

Multi perspective Analysis the WiFi Performance and Evaluation: Case Study Songkhla Rajabhat University

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ABSTRACT

This paper presents the concepts of the Wi-Fi device implementation. The data collected from the measurement of quality and stability of broadcasting signals, single and multi-channels of access point, at the computer center building, Songkhla Rajabhat University. Moreover, the research analyzed content analysis of interviewed data from administrators, lecturers and students in the university. The result demonstrates that both single and multi-channel have no significant difference in terms of signal quality. However, the results show that the suitable implementation Wi-Fi devices should consider technical perspective, organizational perspective and personal perspective as well.

Keywords: Access Point, Multi-Channel, Multiple perspective.

I INTRODUCTION

Today, most of the Internet Service Provider designed and installed the access points for broadcasting wireless signal in public area. The devices were developed for transmitting both single channel and multiple channels. Most universities have invested to install wireless Internet system infrastructure to increase the efficiency of services provided across every point in the university. Songkhla Rajabhat University, which is located in the main campus in Songkhla province. There is a need to invest in modern technology and equipment installation (Tongkaw, 2013). However, the quality of wireless Internet service in Songkhla Rajabhat University is poor. In addition, it is still has problems related on the stability of the service. According from these points, there is a need to determine the main key factors that contribute to the problem in any perspectives concerning the connection of the Wi-Fi to conceptualize the solution.

Currently, Songkhla Rajabhat University has installed a wireless access point covered 60% of area including inside all buildings. The WiFi devices were set up and provide wireless network services with many access points to facilitate the students, lecturers, and staffs of the university. To ease the operation, the performance of the wireless network in the campus such as test strength and speed of data transmission will be monitored by the computer Center. To increase the

performance of the service, the Center need to provide the real-time monitoring and assess the wireless system performance report. Through the use of testing for speed and signal strength of the wireless network, the access point can be measured. By testing for speed and signal strength of wireless networks, the access point each of which is measured in decibels (db) stability testing of network access between each point across Songkhla Rajabhat University. This research is a part of the project that provided the concept of measurement and installation in the current status.

Although, a Wi-Fi indoor research proposed that WiFi-based positioning approach can achieve one meter accuracy without any hardware change in commercial WiFi products, which is much better than the conventional solutions from both academia and industry concerning the trade-off of cost and system complexity (Yang & Shao, 2015), Songkhla Rajabhat University implemented WiFi both indoor and outdoor. This research may be useful to the University in terms of planning installations wireless networks in the future, and to optimize the service sustainable.

The objective of this research is to identify the key factors of the problems in the installation of a wireless network of Songkhla Rajabhat University, to create a conceptual framework for the installation of a wireless network in Songkhla Rajabhat University, and join information that helps to improve system planning and installation of a wireless network for the project in the near future. This paper will outline the research method and briefly describe the research study including the Technical system, Organization system and Personal system, as well as outlining the research results and discussion.

II RESEARCH METHOD

Mixed methods take advantage of using multiple ways to explore a research problem. Data collection can involve any technique available to researchers. Moreover, the interpretation of mix methods could be continual and can influence stages in the research process. Therefore, to conduct this research, the researchers used mix methods because of research that can be studied in depth by collecting data from both quantitative and qualitative data. Both types of data could support each other to describe the concept or framework deeply which will be the new knowledge research (John W. Creswell, 2007).

Maya Lin (2007) conducting research in regards to IVT in schools use qualitative research methods. Many researches can collect in-depth information from the relevant target groups. The researchers will be involved every step of the process data. The data analysis used in this study, the researchers analyzed data template (Template Analysis), because it can analyze data from a wide range of target groups (King, 2004).

A. Multiple perspective Model

This research introduced and employed Multi perspective model, a model was developed in the USA by Linstone (2002) in order to check the installation of the IT organization, a complex of installing IT systems. Songkhla Rajabhat University was held that the brand of access points are expanding rapidly. That cause the complex system network architecture in particular building such as the energy systems, as well as those related to the entire system.

Multiple perspective model is a model that may be taken from the perspective of three areas: Organization system, Technical System and Personal System were analyzed for factors associated with the development of the entire system. The Multiple perspective model, which may also explain the concept of systems thinking.

