Analyze A Wireless Signal Services In New Built Hall Of Residence In NIT, Rourkela

A THESIS SUBMITTED IN PARTIAL REQUIREMENTS FOR THE DEGREE OF
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BY

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CERTIFICATE

This is to certify that the project entitled, "**Analyze a wireless signal services in new built hall of residence in NIT, Rourkela**" submitted by **Rahul Warkadey** is an authentic work carried out by them under my supervision and guidance for the partial fulfillment of the requirements for the award of Bachelor of Technology Degree in Computer Science and Engineering at National Institute of Technology, Rourkela.

To the best of my knowledge, the matter embodied in the project has not been submitted to any other University / Institute for the award of any Degree or Diploma.

Date: 1st July, 2011

Place: NIT Rourkela

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CONTENTS

ABSTRACT

In recent years, wireless technology with its sub standard 802.11 gaining popularity in deploying for positioning system. With development of mobile computing devices and wireless technique, location detection system is used to determine users' location either in indoor or outdoor environment that relies on Wi-Fi signal strength. The aim of this project is to analyze the wireless signal services of different position from access point based on signal strength that broadcast by access point. Beside that this project also apply application is very helpful to detecting the access point strength cover up the areas to provide signal strength which is can determine the signal strength of access point where the signal is good at certain distant . In this project, I used different software. That is very helpful for me determining the signal strength and the detection access point and realizing the quality of the signal software used net stumbler and peed pro test net-stumbler software is used to detecting the access point in the area. It also provides other information of signal strength bandwidth of signal and nearest access point speed pro test is used for Wi-Fi graphical representation of Wi-Fi signals.

These experimental results that demonstrate the ability of Wi-Fi Positioning system to estimate location of the devices at different measurable distances and result in application part is shown based on highest percentage accuracy of providing signal strength.

List of tables

List of figures

CHAPTER 1

Introduction

1.1 Wireless Access Point

A wireless access point (WAP) is a device that allows wireless devices to connect to a wired network using Wi-Fi, Bluetooth or related standards the wireless access point usually connects to a router (via a wires network)and can relay data between the wireless devices (such as computers or printers)and wired devices on the network.

1.2 Common WAP applications

The wireless access points are managed by a WLAN controller which handles automatic adjustments to RF power, channels authentication, and security. This saves the clients' time and administrators overhead because it can automatically re- associate or authenticate. The majority of WAPs are used in home wireless networks generally have only one WAP to connect all the computers in a home most are wireless routers that include wireless access point a router and often an Ethernet switch many also include broadband modem in places here most homes have their own WAP within range of the neighbors

A WAP may also act as the network arbitrator, negotiating when each nearby client device can transmit .the vast majority of currently installed IEEE 802.11 network do not implement this using a distributed pseudo random algorithm called CSMA/CA.

1.3 Limitations

One IEEE 802.11 WAP can typically communicate with 30 clients systems located within a radius of 100 m the actual range of communication can vary significantly, depending on such variables as indoor or outdoor placement, height above ground, nearby obstructions, other electronics devices that might actively interfere with the signal by broadcasting on the same frequency, type of antenna, the current whether, operating radio frequency and the power output of devices network designers can extend the range of operated over distances of several hundred kilometers Adjacent WAP will use different frequencies(channels) to communicate with their clients in order to avoid interference between the two nearby systems .wireless devices can listen for data traffic on other frequencies, can rapidly switch from one frequency to another to achieve better reception the limited number of frequencies become problematic in crowd downtown areas with tall building using multiple WAPs signal overlap becomes an issue causing interference which results in digital dropage and data errors

Wireless networking lags behind wired networking in terms of increasing bandwidth and throughput. the speed of 300MBps IEEE(802.11g) wired hardware of similar cost reaches 1000Mbit/s one impediment to increasing the speed of wireless communications comes from WIFI use of shared communications medium, so a WAP is only able to use somewhat less than half of the actual over the air rate for data throughout. Thus a typical 54 MBit/s wireless connection actually carries TCP/IP data at 20 to 25 Mbit/s users of legency wired networks expect faster speeds and people using wireless connections keenly want to see the wireless network catch up.

1.4 Security

Wireless access has special security considerations many wired networks base the security on physical access control,trusting all the users on the local network, but if wireless access points are connected to the network, anyone on the street or in the neighboring office could conn most common solution is wireless traffic encryption. Modern access points come with built in encryption.the first generation encryption scheme WEP proved easy to crack; the second and third generation schemes WPA and WPA2 are considered secure if a strong enough password or passphrase is used some WAPs support hotspot style authenication using RADIUS and other authentication servers

1.5 Procurve wireless access point 420

The procurve wireless access point 420 is a wireless repeater that seamlessly integrates with existing wired networks to support connectivity for mobile user or wireless workstations .this solution offers fast, reliable wireless connectivity with considerable cost saving over wired-LANs just install into your notebooks or install wireless adapters into your desktops and startnetworking throughout this access point will be abbreviated as the Access point 420.

