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Wi-Fi Site Survey and Analysis of Dead Zones

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Abstract: **- Wi-Fi Analyser tools and range recognition is a project which involved analyzing the Wi-Fi traffic in Vishwakarma Institute of Technology. We present the details of the analysis and the results of our experiment on the Wi-Fi network using a Wi-Fi analyzer tool called Netspot which is windows software Open Signal and a Coverage app. This paper provides an overall coverage of the Wi-Fi in the college campus . The idea was to present how the signals were measured, analyzed and the conclusion was based on the analysis. Today we already have better tools to access the WiFi devices. This paper presents measurements in real WiFi scenarios and shows how a simple laptop along with some built in applications can be used for such measurement purpose. The applications used for the study is user friendly, free of cost and is easily available both online and offline.**
The project concentrated on optimizing the number of APs required to access the Wi-Fi signal from every corner of the project site.

Keywords — Abstract, Introduction, Implementation, Result, Analysis, Conclusion, Acknowledgment, References.

I. INTRODUCTION

The fundamental components on which WLAN is composed of, are access points (AP) and the mobile clients (MC), typically a laptop or a PDA with a WLAN card. While for wired network communications, Ethernet cables are laid down all over the building and subsequently different buildings are linked to each other by using fibre optics. In Wireless LAN, in order to make a network infrastructure APs are positioned at different place all over a building and also if needed in outdoors as well. Then mobile clients communicate with each other by first communicating to the access points and then to the outer world.

In this project we have studied general signal strength and then the observed the effect of obstacles (wood, glass and brick etc.) and other factors such as the presence of people.
So basically our project involves the measurement and analysis of signal strength in various buildings selected for experiment by taking account the effect of surrounding environment on Wi-Fi at that particular location.

II. MAIN BODY

A: Initial Survey

Measurement of Wi-Fi signal can be done using various softwares available both on PC and on Android phones. Below is the list of few softwares that can be used:

- AirGrab WiFi Radar [7]

It is a free Mac based Wi-Fi stumbler.

Advantages
- Shows noise levels and hence signal to noise ratio of all APs can be easily calculated
- Useful tool for Wi-Fi troubleshooting

Disadvantages
- Registration is required to get rid of the snag screen
- Cannot be mapped on google maps

- Cain & Abel [7]

It is multipurpose password recovering and cracking application that also features Wi-Fi stumbling, sniffing, and cracking tool.

Advantages
- Simple and easy to use
- Data can be stored in text format

Disadvantages
- No graphs can be drawn
- No mapping on google maps

- Homedale [7]

Relatively simple and portable Windows based software

Advantages
- Supports GPS and other geo-location support logging
- Shows both graphs and maps

Disadvantages
- Does not detect hidden SSID
- Cannot show individual AP results

- Ekahau Heatmapper [9]

Ekahau Heatmapper is a free version of networking design toolmaker Ekahau's Wi-Fi site & Survey Planner. It offers an attractive geographical view of the airways around you and even some security settings on detected Wi-Fi networks.

Advantages
- Can be easily mapped on any available map
- Provides individual as well as single AP mapping

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- Acrylic WiFi [7]

Tartologis securities offer Acrylic Wi-Fi software in two versions, paid and unpaid. The free edition has a simple but attractive and user-friendly GUI.

Advantages

- Captures larger bandwidth and multiple channels

Disadvantages .

- Cannot be mapped on google maps

- NetSpot [12]

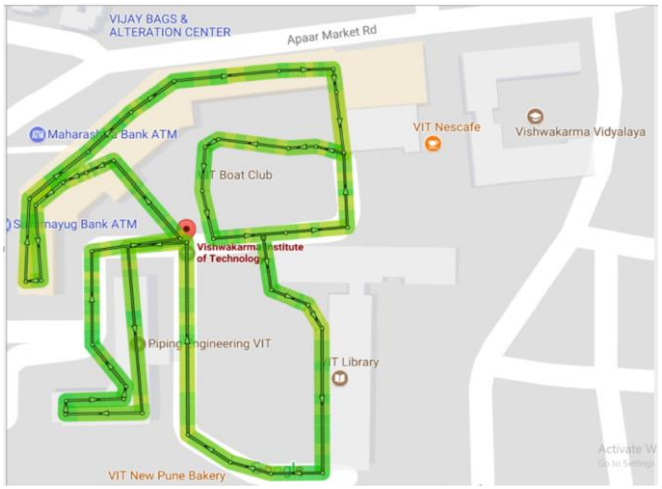

Figure 2- Path followed wireless networks.

It is a software tool for wireless network assessment, scanning, and surveys, analyzing Wi-Fi coverage and performance.

It runs on Mac OSX 10.6+ and Windows 7-8-10 and supports 802.11n, 802.11a, 802.11b, and 802.11g

III. RESULT

- After keeping in mind the advantages and disadvantages of different softwares, we decided to analyze the site using NETSPOT and due to missing feature of site mapping in the free version of NetSpot, we mapped the readings using EKAHAU HEATMAPPER.

B: Implementation

The working on Netspot is quite simple. Netspot provides all professional wireless site survey features for Wi-Fi and maps coverage of a living area, office space, buildings, etc. We walked around the site along with our laptop that continuously captured the Wi-Fi signal strength and various details of the Wi-Fi such as SSID, MAC, Channel, Security, Graph etc.

