



**Faculty of Information and Communication Technology**

**ENHANCING PERFORMANCE OF WLAN AT KPTM BATU  
PAHAT USING CHANNEL ASSIGNMENT**

Noor Atiqah Binti Fatahurahman

Master of Computer Science  
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**ENHANCING PERFORMANCE OF WLAN AT KPTM BATU PAHAT USING  
CHANNEL ASSIGNMENT**

**NOOR ATIQA BINTI FATAHURAHMAN**

**A thesis submitted  
in fulfillment of the requirements for the degree of Master of Computer Science in  
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2016

**DECLARATION**

I declare that this thesis entitled “Enhancing Performance of Wireless Local Area Network (WLAN) at KPTM Batu Pahat using channel assignment” is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature : .....

Name : .....

Date : .....

## APPROVAL

I hereby declare that I have read this thesis and in my opinion this thesis is sufficient in term of scope and quality for the award of Master of Computer Science in Internetworking Technology.

Signature : .....

Supervisor Name : .....

Date : .....

## ABSTRACT

Nowadays, Wireless Local Area Network (WLAN) has been growing rapidly in the world, especially in business and education institutions. There are much type of wireless technology on the market today such as Institute of Electrical and Electronics Engineer (IEEE) 802.11a, b, g, and n series. WLAN generally consist of a central point connection called an Access Point (AP). It is the same function as hubs or switches in a star topology-based, traditional wired networks in the local area network. The Access Point (AP) can transmit data between different node of the wireless local area network and it serves as the only connection between wireless LAN and wired LAN. The rapid development of WLAN campus, it is easier for the lecturers and students gain access to targeted information anytime and anywhere. WLAN is also caused the lecturers and the students depend on WLAN to access the information anywhere. Besides that, WLAN provide great freedom and enables users to communicate and facilitate the users to communicate without special sitting at the computer. WLAN has become a very important part in university and campus life for student and lecturers. This project wants to identify the issue arise from the use of WLAN from the perspective of user and particularly from the perspective of student and lecture. There are many issues in the implementation of WLAN in Kolej Poly-Tech MARA (KPTM) Batu Pahat, which is the coverage of WLAN limited to access, slow connection, sometimes it can be shared sometimes not and the number of APs do not support the number of existing users. This project also want to investigate about the coverage of WLAN, the channels used and channel overlapping in the Kolej Poly-Tech MARA (KPTM) Batu Pahat. In addition, this thesis aims to improve the performance of wireless networks in the Kolej Poly-Tech MARA (KPTM) Batu Pahat.

## ABSTRAK

Pada masa kini, Wireless Local Area Network (WLAN) telah berkembang pesat di dunia, terutama di institusi perniagaan dan pendidikan. Terdapat banyak teknologi tanpa wayar di pasaran hari ini seperti Institut Jurutera Elektrik dan Elektronik (IEEE) siri 802.11a, b, g, dan n. WLAN umumnya terdiri daripada sambungan titik pusat yang dipanggil Pusat Akses (AP). Fungsinya adalah sama seperti hub atau suis dalam berasaskan topologi-, rangkaian berwayar tradisional bintang dalam rangkaian kawasan tempatan. Access Point (AP) boleh memindahkan data antara nod yang berbeza rangkaian kawasan setempat tanpa wayar dan ia berfungsi sebagai satu-satunya hubungan antara LAN berwayar. Pembangunan pesat kampus WLAN, ia adalah lebih mudah untuk pensyarah dan pelajar mendapat akses kepada maklumat yang disasarkan pada bila-bila masa dan di mana sahaja. Pensyarah dan pelajar-pelajar bergantung kepada WLAN untuk mengakses maklumat di mana-mana sahaja. Selain itu, WLAN memberi kebebasan yang besar dan membolehkan pengguna untuk berkomunikasi dan memudahkan pengguna untuk berkomunikasi tanpa persidangan khas di komputer. WLAN telah menjadi sebahagian yang sangat penting di universiti dan kehidupan kampus untuk pelajar dan pensyarah. Projek ini mahu mengenalpasti isu yang timbul daripada penggunaan WLAN dari perspektif pengguna dan terutamanya dari perspektif pelajar dan kuliah. Terdapat banyak isu-isu dalam pelaksanaan WLAN di Kolej Poly-Tech MARA (KPTM) Batu Pahat, yang merupakan liputan WLAN terhad kepada capaian, sambungan perlahan, kadang-kadang ia boleh dikongsi kadang-kadang tidak dan jumlah AP yang tidak menyokong bilangan pengguna yang sedia ada. Projek ini juga mahu menyiasat mengenai liputan WLAN, saluran yang digunakan dan saluran bertindih di Kolej Poly-Tech MARA (KPTM) Batu Pahat. Di samping itu, tesis ini bertujuan untuk meningkatkan prestasi rangkaian tanpa wayar di Kolej Poly-Tech MARA (KPTM) Batu Pahat.