Figure 1.1: Procurve access point 420

The access point 420 has one 10/100 Base-TX RJ -45 port this port also supports Power over Ethernet (PoE) based on the IEEE 802.3af standard. The access point supports wireless connectivity at speed up to 54Mbps based on IEEE 802.11g standard this access point is designed to be used primarily for connecting wireless clients to an enterprise network this access point allows wireless clients to connect directly to each other, or to connect to other computers or network resources located on the wired network

CHAPTER -2

WIRELESS ACCESS POINT DESIGNS

This chapter presents general technological background for citywide wireless networks, their architecture and common standards. The RFID technology is also presented, with the focus on Wi-Fi RFID tags. In addition, different positioning techniques that are used in Wi-Fi based location systems are given.

2.1 WLAN Architecture

2.1.1Traditional WLAN

A Wireless Local Area Network (WLAN) can be designed and deployed with different levels of complexity. Basically, a traditional WLAN architecture consists of four main components. These components are depicted in Fig.

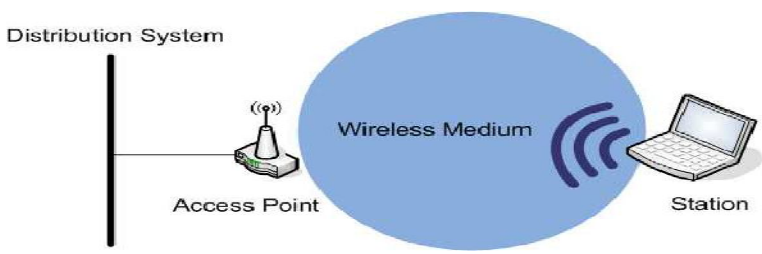

Figure 2.1: Components in a traditional WLAN

The purpose of a WLAN is to transfer information wirelessly between stations. These stations are typically laptops or other mobile terminals that are equipped with a wireless interface. The communication is done through a wireless medium. The stations communicate with access points, which are connected to a wired distribution system or backbone network. Hence, the access points perform a wireless-to-wired bridging function [13]. A group of stations that communicate with each other is called a Basic Service Set (BSS). An access point and all the stations that are able to communicate with each other within the coverage area of the access point, is said to be in an Infrastructure Basic Service Set.

Two stations can also communicate directly with each other, without using an access point. Several stations communicating directly together form an ad-hoc network or an Independent Basic Service Set (IBSS). Figure 2.2 illustrates how the stations communicate with each other in the independent and infrastructure BSSs.

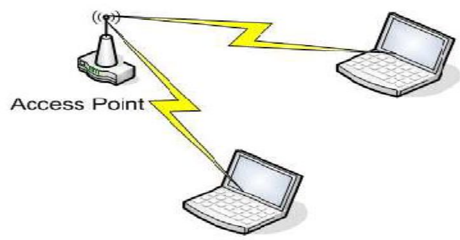

Figure 2.2: Infrastructure Basic Service Set

In large WLAN deployments, such as citywide wireless networks, several access points are often cooperating with each other to serve a certain area. In such systems, access point controllers are used as additional components in the architecture. In these architectures, much of the functionality is moved from the access point to the controller. Light-weight access points communicate with the controllers using special tunneling protocols. A citywide wireless network requires a large number of access points to cover the Entire area. Connecting all these access points directly to the wired distribution network is costly. Thus, wireless links are often used to interconnect access points. In such interconnections, at least one access point is wired to the backbone network. This access point functions as a bridge for the other access points in the interconnection. If there are multiple paths to backbone network, the network is referred to as a wireless mesh. This is illustrated in figure 2.3. In outdoor deployments, additional external high-gain antennas are often connected to the access points in order to cover a larger area

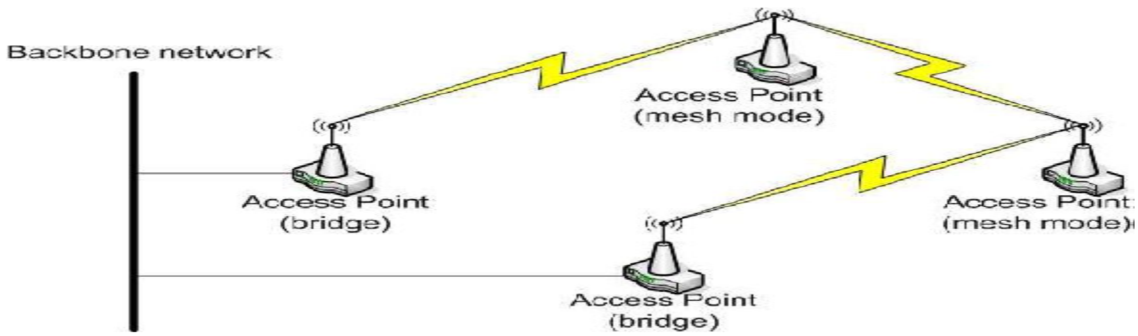

Figure 2.3: A wireless mesh network. Two access points are interconnected with wireless links and multiple paths are available to the backbone network

2.1.2 IEEE 802.11a, 802.11b and 802.11g

The 802.11 standards specify the physical layer and the Media Access Control (MAC) part of the data link layer. The Logical Link Control (LLC) part of the data link layer is equal to the other IEEE 802 specifications.

