1.62	5.41
30	5.53	1.97	7.5
31	6.22	1.91	8.13
32	5.35	1.38	6.73

IEEE 802.11b only

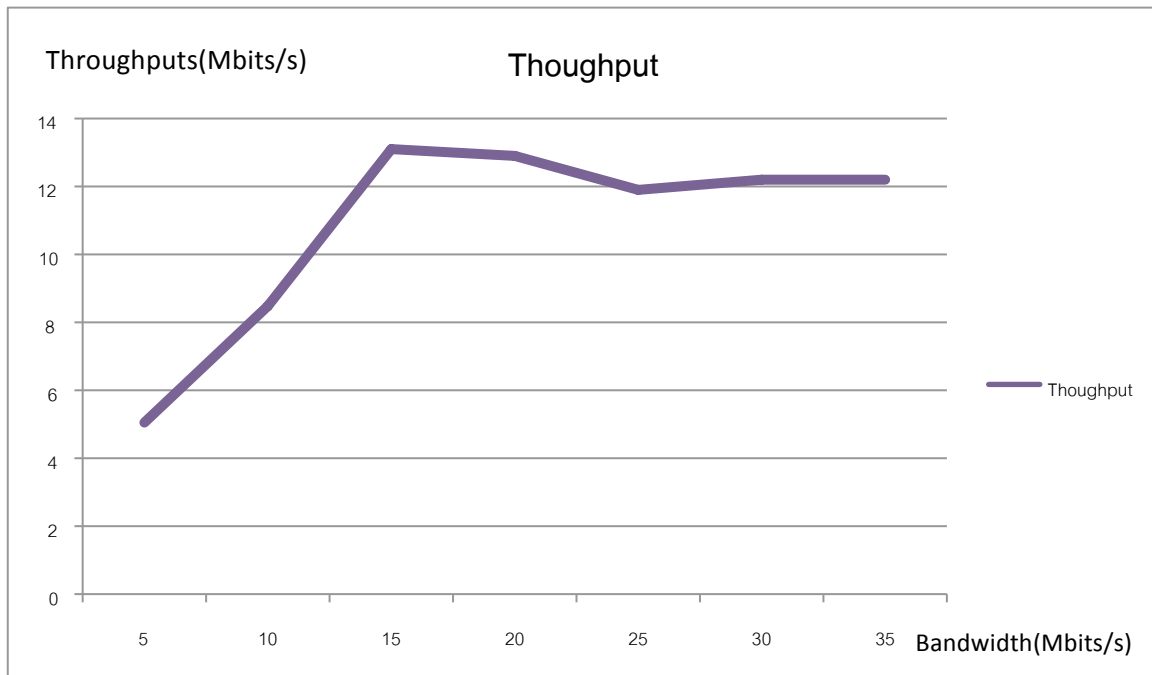
Bandwidth (MB/s)	Client1	Client2	Total
	Throughput (MB/s)	Throughput (MB/s)	Throughput (MB/s)
5	1.87	1.06	2.93
10	1.57	1.08	2.65
15	1.65	1.02	2.67
20	1.57	1.07	2.64
25	1.36	1.16	2.52
30	0.241	0.416	0.657
35	0.27	0.824	1.094
40	0.298	0.54	0.838
45	0.311	0.774	1.085
50	0.362	0.433	0.795
55	0.327	0.666	0.993
60	1.66	0.864	2.524
Try to focus on the maximum throughput.			
3	0.201	0.454	0.655
4	0.41	0.658	1.068
5	0.194	0.977	1.171
6	1.33	1.22	2.55
7	1.39	0.903	2.293
8	0.305	1.29	1.595

IEEE 802.11g only

Bandwidth (MB/s)	Client1	Client2	Total
	Throughput (MB/s)	Throughput (MB/s)	Throughput (MB/s)
5	4.01	2.16	6.17
10	4.32	2.38	6.7
15	1.81	0.865	2.675
20	1.92	0.995	2.915
25	3.32	1.16	4.48
30	4.68	1.61	6.29
35	4.69	1.27	5.96
40	2.85	1.37	4.22
45	2.84	1.57	4.41
50	1.71	1.01	2.72
55	2.71	1.40	4.11
60	2.60	1.20	3.8
8	1.74	0.792	2.532
9	8.07	3.31	11.38
10	7.66	2.8	10.46
11	7.76	2.49	10.25