B. TOP Model

Researchers in England Professor Wood River's Cooper and colleagues (A. T. Wood-Harper, Steve, J. R. G. Wood, & Heather, 1996)(Wood-Harper et al., 1996) using the Multiple perspective model in the May issue of the installation of the IT organization. Results of the research showed that the Organization system (O) and a Personal System (P) are overlapping with Technical Systems (T) also note factors of issues related to corporate Organization system (O) and the related Personal system (P) can be used to help solve the problem of complex IT systems have also Fred Hendrix Sun (Fredriksson, 2008) researchers from Australia.

Cooper has used Multiple perspective model in the May issue of the installation of IT departments in educational research activities keeping in mind the condition guidelines and other factors that develop IT systems have the effect of driving to school, which research has shown that factors outside the school. Within the study, the researchers analyzed the factors that occur at different levels. A highly addition can be used Multiple perspective model to study the problem of installing IT systems in government departments and the private sector make aware of the installation of all IT systems (Metcalf & Hobson, 2001). The problem arises from the plan it at different levels down to the level practitioners. Moreover, Multiple perspective model can use to test the installation of IT

systems. The model is a clear pattern in the factors of the problem. The model can also explain the problem of complexity involved in the technical organization and the people involved in that project. The Multiple perspective model may also explain the depth of the problem in the culture of the organization as well.

III RESULTS AND DISCUSSION

The results could be separated into three parts: Technical perspective (T), Organizational perspective (O), and Personal perspective (P). The details show as following:

A. Technical Perspective :

To test the strength the signal and the brand of access point, this research collected WiFi signal measurement data by using two WiFi application software types. The WiFi signal was tested by using Homedale 1.41, showed in Figure 1, WiFi Analyzer 3.5.2, showed in Figure 2, SIP phone Application (Zoiper), Ekahau Heatmapper, and WireShark showed in Figure 3. The test was repeated by 5 minutes gap in the same access point for five times.

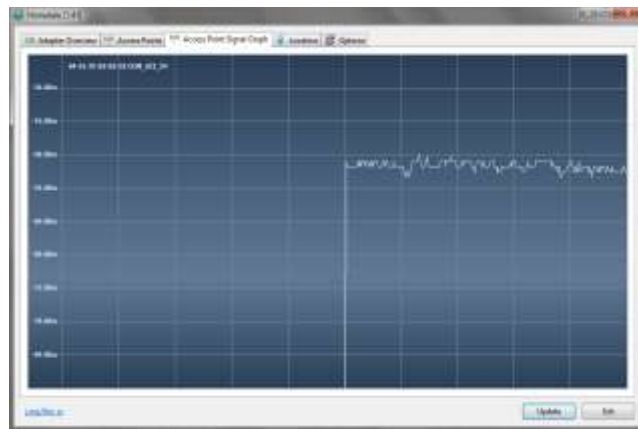


Figure 1. A Homedale 1.41 program shows AP Signal Graph

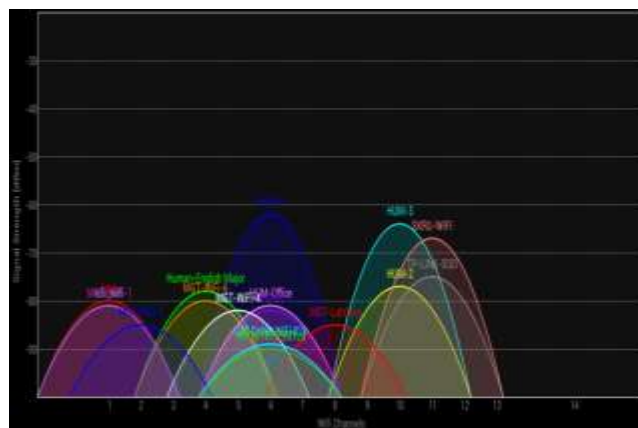


Figure 2. A WiFi Analyzer 3.5.2 program shows AP Signal Graph

Figure 2 shows that the various signal of each access points appeared in different colors and the moving

graph because it is not stable, they are moving during the testing device move around.