.Application Layer	
Presentation Layer	
Session Layer	
Transport Layer	
Network Layer	
Data Link Layer	IEEE 802.11 logical link control (LLC) sublayer
	IEEE 802.11 medium access control (MAC) sublayer
Physical Layer	Physical layer convergence procedure (PLCP) sublayer
	Physical medium dependent (PMD) sublayer

Table 2.1: Shows the relationship between the 802.11 specifications and the Open Systems Interconnection (OSI) reference model

IEEE standard	Max speed	Frequency band	Modulation
802.11a	54 Mbps	5 GHz	OFDM
802.11b	11 Mbps	2.4 GHz	DSSS
802.11g	54 Mbps	2.4 GHz	OFDM

Table 2.2: Shows the three standards that currently are widespread in use in mass market Wi-Fi equipment. Their specifications at the physical layer are different, and so are the capacity they can offer and the frequency band they utilize.

The 802.11b physical layer is based on the Direct Sequence Spread Spectrum (DSSS) modulation technique, which spreads the transmitted signal energy over a wider frequency band by multiplying the signal by a pseudorandom noise code. This standard uses the non-licensed 2.4 GHz frequency band, and can offer theoretical data rates up to 11 Mbps

The 2.4 GHz frequency band is heavy utilized both by 802.11 stations and other equipment. Thus, the 802.11a is specified to operate in the 5 GHz unlicensed frequency band. 802.11a offers theoretical data rates up to 54 Mbps and its physical layer is based on Orthogonal Frequency Division Multiplexing (OFDM). OFDM divides the available bandwidth into several sub channels. The signal is transmitted using these sub channels in parallel and multiplexing data over the set of sub channels.

OFDM is more adaptable to interference than other modulation techniques because the sub channels are selected orthogonally. Hence, OFDM is better suited for outdoor deployments As with 802.11a, the 802.11g physical layer is based on OFDM and supports theoretical data rates up to 54 Mbps. However, 802.11g operates in the 2.4 GHz frequency band and also supports DSSS for backwards compatibility with 802.11b

2.2 Wi-Fi Based Positioning

Wi-Fi RTLSs use different techniques for determining the location of a client or RFID tag. The location can be computed using signal strength or timing information, observed at a single or multiple access points. There are mainly four different location determination approaches that are used in Wi-Fi networks [25]. The approaches differ in which physical measurements they take into account, and how these are used in the location computation.

2.2.1 Closest Access Point

The most basic of the four location determination techniques, is to identify the location based on the access point that is closest to the client or RFID tag. This can be done by looking at the association between the client and the access point or by measuring signal strength. However, the closest access point method has a low degree of accuracy because an access point usually has a large coverage area.

2.2.2 Distance

A more advanced location determination technique is to compute the approximately distance between the client or RFID tag and one or more access points. This technique is called lateration. The distance can be computed based on signal strength or timing information [16].

CHAPTER - 3
SOFTWARES

3.1 NET STUMBLER

3.1.1 Definitions

Net Stumbler is a tool for windows that facilitates detection of wireless LAN using 802.11a, 802.11a, 802.11g WLAN standards. It runs on Microsoft windows operating system WINDOWS 2000 to WINDOWS XP.

Its updated version that will work correctly with WINDOWS VISTA AND WINDOWS 7

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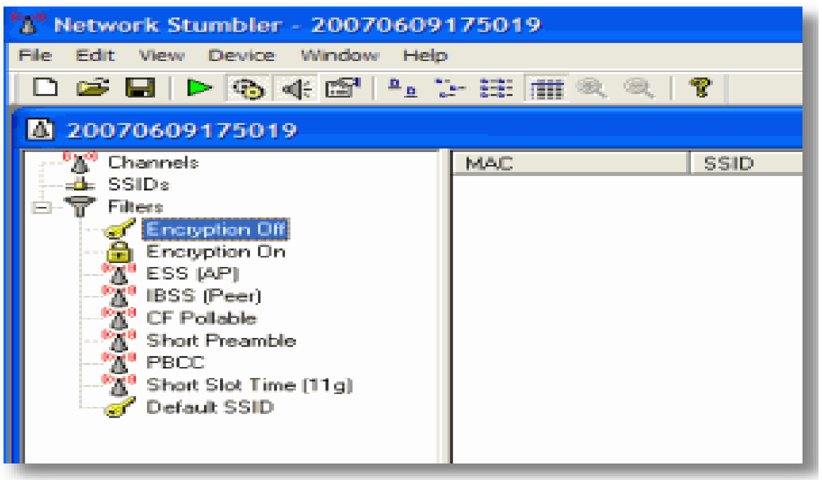


Dialog box of Netstumbler

3.1.2 USAGE

This program commonly used for

- War driving
- Verifying network configurations
- Detecting causes of wireless interference
- Detecting unauthorized (“rogue “) access points
- Aiming directional antennas for long haul WLAN links