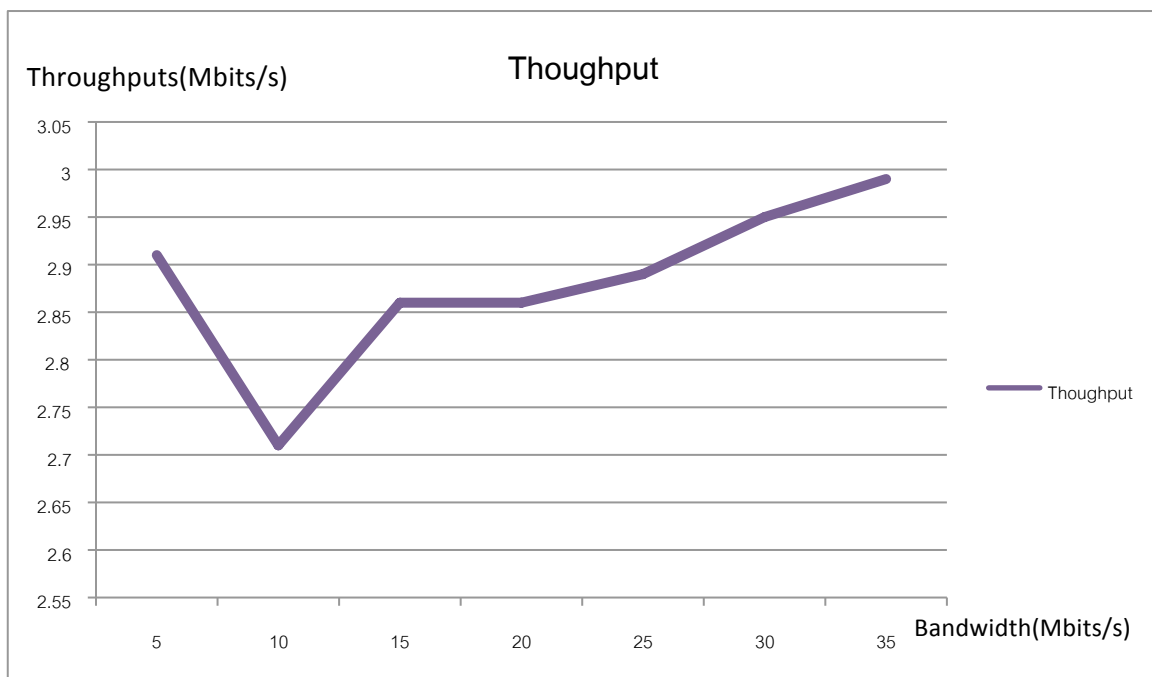
Results of the experiment 1: one client, one server

- Mixture



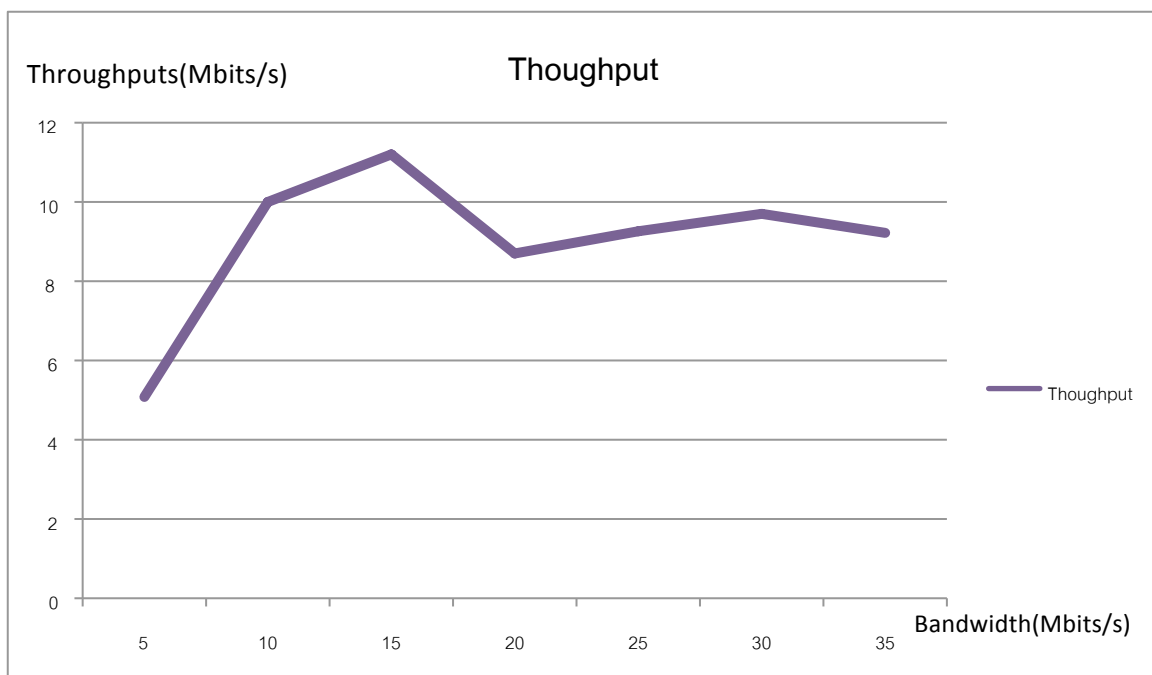
From this graph, Throughput will increase until the bandwidth is 15 Mb/s, after that the throughput will remain the same because the maximum of throughput is around 15 Mb/s. If you change the size of the bandwidth more than the bandwidth of maximum throughput, the result will be the same.

