Assignment 1 – ITS413

Present to

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By

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Task1

Bangkadi Wireless LAN Coverage Map

IT/MT Building 3rd floor										
Point	Device	Location	MAC Address	SSID	Signal Strength	Min	Max	Average RSSI	Security Level	Max Rate(Mbps)
Point 1	Com1	FL3 - Room1302 - Door	00:19:CB:4F:0A:0E	wsiit	Strong	-63	-50	-56.5	Unsecure	54
	Com2	FL3 - Room1302 - Door	00:19:CB:4F:0A:0E	wsiit	Strong	-50	-50	-50	Unsecure	54
Point 2	Com1	FL3 - Exit - Door	00:19:CB:4F:09:C3	wsiit	Strong	-40	-37	-38.5	Unsecure	54
	Com2	FL3 - Exit - Door	00:19:CB:4F:09:C3	wsiit	Strong	-38	-34	-36	Unsecure	54
Point 3	Com1	FL3 - ICTES-Room	00:19:CB:4F:0A:0E	wsiit	Strong	-45	-40	-42.5	Unsecure	54
	Com2	FL3 - ICTES-Room	00:19:CB:4F:0A:0E	wsiit	Strong	-50	-44	-47	Unsecure	54
Point 4	Com1	FL3 - Lift - Door	00:19:CB:4F:0A:0E	wsiit	Strong	-50	-50	-50	Unsecure	54
	Com2	FL3 - Lift - Door	00:19:CB:4F:0A:0E	wsiit	Strong	-50	-50	-50	Unsecure	54
Point 5	Com1	FL3 - Lab-IT-Front	00:19:CB:4F:09:C3	wsiit	Strong	-60	-50	-55	Unsecure	54
	Com2	FL3 - Lab-IT-Front	00:19:CB:4F:09:C3	wsiit	Strong	-62	-50	-56	Unsecure	54
Point 6	Com1	FL3 - Lab-IT-Middle	00:19:CB:4F:09:C3	wsiit	Strong	-50	-50	-50	Unsecure	54
	Com2	FL3 - Lab-IT-Middle	00:19:CB:4F:09:C3	wsiit	Strong	-45	-48	-46.5	Unsecure	54
Point 7	Com1	FL3 - Lab-IT-Back	00:19:CB:4F:09:C3	wsiit	Strong	-50	-44	-47	Unsecure	54
	Com2	FL3 - Lab-IT-Back	00:19:CB:4F:09:C3	wsiit	Strong	-49	-43	-46	Unsecure	54

This table show that our experiment result among room on the floor. Our group have divided this floor into 7 points, Room 1302's door, Fire exit door , ICTES room's door , lift ,Lab IT Front, Lab IT middle and Lab IT back. This table provide MAC address, SSID, average value of RSSI and security level.

IT/MT Building 4th floor										
Point	Device	Location	MAC Address	SSID	Signal Strength	Min	Max	Average RSSI	Security Level	Max Rate(Mbps)
Point 1	Com1	FL4 - Lift - Door	00:23:69:3A:F6:92	wsiit	Strong	-62	-48	-55	Unsecure	54
	Com2	FL4 - Lift - Door	00:23:69:3A:F6:92	wsiit	Strong	-49	-43	-46	Unsecure	54
Point 2	Com1	FL4 - Exit - Door	00:23:69:3A:F5:D2	wsiit	Strong	-76	0	-38	Unsecure	54
	Com2	FL4 - Exit - Door	00:23:69:3A:F5:D2	wsiit	Strong	-69	0	-34.5	Unsecure	54
Point 3	Com1	FL4 - Room2401 - Front	00:23:69:3A:F5:D2	wsiit	Strong	-50	-49	-49.5	Unsecure	54
	Com2	FL4 - Room2401 - Front	00:23:69:3A:F5:D2	wsiit	Strong	-50	-46	-48	Unsecure	54
Point 4	Com1	FL4 - Room2401 - Middle	00:23:69:3A:F5:D2	wsiit	Strong	-50	-48	-49	Unsecure	54
	Com2	FL4 - Room2401 - Middle	00:23:69:3A:F5:D2	wsiit	Strong	-50	-45	-47.5	Unsecure	54
Point 5	Com1	FL4 - Room2401 - Back	00:23:69:3A:F5:D2	wsiit	Strong	-56	0	-28	Unsecure	54
	Com2	FL4 - Room2401 - Back	00:23:69:3A:F5:D2	wsiit	Strong	-50	-50	-50	Unsecure	54
Point 6	Com1	FL4 - Room2407 - Door	00:23:69:3A:F6:92	wsiit	Strong	-48	-28	-38	Unsecure	54
	Com2	FL4 - Room2407 - Door	00:23:69:3A:F6:92	wsiit	Strong	-41	-30	-35.5	Unsecure	54

This table show that our experiment result among room on the floor. Our group have divided this floor into 6 points, Fire exit door , ICTES room's door ,Lift, Room 2401 Front, Room 2401 middle, Room 2401 back and Room 2407's door. This table provide MAC address , SSID ,average value of RSSI and security level.