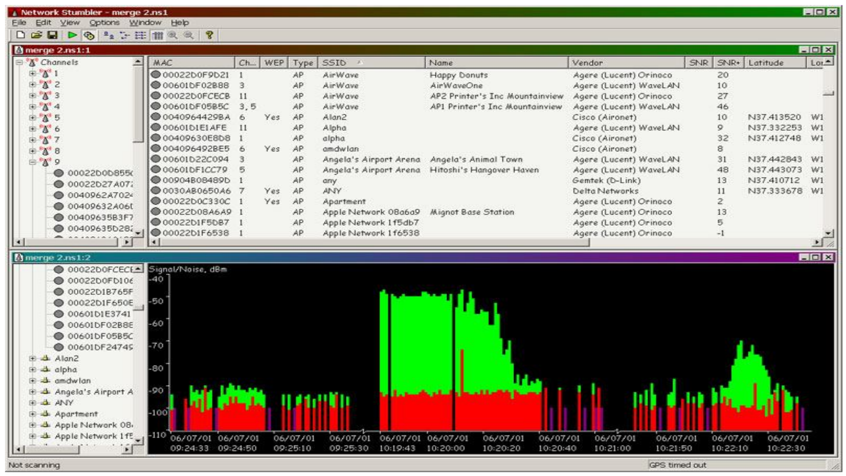


Figure 3.2: Represents a access points and graphical signal strength

3.1.3 General Requirements

- The requirements of Net Stumbler are complex and depend on hardware, firmware versions, driver versions and operating system. The best way to see if it works on your system to try it. Your card must be configured in such a way that it can be seen by the management software that came with the card
- Net Stumbler is in "auto configure "mode (the default), it will occasionally disconnect you from your network this enables it to perform it scans accurately, and is not bug .

3.2 SPEED PRO TEST

3.2.1 Definition

Speed pro test is a software which is used to monitors your internet connection, website , CPU , memory hard drives ,WIFI , lan ,processes and much more all in real time and will store all data recorded into an log, so it can be easily imported into almost any application. This data can be used to help in resolving problems with your internet connection or computer. Speed test is must for resolving connection issues. Speed test has the flexibility to allow you to view the data in many ways to suit your need.

Figure 3.3: Dialog box of Speed Pro Test

3.2.2 SYSTEM REQUIREMENT

1. Windows 95/98/XP/Vista/win 7
2. Window NT 4.0 SP4 or later
3. Pentium 366mhz or greater
4. Minimum 32MB RAM
5. 100MB free hard drive space for logs
6. Internet connection

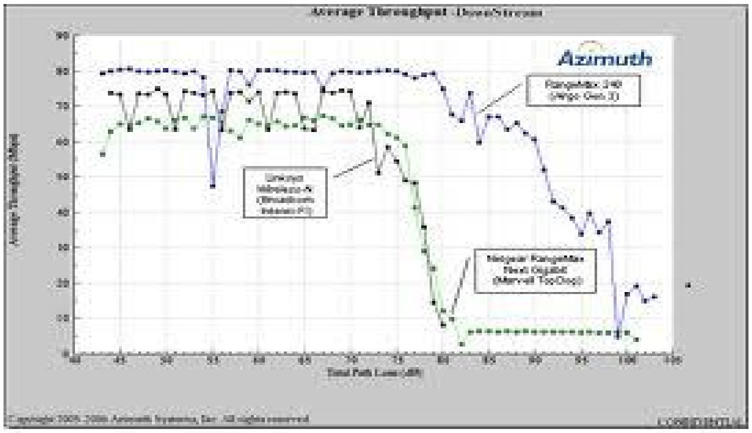


Figure 3.4: Graphical representation of Wi-Fi signal

3.3.3 KEY BENEFITS

1. Measure your actual maximum bandwidth speed by downloading from our server
2. Measure your quality of service
3. Test your own website's speed ,connectivity ,response time and errors
4. Test your home network or LAN speed
5. You can monitor network connections as well as broadband internet connections
6. You can also monitor dial up connections using the (local host)
7. Quick and easy viewing logs inside of graphs
8. Ping packet size up to 1k
9. Ability to ping a website to estimate connections speeds
10. Viewing your WIFI signal strength with a graph in real time
11. View memory status in graphs
12. View hard drive space in graphs
13. View system uptime in graphs
14. View battery status in graphs
15. View a processes memory usage in graphs

16. Alert wizard, allowing you to print, run an app, restart, send an email under any condition that you specify.

Transmitter specs. (output power settable on the transmitter)	**Receiver Specs.** (received signal strength vs. max. data rate)
200 mW (23 dBm) *ERP assuming a 3 dBi gain antenna*	-66 dBm 54 Mbps*
63 mW (18 dBm)	-71 dBm 48 Mbps
30 mW (15 dBm)	-76 dBm 35 Mbps
20 mW (13 dBm)	-80 dBm 24 Mbps
10 mW (10 dBm)	-83 dBm 18 Mbps
5 mW (7 dBm)	-84 dBm 12 Mbps
1 mW (0 dBm)	-85 dBm 11 Mbps
	-86 dBm 9 Mbps
	-87 dBm 6 Mbps
	-88 dBm 5.5 Mbps
	-89 dBm 2 Mbps
	-92 dBm 1 Mbps

