Analysis of the Coverage Area of the Access Point Using Netspot Simulation

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Abstract. Currently the ease of accessing the internet has become a fundamental requirements primarily a college surroundings. The requirement to always be connected to the internet network is seen with the growing number of access points that are installed to meet these needs. Installation of the access point is often not structured properly so that the area of coverage is uneven. On the research of the simulation is done against the signal strength of the access point toward the receiver Wi-Fi in the room and the room of the student learning lecturer electrical engineering building FPTK UPI 3 and 4 floors. This research aims to map the territory of blankspot on that location, so that it can be used as a reference for optimizing the placement of access points. The research method used was the experiment through the drive test using Netpot software. The analysis performed includes: Signal level, Signal-to-Interference ratio, and Quantity of Access point. Experimental results indicate the quality of the reception on location observed is not the same, some point receive very strong signals from more than one access point, while some other point still entered into the realm of blankspot. Of research results also gained some room located near some of the access point are having Signal to Interference Ratio-(SIR).

1. Introduction
The current utilization of access to internet network is already widely used. Request student and lecturer for the always connected to the internet network on the rise. The number of access point installed should be able to meet the needs, but the reality that there are currently mounting point of the access point was not arranged properly, so that the laying on of access point at some locations are outside the range of the area.

In line with the development of many current technologies utilized for communication through the medium of the internet. The current wireless network has been developing very rapidly with the latest technology refers to the IEEE 802. 11n [1]. At this time there have been many schools, colleges and agencies that utilize wireless networks. In planning a wireless network we need to know the condition of the room as well as a place to placing the acess point to work optimally, and every client in every room can capture the signals properly.

A study been done by A.R. Sandeep, y. Shreyas, Shivam Seth, Rajat Agarwal, and g. Sadashivappa [2], who is researching about the comparison Log Distance Path Loss Model and Empirical Indoor propagation Model (IEPM) in layout optimization Free Wi-Fi in the R.V. college of Engineering campus in Bangalore. The simulation is done by laying the Wi-Fi network anywhere within the campus.
This research was conducted to analyze wireless network in the building of the lecture with attention to parameters: Signal level, Signal-to-interference ratio, Quantity and access point.

2. Research method

The methods used in this research is a method of experimentation through a test drive using NetSpot PRO Software. NetSpot PRO serves as the scanning software used for Wi-Fi networks with the primary SSID parameter and can keep track of the strength of the signal, the NetSpot PRO can scan an area and identify the quantity and strength of all access points in range.

Area Map – each survey site NetSpot PRO is based on the location of that want scanned. The map must be floor plans, with all of the interior walls and other obstructions are marked. The map must be drawn to the actual scale so that accurate scanning. Map area can be loaded into the NetSpot PRO from scanner or image program outside of, or a map can be drawn directly on the NetSpot PRO, using Illustrator map function.

Access point serves as a transmitter that emits radio wave signals. AP (Access Point)-the wireless access points (such as a wireless router) that allows other wireless devices (such as a computer) to connect to a local area network using radio waves.

The purpose of the research method of the experiment was to investigate the room blankspot include Signal level, signal-to-interference ratio and Quantity access point, the author did this experiment on space DPTE lecturer who was on the 3rd floor FPTK UPI as well as lecture room of electrical students are on the 4th floor FPTK UPI. These stages can be seen in figure 1.

![Flowchart](image_url)

**Figure 1.** Flowchart.

The first step to be prepared is the scanning location plan. To be used on NetSpot PRO, the plan should be in .dwg or .jpg format.
The numbering the room on the floor plan is sequentially from numbers 1 to 9. The floor plan includes all the rooms, with all interior walls and other obstructions. Floor 3th is used for lecturers and administrative rooms. The floor plan can be seen in figure 2.

Floor 4th is used for electrical engineering student classrooms. It consists of four rooms and the space in front of the rooms. The floor plan can be seen in figure 3.

The parameters examined:

Signal level is the value of the size of a computer connection to connect to the internet through a Wi-Fi network, strong signal effect with the speed of the network connection to the internet and are affected by the presence of a barrier that would keep the signal experienced the downturn.