Map of AP – Signal Strength [3rd floor]

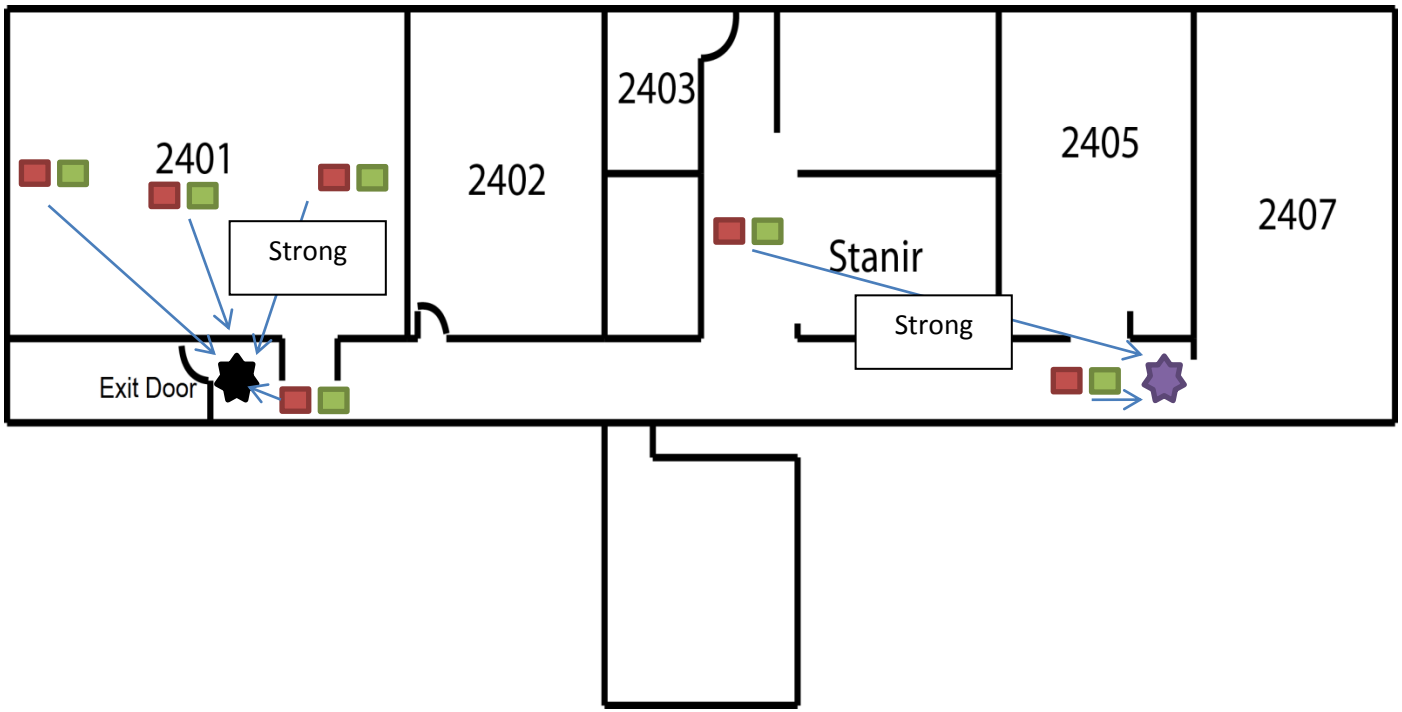
This picture tell that there are 2 access points on 3rd floor. We have chosen 7 locations for experiments. There are 3 locations that using orange access point[00:19:CB:4F:0A:0E] .There are 4 locations that using blue access point[00:19:CB:4F:09:C3]. All of them received that the signal strength is “strong” because 3rd floor is not large and less obstacles. Only 2 access points can be covered for all of this area.

- Example in case of computer around Lab IT , the signal strength that we receive from the access point [00:19:CB:4F:0A:0E] is may be not strong because the distance of signal little far. It depend on many factor at the time. It may be strong but the signal strength will lower than access point [00:19:CB:4F:09:C3] absolutely.

Map of AP – Security Levels [3rd floor]

- This picture tells that there are 2 access points on 3rd floor. We have acquired data from AP that the security is unsecure. So we can see from picture we can receive signal from both of them but when we access to “wsiit” we will see the login page that protect another people to use this access point.