Table 3.1 Transmission and receiving signal strength

Type	**Radio Frequency**	**Signal Range**	**Maximum Data Speed**	**Typical Speed**
802.11b	2.4 GHz	~30 meters (indoor) ~100 meters (outdoor)	11Mbps	4Mbps
802.11a	5 GHz	~35 meters (indoor) ~110 meters (outdoor)	54Mbps	23Mbps
802.11g	2.4 GHz	~35 meters (indoor) ~110 meters (outdoor)	54Mbps	20Mbps

Table 3.2: Wi-Fi Characteristics

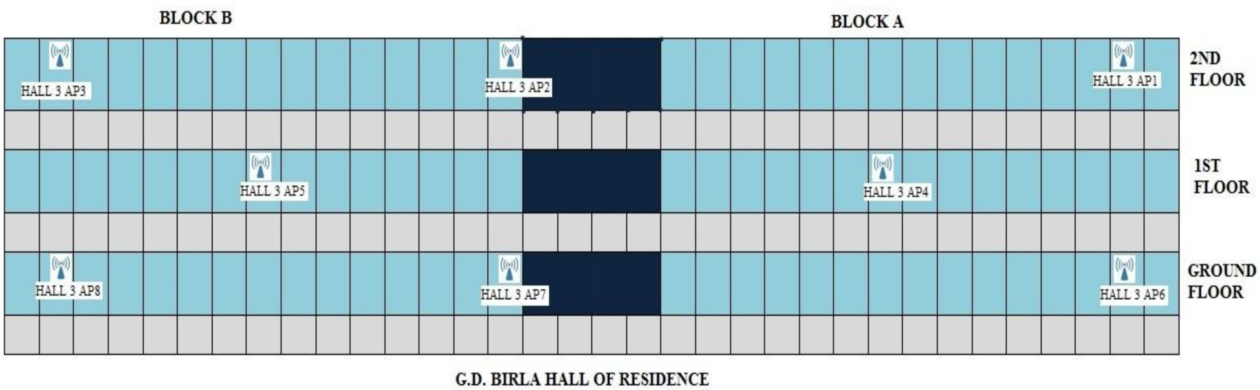
CHAPTER – 4

BRIEF DESCRIPTION ABOUT OBSERVATION SITES

4.1 G.D. BIRLA HALL OF REISDENCE

The wireless access point is build up in the new extension building of hall 3 where it almost rooms in the each block. Two blocks are there Block A and Block B

Three floors ground, 1st floor and 2nd floor.



4.1.1 Block – A & B

Figure 4.1 G.D BIRLA hall of residence

In Ground floor - Room No. 1- 40

In 1st floor - Room No. 41-80

In 2nd floor - Room No. 81-120

The number of access point is located in extension building are Eight (8)

In ground floor three access points two access points are located in corners in left and right side One is on centre near the stairs It provides the Wi-Fi services to entire building the quality of the signal is good which is nearer to this access points.

4.1.2 Description of access point in ground floor

- Hall 3 AP6 in right

- Hall 3 AP7 in centre

- Hall 3 AP8 in left

In 1st floor two access points both access points are located in between corner and centre at distance of 30 meters from each others in side. It provides the Wi-Fi services to entire building the quality of the signal is good which is nearer to this access points.

4.1.3 Description of access point in 1st floor

- Hall 3 AP5 in left

- Hall 3 AP4 in right

In 2nd floor three access points two access points are located in corners in left and right side One is on centre near the stairs It provides the Wi-Fi services to entire building the quality of the signal is good which is nearer to this access points.

4.1.4 Description of access point in 2nd floor

- Hall 3 AP1 in right

- Hall 3 AP2 in centre

- Hall 3 AP3 in left

4.2 DHIRUBHAI AMBANI HALL OF RESIDENCE

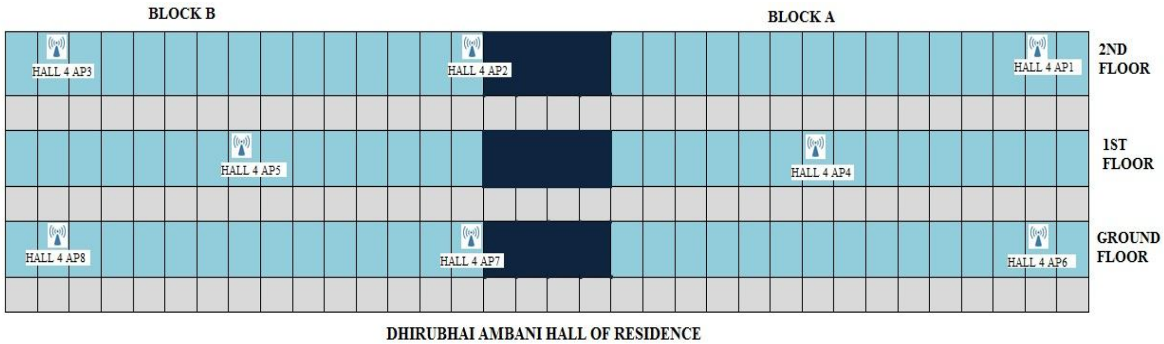


Figure 4.2: Dhirubhai ambani hall of residence

The wireless access point is build up in the new extension building of hall 4 where it almost rooms in the each block. Two blocks are there Block A and Block B

Three floors ground 1st floor and 2nd floor.