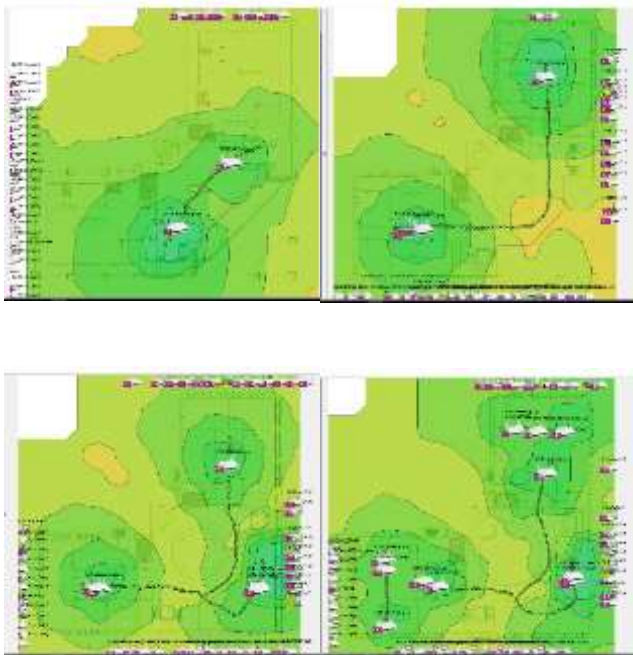


Figure 3. An Ekahau Heatmapper program shows AP Signal Graph

To test the strength of the signal, this research used Ekahau Heatmapper software to show the intensity of the signal in space per square meter, the software was installed in the notebook together with software WireShark which used to trap packet of SIP phone application. The process of testing signal, this research used a smart phone and a notebook detected the signal simultaneously when moving from one point to another point. When moving mobile receiver away, the broadcast signals are weak and the receiver signal will try to attach another point. This research capture the signal every 3-meters. Figure 3 shows signal level of service Hotspot (WiFi) signal of each floor of the building.

Strength of the signal is divided into four levels, showed in Table 1.

Table 1. The strength of signal

DB	Stability	Color
(-40db) to (-35db)	Very good	Dark green
(-48db) to (-40db)	Good	Green
(-56db) to (-48db)	Moderate	Yellow-Green
(-64db) to (-56db)	Low	Orange

The results showed that the test signal level, which is in moderate and very good, made effective use of the Internet.

Test using software that needs the stability of a VoIP network with software SIP phone Application (Zoiper) to dial into the phone system within the university. By connecting through Hotspot (WiFi) and data capture software WireShark sample data for the SIP protocol contains : No., Time, Source, Destination, Protocol, Length, Info. Example shows in Figure 4

No.	Time	Source	Destination	Protocol	Length	Info
50	5.844141000	172.17.160.22	172.17.3.29	SIP/SDP	924	Status: 200OK
Frame 50: 924 bytes on wire (7392 bits), 924 bytes captured (7392 bits) on interface 0						
Ethernet II, Src: LiteonTe_38:f1:3d (74:e5:43:38:f1:3d), Dst: RealtekU_5f:c9:a0 (52:54:00:5f:c9:a0)						
Internet Protocol Version 4, Src: 172.17.160.22 (172.17.160.22), Dst: 172.17.3.29 (172.17.3.29)						
User Datagram Protocol, Src Port: 61234 (61234), Dst Port: 5060 (5060)						
Session Initiation Protocol (200)						

Figure 4. SIP packet data of SIP phone application

For single channel, information from software WireShark able to create and implement the IO Graph graphing the relationship between the number of packets of Figure 5.