Map of AP – Signal Strength [4th floor]



Access Point

00:23:69:3A:F5:D2

Access Point

00:23:69:3A:F6:92

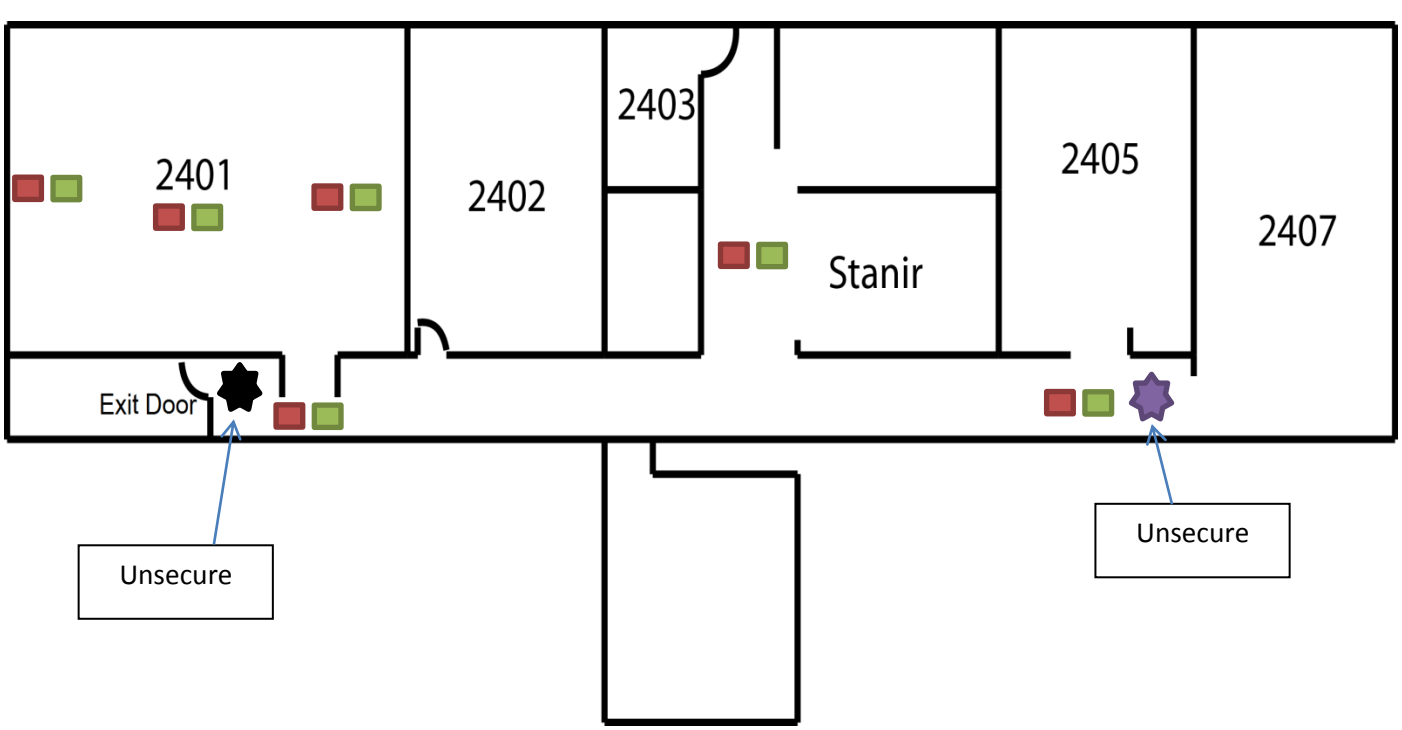
Com1

Com2

This picture tells that there are 2 access points on 4th floor. We have chosen 6 locations for experiments. There are 4 locations that using black access point[00:23:69:3A:F5:D2]. There are 2 locations that using purple access point[00:23:69:3A:F6:92]. All of them received that the signal strength is “strong” because 4th floor is not large and less obstacles. Just only 2 access points can be covered for all of this area.

- Example case of computer around room-2407.If computer get signal from access point [00:23:69:3A:F6:92] the signal that show is strong because the distance between computer and access point is too close. But the signal strength from access point [00:23:69:3A:F5:D2] show on computer around room-2407 is maybe strong or lower because the distance is a little bit far and depend on many factor on that time.

Map of AP – Security Levels [4th floor]



Access Point

00:23:69:3A:F5:D2

Access Point

00:23:69:3A:F6:92

Com1

Com2

- This picture tells that there are 2 access points on 4th floor. We have acquired data from AP that the security is unsecure. So we can see from picture we can receive signal from both of them but when we access to “wsiit” we will see the login page that protect another people to use this access point.