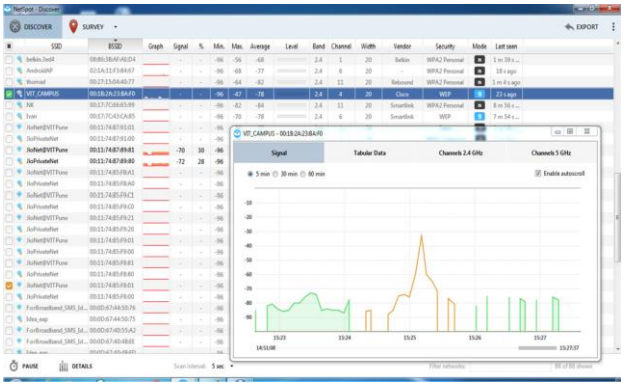

Figure 1- Overview of Netspot

The software measured the signal strength of each and every AP available at different locations. At the end, it showed both overall strength and individual AP strengths as you can see below:

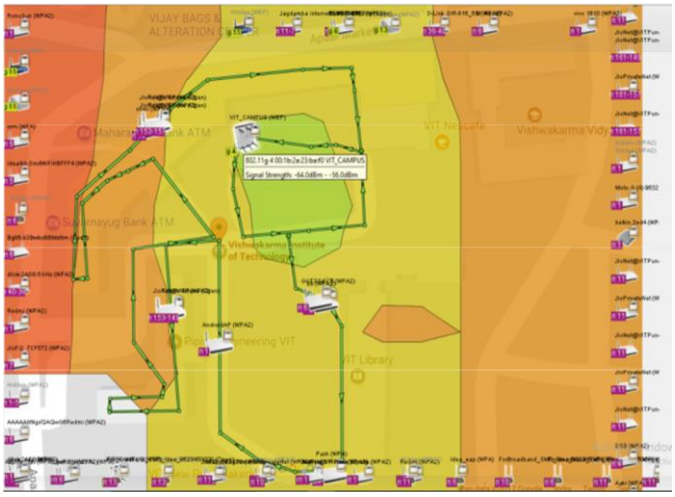

Figure 3 - VIT campus Wi-Fi strength

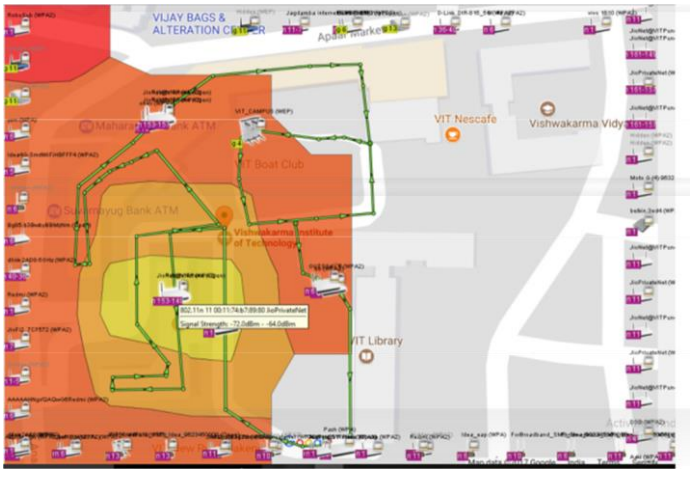

Figure 4 - Jio Private Net 1 Wi-Fi strength

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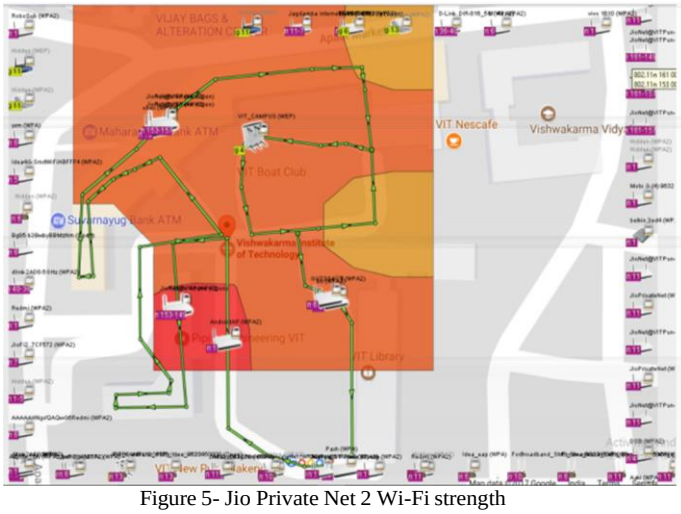

Figure 5- Jio Private Net 2 Wi-Fi strength

IV. RESULT ANALYSIS

The Wi-Fi signal strength of 'VIT campus' is quite strong near the boat club area but is weak otherwise.

A particular 'Jio Private net' has small coverage but they are wide spread all over the college and hence have an overall good strength.

The number of Jio Private net is also more comparatively higher than its counterparts.

hough` there have been man` router signals deteted` in the campus, onl` a ew` o` them were rominent` in our path. Wi-Fi signals also reah` some inaccessible areas of the college campus which is undesirable.

V. CONCLUSION

Wi-Fi quality and signal strength in our college is relatively poor and needs immediate attention. Wi-Fi quality and signal strength in our ollege` is relativel `Poor` and needs immediate attention` rom` the above heat mas,` we an` clearly see that there are laws` in the Wi-Fi. he` area under the strong one` (green) an` be significantly imroved` b` efficiently inreasing` the number o` access oints` in the ollege` campus. he` undesirable areas reeiving` the amle` Wi-Fi signals an` be shited` to desirable areas b` reloating` the access oints` awa` rom` suh` areas` uildings` ` and ` o` the VIT Campus are almost dead ones` with no access points. So, two access oints` in uilding` ` sine` it is comparatively bigger and accommodates majorit` o` students and one access Point in uilding` 4. he` area under the strong one` (green) an` be significantly imroved` b` efficiently inreasing` the number o` access points in the college campus.

at` same loation,` we are getting variation in the signal strength, so there might be hanges` in the Wi- i ` signal due to the environmental arameters` in the region.

VI. ACKNOWLEGMENT

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