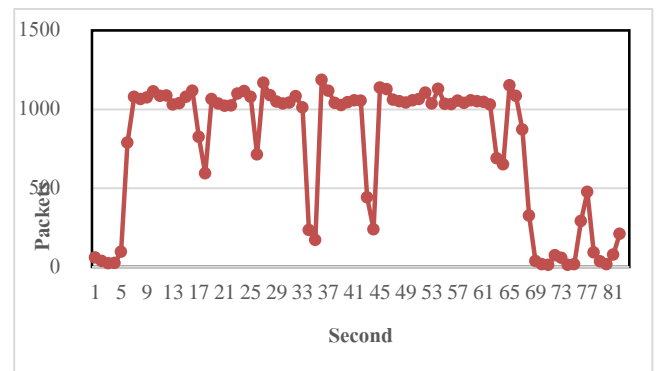


Figure 5. Single channel data send – receive using a SIP protocol

As a result of the summary data with software WireShark, data was sent – received continuously from first floor to the fourth floor, with a low data point is at 330-340 second for first time and for second time is at 420-430 second, where the second signal is low.

For multi channel Information from software WireShark able to create and implement the IO Graph graphing the relationship between the number of packets of Figure 6.

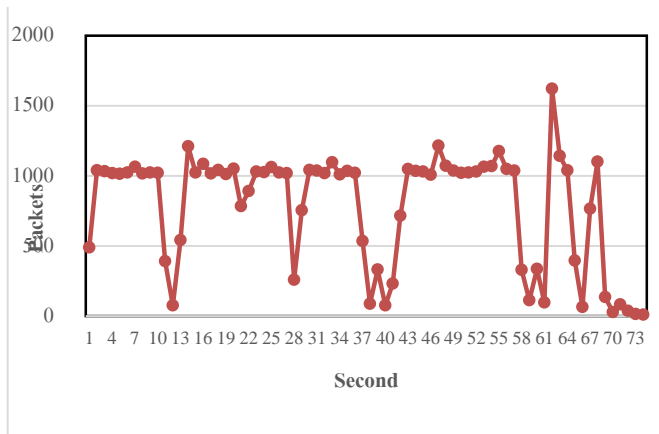


Figure 6. Multi-channel data send – receive using a SIP protocol

B. Organizational perspective (O)

The organization perspective focused on the policy of authentication lecturers, students, and guests. The university should create policy of installation for example the new WiFi devices. They should register and set up the network properly and they should not allow illegal access point installation. Moreover, in the past the university was contact by private ISP who would like to install their private access point. However, many problems come with the implementations for instance, the slow access and the balance of the traffic. Therefore, private ISP needs to have allowance to install. The recommendation is the new SSID on access point needs to set the configuration design by computer center only.

C. Personal perspective (P)

The personal perspective of the research came from interview administrators and staffs data, the provider of the wireless network. Some areas, which are not public areas, have trouble bringing access point to install. The services of illegal installments of private access point are cause-effect irritating signal overall Internet services cover Songkhla Rajabhat University. For public areas, the services are limited, so, administrators try to use software to help monitor. In running process, since 2009, number of the access points in process of broadcast service, are nearly 30, but the current rise up ten times, because of increasing of mobile devices. The demand of Internet access is higher. However, the number of devices is limited and the design is require to fit the budget.

For good quality services, Computer Center needs to add a number of access point equipment, but the research found out that in some areas, including the auditorium and active activities, there is a limit number of access points. Moreover, the access points did not suitable for public areas and they are not meet the Internet requirements. In addition, some specific applications may not be compatible with the access point. Then, the service administrators need to prepare

a budget proposal for the year. However, due to the limited number of administrator, as a result, the Internet services may not actives in some area. Currently, the supply of access points for installation is about 150, to serve area that covers the campus. The projects proposed to add high quality signal distribution equipment for areas with dense of access point numbers.

In the service, adding a number of access point in the area with out consider Multi perspective cannot make efficiency work because the signal through the network need to set the configuration. The more important thing to do is consider the budget for the core infrastructure for the distribution area. The installation of signal distribution must have access to the Internet signal to the above points and must be designed better services and network security.

This research can create a conceptual framework to guide research to improve and modify the installation of a wireless network at Songkhla Rajabhat University. It is also important for the referee to administer and manage technology in Songkhla Rajabhat University. The data allows the development of wireless networks in Songkhla Rajabhat University to be effective and sustainable. Moreover, this case study of Songkhla Rajabhat University showed the concepts of implementation to the staffs. Therefore, the staffs have implementation knowledge about how to install a wireless network within the university efficiently. And the findings have to be published for people who want to solve problems in installing wireless networks for the future.

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