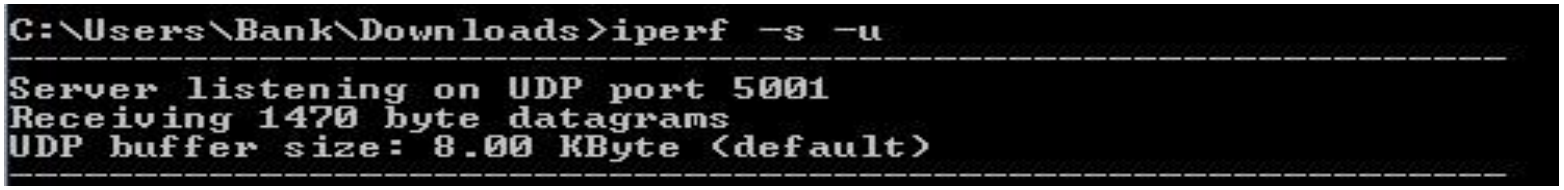
Task2

Wireless LAN Throughput Performance

Testing Command

We use **iperf** command to measure the bandwidth and quality of network, in this test we classify the network for 2 notebook computers. One runs as the server computer and another run as the client by using 2 different commands

- For the server computer we initially set it to the server computer by this command [iperf –s] to run it in server mode.



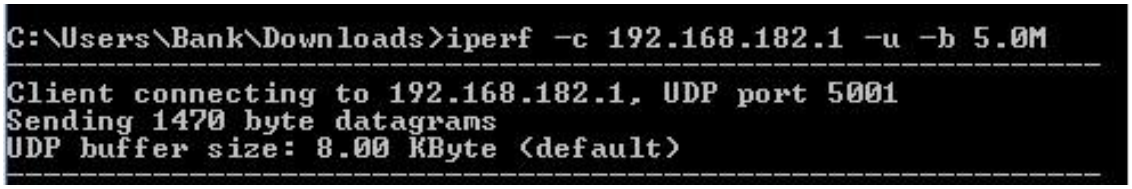
Specific Server Command:

-s, --server run in server mode

Client/Server Command:

-u, --udp use UDP rather than TCP

- For the client computer we use the command lines to measure the bandwidth calculating and monitoring the quality of network by this command [iperf –c <host> –u –b #KM (set the range of data rate in Mbps rate)



Specific Client Command:

-c, --client <host> run in client mode, connecting to <host> in form of ip address (eg. 192.168.1.101)

-b, --bandwidth #[KM] for UDP, bandwidth to send at in bits/sec

By default for 1 Mbit/sec

client connects to the server by sending the packet on the UDP port 5001 and the bandwidth that is displayed is the bandwidth from the client to the server, by this test we try to keep a good quality with less than 1% packet loss that can be occurs in this test because the higher percentage of the packet loss will affect the bandwidth quality in the network.

Testing devices

1. Linksys WRT54GL 54 Mbps Broadband (Wireless-G 2.4GHz)

2. Notebook A, B
    - Sony Vaio CR-320E as Notebook A(Client)
    - ASUS A42JC-VX059D as Notebook B(Server)

This task is to measure the throughput of wireless LAN link with limited condition by users. We are using iperf to send a specific packet from one computer to another. We have set one computer to be a server of iperf and another to be a client with a lot of different bandwidth, we can find approximately maximum throughput by this method.