Signal to Noise Ratio (SIR) is defined as the ratio between the power of the desired signal power noise (noise), and is widely used as a standard measure of the quality of the signals for communication systems [3]. A signal information as communication tools will experience a lot of disturbance by noise (noise), so that the signal can spoil it. Signal misbehaving suffered a decline in its quality. The quality of this signal can be determined from the value of the Signal to Noise Ratio (SIR) that is measured in units of decibels (dB). The quality of the signal can be distorted due to SIR there are many objects such as buildings, barrier walls etc.

Quantity of Access Point is the visualization to indicate the number of the access point is detected at each measurement point on the floor plan. One of the visualizations on Netspot PRO or Enterprise.
2.1. Test Drive using Netspot

A test drive is done using Netspot PRO software that has been installed on a laptop with runs on any room to the other and in a State ON to the software netspot, when doing a test drive on one of the room consists of a 6-7 point Heatmap, the author just took some SSID or that can be used by faculty and students of electro.

2.2. Data selection

After doing a test drive next the retrieved value signal in dBm or dB of some parameters obtained from netspot software including Signal level, Signal to Interference Ratio, Quantity, Frequency band Access Point coverage, PHY mode coverage, Download Speed, Upload Speed and the Wireless transmit rate. Not all parameters taken by the author so that the parameters taken by the writer there are only three parameters later related to the topics that are covered include: Signal level, Signal-to-Interference ratio, Quantity and Access Point.

2.3. Data analysis

The next step after the author specifies the parameter that is doing the analysis by means of entering a value signals into m. excel graph is then created to be easy to analyze equity SSID on the room.

3. Results and discussion

3.1. Signal Level

Signal strength can make quality reliable network, the signal level on a wireless reliability can be measured by knowing the value of a quantity specified dBm when scanning for Wi-Fi. The more positive approach the dBm value then the signal is getting good and reliable. Data retrieval is performed for 3 times and the average was taken. The results signal level from the SSID on every space lecturer FPTK electro 3rd floor can be seen in figure 4.

Based on Figure 4 the fourth access point can be seen gathered in Room 6, so only the nearest covered room i.e. Room 4, 5, 6 and 7. In an area of 1, 2, 3, 8, 9, and 10 not covered due to its distance away with 6. Should have been placed one access point between the rooms 7, 8, 9 so that the signal level is spread evenly. It is visible when a software simulation using Netspot default range set -96 dBm (minimum) and -10 dBm (maximum). If the signal level is approaching -10 dBm (maximum) then the signal level is said to be good as it approaches the maximum value. But the value of the average signal level is obtained by space 1.2 .7, 8, 9, and 10 i.e. above -60 dBm maximum value away from. The results of the signal level of each space lecturer FPTK electro floors 3 to a different SSID can be seen in figure 5.

Based on Figure 5 it can be seen that the uneven Division of the SSID on each room. The get the SSID with the value of the signal level above -62 dBm is room 3, 4, 5, and 6. Room 6 is a gathering place for the access point so that it looks to have a good level of signal and reliable. In Room 8 and 9 need to be placed in the room because of the access point is in the region of blankspot and no one of the SSID can be covered.

In accordance with the previous explanation, a good level of signal it is nearing its maximum point is -10 dBm. Future experiments conducted on FPTK 4th floor. The results signal level from the SSID on every Lecture Hall electro FPTK 4th floor can be seen in figure 6.

Based on Figure 6 can be seen there are five access points where the value of the signal level high above-60 dBm to each room, no one room is all covered by the access point. Therefore the lecture room on the 4th floor of electrical students could be said to blankspot area.

Need for the transfer of the position of the access point in the lecture room on the 4th floor of the students so that students can access the internet network. The results of the signal level of each lecture hall electro FPTK 4th floor to a different SSID can be seen in figure 7.
Figure 4. Comparison of the Signal level from the SSID on every space Lecturer FPTK Electro floor 3.

Figure 5. Comparison of the Signal Level of the Lecturer FPTK Spaces Every third floor to a different SSID.