4.2.1 Block – A & B

In Ground floor - Room No. 1- 40

In 1st floor - Room No. 41-80

In 2nd floor - Room No. 81-120

The number of access point is located in extension building are Eight (8)

In ground floor three access points two access points are located in corners in left and right side One is on centre near the stairs It provides the WIFI services to entire building the quality of the signal is good which is nearer to this access points.

4.2.2 Description of access point in ground floor

- Hall 4 AP6 in right

- Hall 4 AP7 in centre

- Hall 4 AP8 in left

In 1st floor two access points both access points are located in between corner and centre at distance of 30 meters from each others in side. It provides the WIFI services to entire building the quality of the signal is good which is nearer to this access points.

4.2.3 Description of access point in 1^{st} floor

- Hall 3 AP5 in left

- Hall 3 AP4 in right

In 2^{nd} floor three access points two access points are located in corners in left and right side One is on centre near the stairs It provides the wifi services to entire building the quality of the signal is good which is nearer to this access points.

4.2.4 Description of access point in 2^{nd} floor

- Hall 3 AP1 in right

- Hall 3 AP2 in centre

- Hall 3 AP3 in left

CHAPTER – 5

EXPERIMENT ANALYSIS

5.1 G.D BIRLA HALL OF RESIDENCE

5.1.1 Hall 3 AP1

In corridor

Distance(in meters)	Strength of signal(in bps)	Quality
0-10	54*10^6	Excellent
11-20	4*10^5	Good
21-30	23*10^3	Good
31-40	12*10^2	Poor

Table 5.1: HALL 3 AP1

In rooms (room no- 82,89,98,105,113,119)

Room number	Distance(in meters)	Strength of signal(in bps)	Quality
82	2	53*10^6	Excellent
89	8	45*10^6	Excellent
98	18	28*10^4	Good
105	24	15*10^3	Good
113	32	5*10^2	Poor
119	43	2*10^2	Poor

Table 5.2: HALL 3 AP 1

5.1.2 Hall 3 AP2

In corridor

Distance(in meters)	Strength of signal(in bps)	Quality
0-10	53*10^6	Excellent
11-20	42*10^5	Good
21-30	25*10^3	Good
31-40	11*10^2	poor

Table 5.3 : HALL 3 AP 2

In rooms (room no- 82, 89,98,105,113,119)

Room number	Distance(in meters)	Strength of signal(in bps)	Quality
82	22	52*10^6	Good
89	8	46*10^6	Good
98	3	27*10^4	Excellent
105	21	13*10^3	Good
113	30	4*10^2	Poor
119	37	1.5*10^2	Poor

Table 5.4 : HALL 3 AP 2

5.1.3 Hall 3 AP3

In corridor

Distance(in meters)	Strength of signal(in bps)	Quality
0-10	53*10^6	Excellent
11-20	42*10^5	Good
21-30	25*10^3	Good
31-40	11*10^2	Poor

Table 5.5 : HALL 3 AP 3

In rooms (room no- 82,89,98,105,113,119)

Room number	Distance(in meters)	Strength of signal(in bps)	Quality
82	43	52*10^6	Poor
89	**32**	**46*10^6**	**Poor**
98	**24**	**27*10^4**	**Good**
105	**19**	**13*10^3**	**Good**
113	**8**	**4*10^2**	**Good**
119	**3**	**1.5*10^2**	**Excellent**

Table 5.6 : HALL 3 AP 3

5.1.4 Hall 3 AP4

In corridor

Distance(in meters)	Strength of signal(in bps)	Quality
0-10	53*10^6	Excellent
11-20	42*10^5	Good
21-30	25*10^3	Good
31-40	11*10^2	Poor

Table 5.7: HALL 3 AP 4

In rooms (room no- 42,51,60,68,71,79)

Room number	Distance(in meters)	Strength of signal(in bps)	Quality
42	2	52*10^6	Excellent
51	**8**	**46*10^6**	**Excellent**
60	**18**	**27*10^4**	**Good**
68	**25**	**13*10^3**	**Good**
71	**32**	**4*10^2**	**Poor**
79	**43**	**1.5*10^2**	**Poor**

Table 5.8 : HALL 3 AP 4

5.1.5 Hall 3 AP5

In corridor

Distance(in meters)	Strength of signal(in bps)	Quality
0-10	53*10^6	Excellent
11-20	42*10^5	Good
21-30	25*10^3	Good
31-40	11*10^2	Poor

Table 5.9 : HALL 3 AP 5

In rooms (room no- 42,51,60,68,71,79)

Room number	Distance(in meters)	Strength of signal(in bps)	Quality
42	42	52*10^6	**Excellent**
51	**33**	**46*10^6**	**Good**
60	**27**	**27*10^4**	**Good**
68	**19**	**13*10^3**	**Good**
71	**08**	**4*10^2**	**Poor**
79	**04**	**1.5*10^2**	**Poor**

Table 5.10 HALL 3 AP5

5.1.6 Hall 3 AP6

In corridor

Distance(in meters)	Strength of signal(in bps)	Quality
0-10	54*10^6	Excellent
11-20	4*10^5	Good
21-30	23*10^3	Good
31-40	12*10^2	Poor