We divide type of wireless into 3 types

- IEEE 802.11b
- IEEE 802.11g
- Mixture

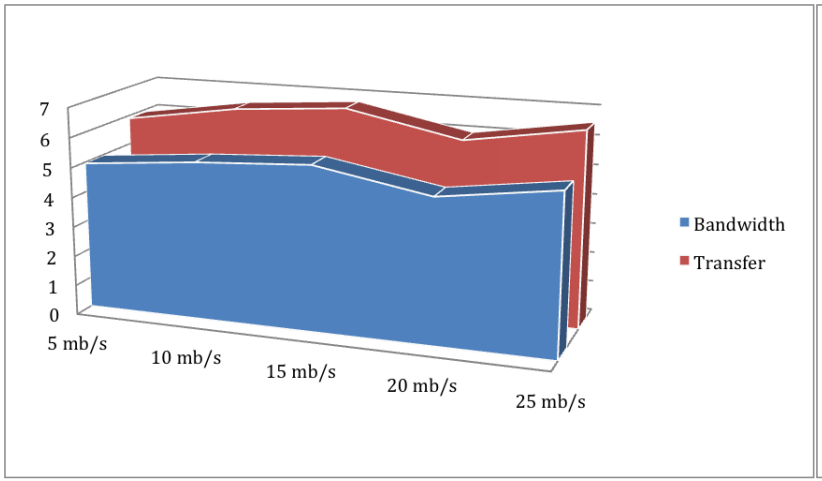


Fig2.1

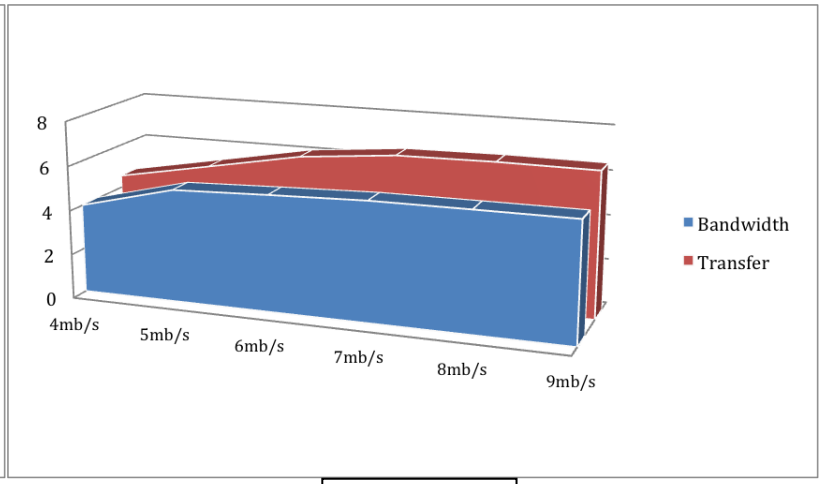


Fig2.2

B Type

- Fig 2.1 transfer bytes and throughput from 5-25 Mbps by B-type

  this graph show that the throughput is converge to 5 at 5-10 Mbps.

- Fig 2.2 transfer bytes and throughput from 4-9 Mbps by B-type

  this graph show that the throughput is converge to 5.35 at 7-8 Mbps.

Case : Server far from client 3 m.

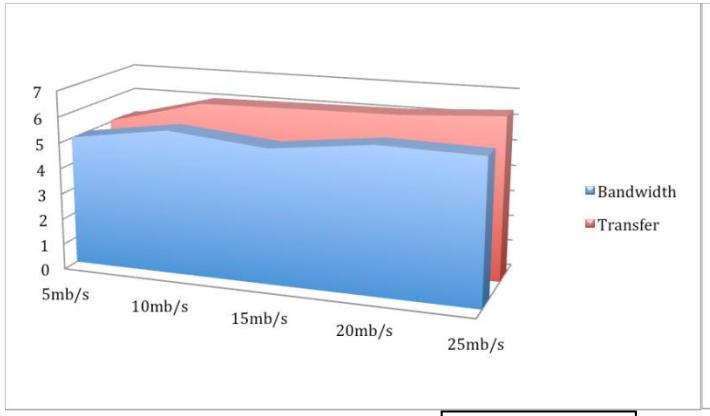


Fig2.1.1

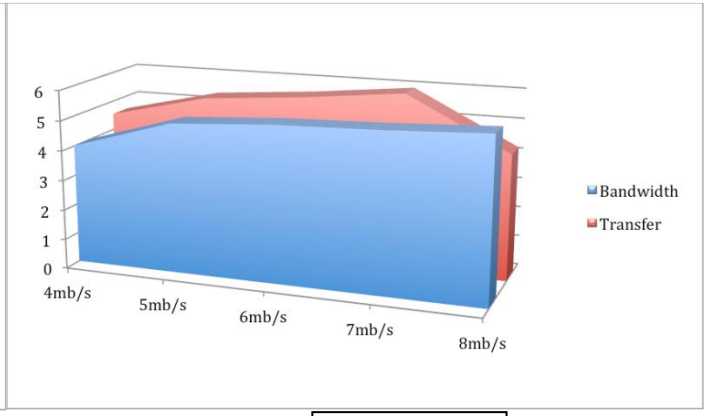


Fig2.2.1

- Fig 2.1.1 transfer bytes and throughput from 5-30 Mbps by B-type by server is far from client 3 meters. this graph show that the throughput is converge to 5.3 at 5-10 Mbps.

- Fig 2.2.1 transfer bytes and throughput from 4-8 Mbps by B-type by server is far from client 3 meters. this graph show that the throughput is converge to 5.3 at 4-8 Mbps.

B Type							
Specified - Bandwidth(Mb/s)	Device	No.Server	No.Client	Channel	Time - Interval(s)	Transfer(MBytes)	Bandwidth(Mb/s)
5	Linksys WRT54GL wireless routers	1	1	11	10	5.9	4.96
10	Linksys WRT54GL wireless routers	1	1	11	10	6.48	5.3
15	Linksys WRT54GL wireless routers	1	1	11	10	6.76	5.52
20	Linksys WRT54GL wireless routers	1	1	11	10	5.97	4.83
25	Linksys WRT54GL wireless routers	1	1	11	10	6.58	5.36
More Test							
Specified - Bandwidth(Mb/s)	Device	No.Server	No.Client	Channel	Time - Interval(s)	Transfer(MBytes)	Bandwidth(Mb/s)
4	Linksys WRT54GL wireless routers	1	1	11	10	4.55	4.01
5	Linksys WRT54GL wireless routers	1	1	11	10	5.33	5.07
6	Linksys WRT54GL wireless routers	1	1	11	10	6.12	5.22
7	Linksys WRT54GL wireless routers	1	1	11	10	6.51	5.35
8	Linksys WRT54GL wireless routers	1	1	11	10	6.56	5.36
9	Linksys WRT54GL wireless routers	1	1	11	10	6.53	5.36