- IEEE802.11b with one client



From this graph, throughput will increase until the bandwidth is 35 Mb/s, after that the throughput will be fluctuate and not reach to the maximum.

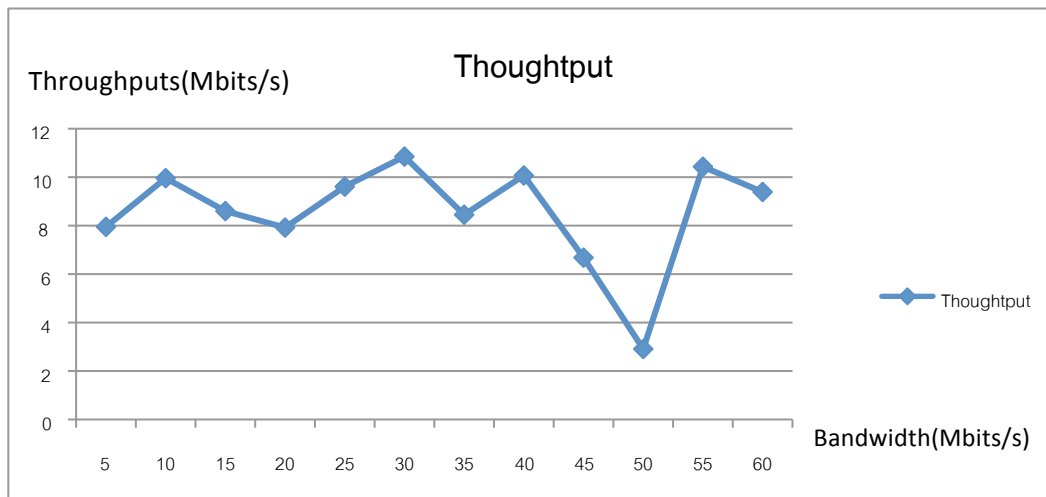
-IEEE 802.11g



From this graph, the shape still the same as mixture but the throughputs are lower than mixture and higher than 802.11b.