Table 5.11 : HALL 3 AP6

In rooms (room no-01,07,16,20,30,39)

Room number	Distance(in meters)	Strength of signal(in bps)	Quality
01	2	53*10^6	Excellent
07	**8**	**45*10^6**	**Excellent**
16	**18**	**28*10^4**	**Good**
20	**24**	**15*10^3**	**Good**
30	**32**	**5*10^2**	**Poor**
39	**43**	**2*10^2**	**Poor**

Table 5.12 : HALL 3 AP6

5.1.7 Hall 3 AP7

In corridor

Distance(in meters)	Strength of signal(in bps)	Quality
0-10	53*10^6	Excellent
11-20	42*10^5	Good
21-30	25*10^3	Good
31-40	11*10^2	poor

Table 5.13 : HALL 3 AP 7

In rooms (room no- 01,07,16,20,30,39)

Room number	Distance(in meters)	Strength of signal(in bps)	Quality
01	22	52*10^6	Good
07	**8**	**46*10^6**	**Good**
16	**3**	**27*10^4**	**Excellent**
20	**21**	**13*10^3**	**Good**
30	**30**	**4*10^2**	**Poor**
39	**37**	**1.5*10^2**	**Poor**

Table 5.14 : HALL 3 AP7

5.1.8 Hall 3 AP8

In corridor

Distance(in meters)	Strength of signal(in bps)	Quality
0-10	54*10^6	Excellent
11-20	4*10^5	Good
21-30	23*10^3	Good
31-40	12*10^2	Poor

Table 5.15 : HALL 3 AP8

In rooms (room no-01,07,16,20,30,39)

Room number	Distance(in meters)	Strength of signal(in bps)	Quality
01	45	11*10^6	**Poor**
07	**36**	**18*10^6**	**Poor**
16	**27**	**24*10^4**	**Good**
20	**17**	**28*10^3**	**Good**
30	**9**	**35*10^2**	Excellent
39	**2**	**44*10^2**	**Excellent**

Table 5.16 : HALL 3 AP8

5.2 DHIRU BHAI AMBANI HALL OF RESIDENCE

5.2.1 Hall 4 AP1

In corridor

Distance(in meters)	Strength of signal(in bps)	Quality
0-10	54*10^6	Excellent
11-20	4*10^5	Good
21-30	23*10^3	Good
31-40	12*10^2	Poor

Table 5.17 : HALL 4 AP1

In rooms (room no- 82,89,98,105,113,119)

Room number	Distance(in meters)	Strength of signal(in bps)	Quality
82	2	53*10^6	Excellent
89	**8**	**45*10^6**	**Excellent**
98	**18**	**28*10^4**	**Good**
105	**24**	**15*10^3**	**Good**
113	**32**	**5*10^2**	**Poor**
119	**43**	**2*10^2**	**Poor**

Table 5.18 : HALL 4 AP1

5.2.2 Hall 4 AP2

In corridor

Distance(in meters)	Strength of signal(in bps)	Quality
0-10	53*10^6	Excellent
11-20	42*10^5	Good
21-30	25*10^3	Good
31-40	11*10^2	Poor

Table 5.19 : HALL 4 AP2

In rooms (room no- 82,89,98,105,113,119)

Room number	Distance(in meters)	Strength of signal(in bps)	Quality
82	22	52*10^6	Good
89	**8**	**46*10^6**	**Good**
98	**3**	**27*10^4**	**Excellent**
105	**21**	**13*10^3**	**Good**
113	**30**	**4*10^2**	**Poor**
119	**37**	**1.5*10^2**	**Poor**

Table 5.20 : HALL 4 AP2

5.2.3 Hall 4 AP3

In corridor

Distance(in meters)	Strength of signal(in bps)	Quality
0-10	53*10^6	Excellent
11-20	42*10^5	Good
21-30	25*10^3	Good
31-40	11*10^2	Poor

Table 5.21 : HALL 4 AP3

In rooms (room no- 82,89,98,105,113,119)

Room number	Distance(in meters)	Strength of signal(in bps)	Quality
82	43	52*10^6	**Excellent**
89	**32**	**46*10^6**	**Good**
98	**24**	**27*10^4**	**Good**
105	**19**	**13*10^3**	**Good**
113	**8**	**4*10^2**	**Poor**
119	**3**	**1.5*10^2**	**Poor**

Table 5.22 : HALL 4 AP3

5.2.4 Hall 4 AP4

In corridor

Distance(in meters)	Strength of signal(in bps)	Quality
0-10	53*10^6	Excellent
11-20	42*10^5	Good
21-30	25*10^3	Good
31-40	11*10^2	Poor

Table 5.23 : HALL 4 AP4

In rooms (room no- 42,51,60,68,71,79)

Room number	Distance(in meters)	Strength of signal(in bps)	Quality
42	2	52*10^6	Excellent
51	**8**	**46*10^6**	**Excellent**
60	**18**	**27*10^4**	**Good**
68	**25**	**13*10^3**	**Good**
71	**32**	**4*10^2**	**Poor**
79	**43**	**1.5*10^2**	**Poor**