- From graph of B-type experiment with interval of 5 Mb/s , we can see that the line is converge to 5 or 6 Mbps. then we decide to reduce the interval to 1 Mbps for more accuracy with limited bandwidth between 4 to 9.
- From graph of B-type experiment with interval of 1 Mb/s , We can see that the throughput is stable at the rate of 5.35 Mbps. based on these data, we concluded that the throughput of B-type wireless is about 5.3 Mbps.
- From this experiment, the throughput of B-type wireless is about 5.3 Mbps. This experiment was done in channel 11 which should be a channel that rarely used by others. This also was done without other groups nearby. We can say that it has low impact from noise. The throughput of B-type wireless theoretically is 11 Mbps. Used with 2 computers, server and client, the bandwidth is divided by 2.it will be about 5.5 Mbps that near to 5.3 Mbps from our experiment.

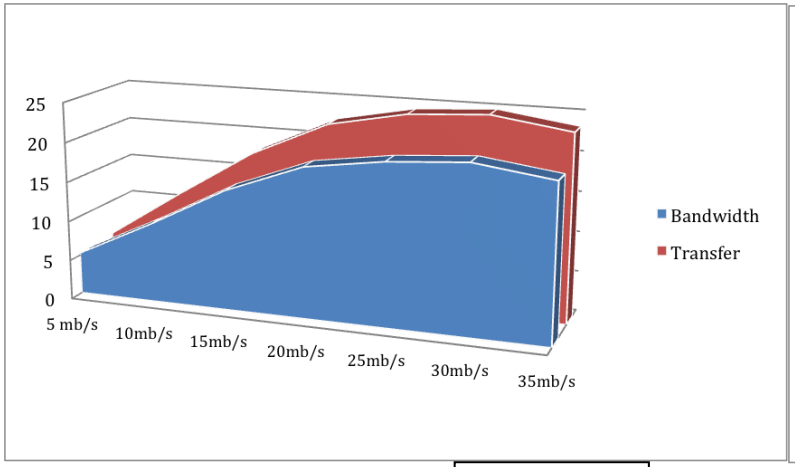


Fig2.3

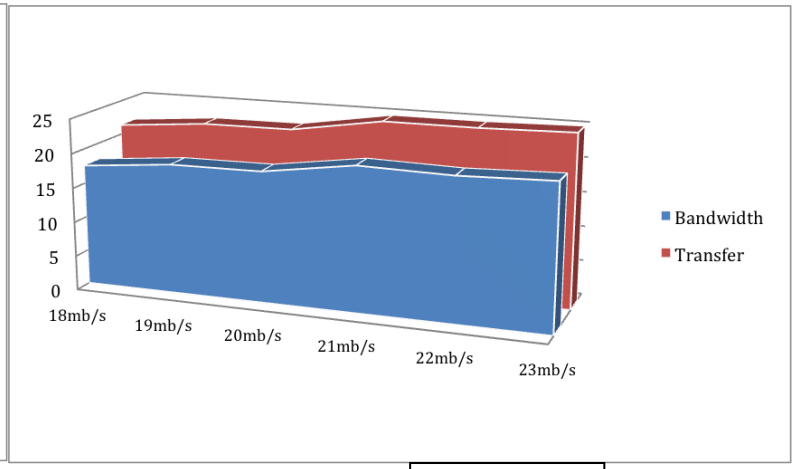


Fig2.4

G Type

- Fig 2.3 transfer bytes and throughput from 5-25 Mbps by G-type

  this graph show that the throughput is converge to 20 at 25-30 Mbps.

- Fig 2.4 transfer bytes and throughput from 18-23 Mbps by G-type

  this graph show that the throughput is converge to 20.8 at 21-23 Mbps.

Case : Server far from client 3 m.