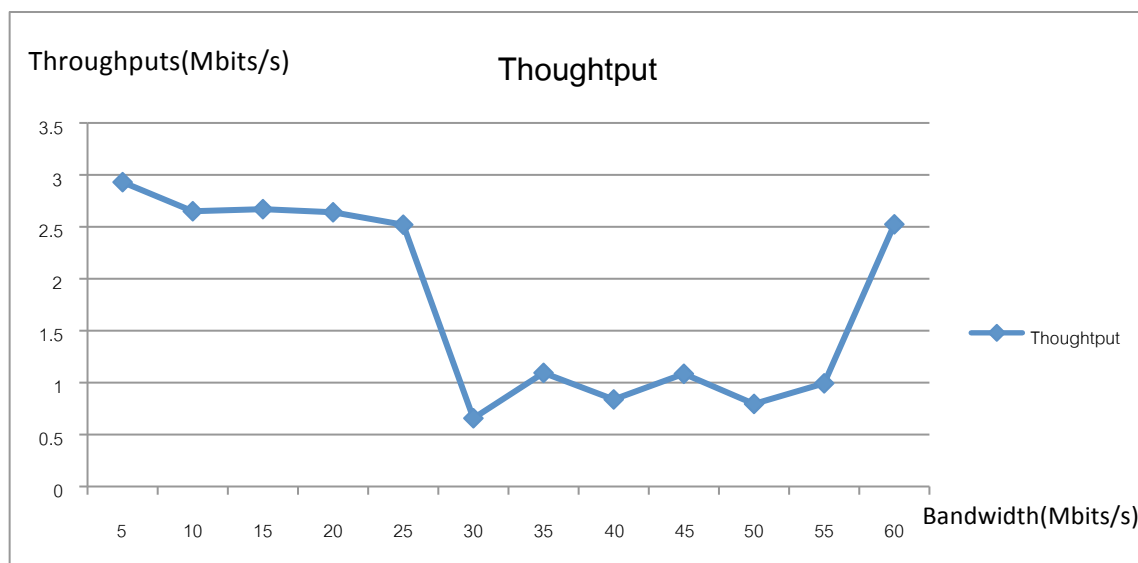
Results of the experiment 2: two clients, one server.

- IEEE 802.11 mixture



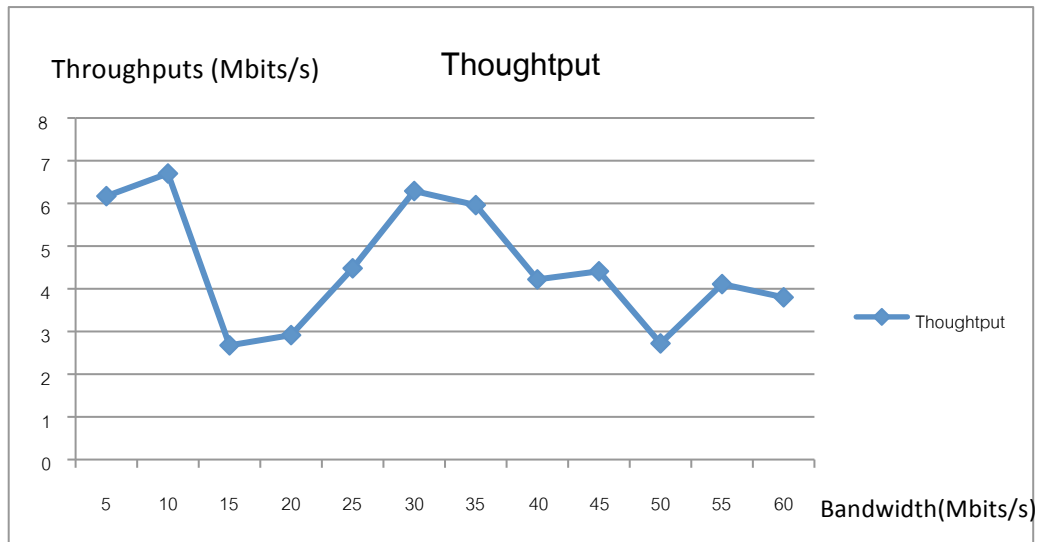
From this graph, throughputs come from sum of 2 clients' s throughput. About the shape of the graph still the same as one client experiment, but throughput decrease from one client because they share the bandwidth between 2 clients.

- IEEE 802.11b



In this graph, throughputs come from sum of 2 clients 's throughput. From the Maximum throughput of 802.11b, when we are compare with other in the experiment 2 it is smallest value.

- IEEE 802.11g



From this graph, throughputs come from sum of 2 clients 's throughput. About the shape of the graph still the same but the throughputs are lower than mixture but higher than B.

Actually the curve of graph should be reach to maximum throughput and still the same throughput rate as the mixture with one client in the first experiment. It may be cause from environment that made some experiment has errors.

Conclusion for all experiments in task2

From the experiments, we got the idea of the bandwidth. For the one client data rate may reach to maximum bandwidth but if more than one client. They will share the bandwidth and lower than the maximum bandwidth.