Table 5.24 : HALL 4 AP4

5.2.5 Hall 4 AP5

In corridor

Distance(in meters)	Strength of signal(in bps)	Quality
0-10	53*10^6	Excellent
11-20	42*10^5	Good
21-30	25*10^3	Good
31-40	11*10^2	Poor

Table 5.25 : HALL 4 AP5

In rooms (room no- 42,51,60,68,71,79)

Room number	Distance(in meters)	Strength of signal(in bps)	Quality
42	42	52*10^6	Excellent
51	33	46*10^6	Good
60	27	27*10^4	Good
68	19	13*10^3	Good
71	08	4*10^2	Poor
79	04	1.5*10^2	Poor

Table 5.26 : HALL 4 AP5

5.2.6 Hall 4 AP6

In corridor

Distance(in meters)	Strength of signal(in bps)	Quality
0-10	54*10^6	Excellent
11-20	4*10^5	Good
21-30	23*10^3	Good
31-40	12*10^2	Poor

Table 5.27 : HALL 4 AP6

In rooms (room no-01,07,16,20,30,39)

Room number	Distance(in meters)	Strength of signal(in bps)	Quality
01	2	53*10^6	Excellent
07	**8**	**45*10^6**	**Excellent**
16	**18**	**28*10^4**	**Good**
20	**24**	**15*10^3**	**Good**
30	**32**	**5*10^2**	**Poor**
39	**43**	**2*10^2**	**Poor**

Table 5.28 : HALL 4 AP6

5.2.7 Hall 4 AP7

In corridor

Distance(in meters)	Strength of signal(in bps)	Quality
0-10	53*10^6	Excellent
11-20	42*10^5	Good
21-30	25*10^3	Good
31-40	11*10^2	Poor

Table 5.29 : HALL 4 AP7

In rooms (room no- 01,07,16,20,30,39)

Room number	Distance(in meters)	Strength of signal(in bps)	Quality
01	22	52*10^6	Good
07	**8**	**46*10^6**	**Good**
16	**3**	**27*10^4**	**Excellent**
20	**21**	**13*10^3**	**Good**
30	**30**	**4*10^2**	**Poor**
39	**37**	**1.5*10^2**	**Poor**

Table 5.30 : HALL 4 AP7

5.2.8 Hall 4 AP8

In corridor

Distance(in meters)	Strength of signal(in bps)	Quality
0-10	54*10^6	Excellent
11-20	4*10^5	Good
21-30	23*10^3	Good
31-40	12*10^2	Poor

Table 5.31 : HALL 4 AP8

In rooms (room no-01,07,16,20,30,39)

Room number	Distance(in meters)	Strength of signal(in bps)	Quality
01	42	53*10^6	**Poor**
07	**35**	**45*10^6**	**Poor**
16	**25**	**28*10^4**	**Good**
20	**24**	**15*10^3**	**Good**
30	**14**	**5*10^2**	**Excellent**
39	**4**	**2*10^2**	Excellent

Table 5.32 : HALL 4 AP8

CHAPTER- 6

CONCLUSION

The main goal with this thesis is survey the performance of the Wi-Fi signal strength. The project intends to utilize the popular WLAN equipments and design a location system that would work effectively in indoor environments Wi-Fi Location System is capable of identifying position of the device in relation to the indoor environment, using signal information of surrounding access points.

The performance determines the potential commercial services that can utilize. The accuracy is also influenced by the number of access points, which cover the particular area. In areas covered by access points, accuracy less or equal to 35 meters can be achieved with a reasonable level of precision. In areas with only one access point, the corresponding accuracy is degraded to up to 40 meters. The results also indicate that a higher degree of accuracy is achieved still more comprehensive testing is needed in order to verify that a particular service currently can work well with the Wi-Fi.

References

[1] Corporation. Whitepaper: Understanding Wi-Fi and Wimax as metroaccess solutions, 2004.

[2] http ://en.wikipedia.org/wiki/NetStumbler

[3] http:// h50146.www5.hp.com/products/networks/procurve/pdfs/59906005_e1.pd

[4] Cisco Systems Inc. Wi-Fi location-based services - design and deployment considerations *. White Paper. Available from http://www.cisco.com.

[5] Wireless Trondheim. The Wireless Trondheim website (online). Web Site. Available from http://www.wirelesstrondheim.no/. Last visited May 3rd

[6] 2007.

[7] Cisco Systems Inc. Evolution of municipal wireless networks *. White Paper. Available from http://www.cisco.com.

[8] Jeffrey Hightower and Gaetano Borriella. Location systems for ubiquitous computing. IEEE Computer, 34(8):57–66, 2001

[9] Intel Corporation. Whitepaper: Understanding wi-fi and wimax as metroaccess solutions, 2004

[10] Henrik Ljøgodt Moen" A Study of Wi-Fi RFID Tags in Citywide Wireless Networks". Norwegian University of Science and Technology June 2007

[11] AMALINA ABDUL HALIM "WIFI POSITIONING SYSTEM" MARA UNIVERSITY OF TEKNOLOGY SHAH ALAM MAY 2006.