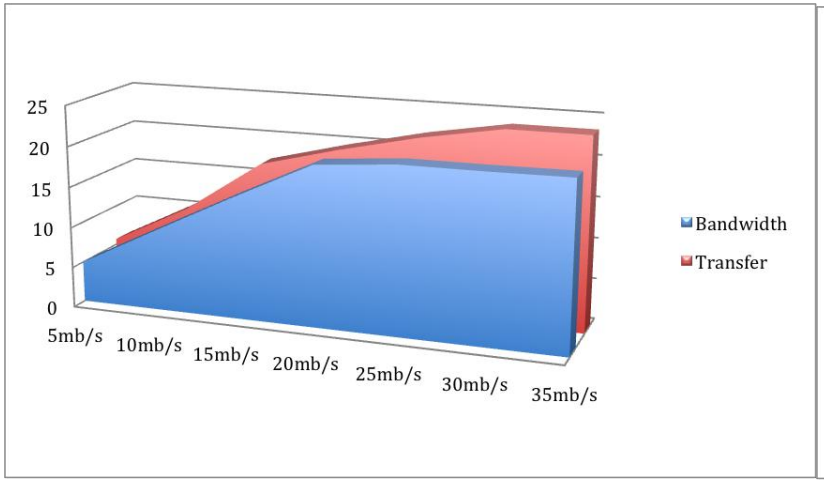


Fig2.3.1

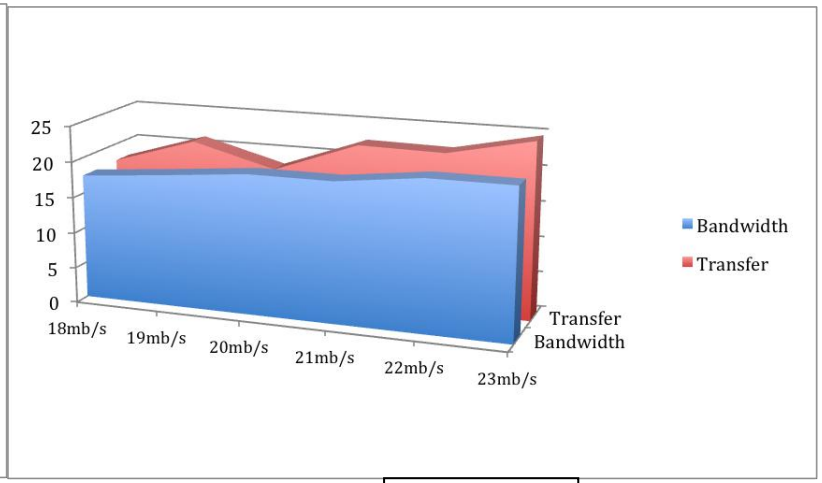


Fig2.4.1

- Fig 2.3.1 transfer bytes and throughput from 5-30 Mbps by G-type by server is far from client 3 meters. this graph show that the throughput is converge to 20.4 at 25-30 Mbps.

- Graph 2.4.1 transfer bytes and throughput from 18-23 Mbps by G-type by server is far from client 3 meters. this graph show that the throughput is converge to 21.0 at 18-23 Mbps.

G Type							
Specified - Bandwidth(Mb/s)	Device	No.Server	No.Client	Channel	Time - Interval(s)	Transfer(MBytes)	Bandwidth(Mb/s)
5	Linksys WRT54GL wireless routers	1	1	11	10	5.63	5.27
10	Linksys WRT54GL wireless routers	1	1	11	10	11.9	10
15	Linksys WRT54GL wireless routers	1	1	11	10	17.9	15.1
20	Linksys WRT54GL wireless routers	1	1	11	10	22.3	18.8
25	Linksys WRT54GL wireless routers	1	1	11	10	24.2	20.2
30	Linksys WRT54GL wireless routers	1	1	11	10	24.8	20.9
35	Linksys WRT54GL wireless routers	1	1	11	10	23.4	19.6
More Test							
Specified - Bandwidth(Mb/s)	Device	No.Server	No.Client	Channel	Time - Interval(s)	Transfer(MBytes)	Bandwidth(Mb/s)
18	Linksys WRT54GL wireless routers	1	1	11	10	21.4	17.6
19	Linksys WRT54GL wireless routers	1	1	11	10	22.5	18.8
20	Linksys WRT54GL wireless routers	1	1	11	10	22.6	18.9
21	Linksys WRT54GL wireless routers	1	1	11	10	24.7	20.8
22	Linksys WRT54GL wireless routers	1	1	11	10	24.7	20.5
23	Linksys WRT54GL wireless routers	1	1	11	10	25	20.9

- From graph of G-type experiment with interval of 5 Mb/s, we can see that the line is converge to 19 or 20 Mbps. then we decide to reduce the interval to 1 Mbps for more accuracy with limited bandwidth between 18 to 23.
- From graph of G-type experiment with interval of 1 Mb/s, we can see that the throughput is stable at the rate of 20.8 Mbps. based on these data, we concluded that the throughput of B-type wireless is about 20.8 Mbps.
- From this experiment, the throughput of G-type wireless is about 20.8 Mbps. This experiment was done in channel 11 which should be a channel that rarely used by others. This also was done without other groups nearby. We can say that it has low impact from noise. The throughput of G-type wireless theoretically is 54 Mbps. Used with 2 computers, server and client, the bandwidth is divided by 2.it will be about 27 Mbps that is not too far from 20.8 Mbps from our experiment. With larger bandwidth, it is vulnerable for more chance to received noise between experiments.