Figure 6. Comparison of the Signal Level of the SSID on the Lecture Hall Electro FPTK 4th floor.
Based on figure 7 shows the placement of access point here not near student lecture room electro. On the SSID FPTK AP AP FPTK 4A, 2A, 3A, and AP FPTK FPTK Audit, has the most low level signal under -70dBm.

3.2. Signal to-Interference ratio
Signal-to-Interference ratio (SIR) is a comparison between strong signals with interference signal strong total. Influence of interference is calculated using the parameters of SIR in a point with a certain distance from the access point. The value obtained from the comparison of SIR Received Signal Level (RSL) received from the access point (S) with a total of interference is received on a particular observation point [4]. The results of the signal-to-interference ratio of the SSID on every space lecturer FPTK electro 3rd floor can be seen in Figure 8, and lecturer FPTK electro space each to different SSID can be seen in Figure 9.

Obtained information that can establish a connection to SIR when SIR positive tend to approach the value, the ratio is the minimum value of the dB 10-15 received to establish the connection. Based on Figure 8 and 9 have a value, value tends to be negative SIR tends to be negative is influenced by the transmission of a mutual "collided, resulting in almost a nuisance. This transmission caused by collected SSID in Room 6. 3 Lt DPTE SSID on the AP has value high and at least SIR room 2 and 3 is positive, for SSID of DPTE library on 3rd floor value is at least SIR Room 8 and 9. The values in Figure 9 is still less than the ratio of the minimum acceptable for establishing the connection.

The results of the signal-to-interference ratio of the SSID on every student room electro FPTK 4th floor can be seen in Figure 10, and every student room electro FPTK UPI for a different SSID can be seen in Figure 11.

Based on Figure 10 and 11 have the value low, which tend to be SIR on the values FPTK AP SSID 2A low-value SIR 96 dB is located in an area of 2 was caused by obstructions and position the SSID of spaces lecture, for SIR on SSID FPTK 4A tend to be among the other SSID but its value is still less than the value of the minimum SIR reliable.
**Figure 8.** Comparison of SIR from the SSID on every space Lecturer FPTK Electro floor 3.

**Figure 9.** Comparison of SIR from every space Lecturer FPTK Electro floors 3 to a different SSID.

**Figure 10.** Comparison of SIR from the SSID on every space Lecturer FPTK Electro floor 4.
3.3. Quantity of Access Point

On this parameter to indicate the number of visualization is an access point that were detected at each measurement point on the floor plan. One of the visualisasi available on NetSpot PRO or Enterprise. The results of the Quantity of Access Point 3rd floor space electro lecturer can be seen in figure 12, and to lecture room of electrical 4 floors can be seen in figure 13.

Based on Figure 12 room professors tend to be orange which means it is rated 4, on Quantity this access point has a range from 1 to 5 with sampe description purple mean 0, light blue color has the value 1, green 2, yellow 3, orange 4, and the best is Red 5. On the 8th and 9th spaces tend to be blue are worth 0. Indicates the SSID is not covered on the Room 8 and 9 as well as the front verandah room lecturer FPTK electro UPI. In addition to Room 8 and 9, in room 1 and 2 its not everything tinted color orange because it is affected by the other four SSID SSID, in an area of 3, 4, 5, 6, 7 room that has a value of 4 indicates that the room can be covered by the four SSID.

Based on Figure 13 spaces and associated electrical students, tend to be colored light blue and purple signifies the value 0 and 1. There is 1 room on 2 SSID and yet still not be said good, room lectures students of electrical is entirely to be said in the blankspot by looking at the visuals in figure 13 [5][6].
4. Conclusion
Based on testing and analysis that has been done on this research, the following conclusions can be drawn: Based on the results of the simulation are represented on the graph can be known that the signal level on the 3rd floor is uneven for the entire space, there is a buildup of electrical lecturer SSID on the one room that causes beberapa other blank spot. On the 4th floor has a low level signal values above-70 dBm causes all the room in the region blank spot. On the 3rd floor space lecturer electro tends to be negative due to gather in an area 6 SSID so that transmission of mutual "collide" yet on SSID DPTE Lt. 3 AP value is high among others SIR. On the 4th floor student space electro has the value low at all SIR due to the placement of the access points that are too far away and eclipsed by room causes all of the room can not be covered by the Access Point.

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