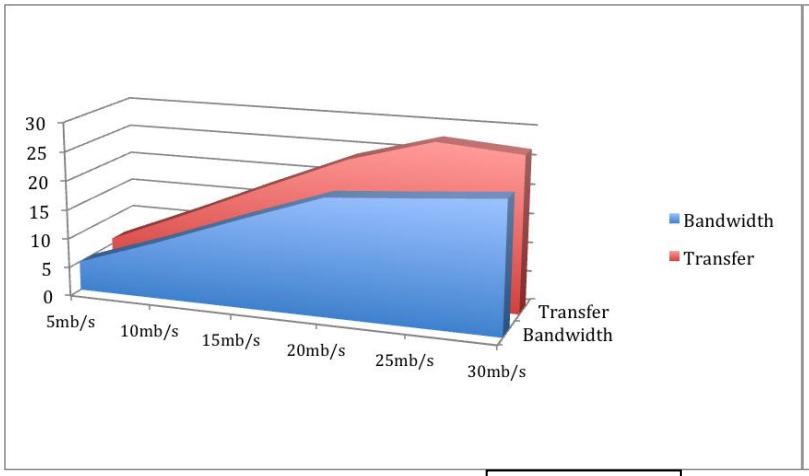


Fig2.5

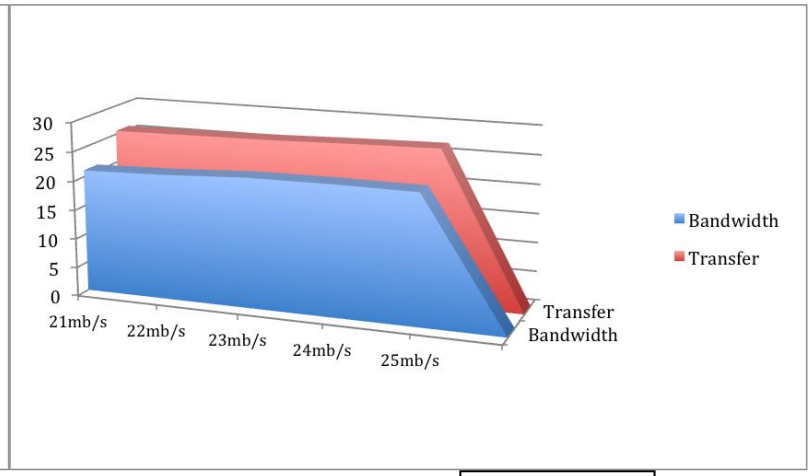


Fig2.6

B&G Type

- Fig 2.5 transfer bytes and throughput from 5-30 Mbps by B&G-type

  this graph show that the throughput is converge to 22.4 at 25-30 Mbps.

- Fig 2.6 transfer bytes and throughput from 21-25 Mbps by B&G-type

  this graph show that the throughput is converge to 22.3 at 23-24 Mbps.

B & G Type							
Specified - Bandwidth(Mb/s)	Device	No.Server	No.Client	Channel	Time - Interval(s)	Transfer(MBytes)	Bandwidth(Mb/s)
5	Linksys WRT54GL wireless routers	1	1	11	10	5.96	5.03
10	Linksys WRT54GL wireless routers	1	1	11	10	11.8	9.84
15	Linksys WRT54GL wireless routers	1	1	11	10	17.9	15.1
20	Linksys WRT54GL wireless routers	1	1	11	10	23.8	20.1
25	Linksys WRT54GL wireless routers	1	1	11	10	27.8	21.2
30	Linksys WRT54GL wireless routers	1	1	11	10	26.7	22.4
More Test							
Specified - Bandwidth(Mb/s)	Device	No.Server	No.Client	Channel	Time - Interval(s)	Transfer(MBytes)	Bandwidth(Mb/s)
21	Linksys WRT54GL wireless routers	1	1	11	10	25.6	21.1
22	Linksys WRT54GL wireless routers	1	1	11	10	25.8	21.5
23	Linksys WRT54GL wireless routers	1	1	11	10	26	22.2
24	Linksys WRT54GL wireless routers	1	1	11	10	26.4	22.3
25	Linksys WRT54GL wireless routers	1	1	11	10	26.7	22.2

- From graph of B and G-type experiment with interval of 5 Mb/s, we can see that the line is converge to 19 or 20 Mbps. then we decide to reduce the interval to 1 Mbps for more accuracy with limited bandwidth between 21 to 25.
- From graph of G-type experiment with interval of 1 Mb/s, we can see that the throughput is stable at the rate of 22.4 Mbps. based on these data, we concluded that the throughput of B-type wireless is about 22 Mbps.
- From this experiment, the throughput of B&G-type wireless is about 22 Mbps. This experiment was done in channel 11 which should be a channel that rarely used by others. This also was done without other groups nearby. When we use B and G wireless together, it may some problem because B and G both use 2.4GHz radio frequency band. It can still work because G wireless has backward-compatible function. The throughput of B&G-type wireless theoretically is 54 Mbps. Used with 2 computers, server and client, the bandwidth is divided by 2.it will be about 27 Mbps that is not too far from 26 Mbps from our experiment. With larger bandwidth, it is vulnerable for more chance to received noise between experiments.