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- **INTRODUCTION**

- **1.1 Background Introduction**

Nowadays, Wireless Local Area Network (WLAN) has been growing rapidly in the world, especially in business and education institutions. There are much type of wireless technology on the market today such as Institute of Electrical and Electronics Engineer (IEEE) 802.11a, b, g, and n series. This wireless networking technology designed for simple data transfer in the area of 100-300 square feet. This wireless networking technology has replaced the wired network and has now been widely used in education centers such as universities and colleges. This wireless network provides the same capability and speeds compare able to wired

10BASE-T, without the problems associated with set up the wire, drill into walls to install wires or install Ethernet cables throughout an office building at a university and college.

WLAN generally consist of a central point connection called an Access Point (AP). It is the same function as hubs or switches in a star topology-based, traditional wired networks in the local area network. The Access Point (AP) can transmit data between different node of the wireless local area network and it serves as the only connection between wireless LAN and wired LAN. Typically, the Access Point (AP) can handle some number of users within 100 - 300 feet. Wireless nodes also known as WLAN clients which usually consist of Desktop PC, laptop or Personal Digital Assistant (PDA) equipped with wireless interface cards and also students or lecturers that use tablet or smartphone.

Liang (2011) and Dai et al. (2012) the researchers have reported that campus development WLAN is very important in the life of the campus, as lecturers and students for access to resources and data. It is also important to the students, faculties, social, academic and business activities associated with the administrative staff at universities. With the rapid development of wireless technology, lecturers and students to campus relies heavily with WLAN, as to get information on "anytime and anywhere" has become the majority of the demand for teachers and students.

Ranjini, R. Yamuna (2011) and Dai et al. (2012) concluded that the Wireless Local Area Network (WLAN) be more convenience and easier to access information everywhere. The rapid development of WLAN campus, it is easier for the lecturers and students gain access to targeted information anytime and anywhere. WLAN is also caused the lecturers and the students depend on WLAN to access the information anywhere. Besides that, WLAN provide great freedom and

enables users to communicate and facilitate the users to communicate without special sitting at the computer. WLAN has become a very important part in university and campus life for student and lecturers.

WLAN has been implemented in Kolej Poly-Tech MARA (KPTM) Batu Pahat to help students and lecturers to access information quickly and easily at any of us are. This thesis wants to identify the issue arise from the use of WLAN from the perspective of user and particularly from the perspective of student and lecture. There are many issues in the implementation of WLAN in Kolej Poly-Tech MARA (KPTM) Batu Pahat, which is the coverage of WLAN limited to access, slow connection, sometimes it can be shared sometimes not and the number of APs do not support the number of existing users. This thesis also want to investigate about the coverage of WLAN, the channels used and channel overlapping in the Kolej Poly-Tech MARA (KPTM) Batu Pahat. In addition, this thesis aims to improve the performance of wireless networks in the Kolej Poly-Tech MARA (KPTM) Batu Pahat.

- **1.2 Research Background**

These days, WLAN also provides to industry demand increased very rapidly in demand access wireless broadband recently. This wireless technology increases the number of mobile phone and laptop in the workplace. Since the use of the 802.11 standard Wireless Local Area Network (WLAN), network performance becomes a very significant concern because of the use of performance WLAN access point (AP). Wired network cannot increase the network capacity by simply moving the equipment so easily.

Study of Chatterjee et al. (2012) show the importance of the issue about coverage of WLAN Access Point (AP) which is limited. Each laptop and phone must be connected to the access point (AP) to ensure that all equipment can communicate with each other regardless of their mobility. When the equipment is moved into the current AP coverage area, no special techniques are necessary to maintain the relationship but when the device moves out of the coverage area of the current APs and it will try to connect with other AP, it's a delay in the submission of the connection that leads to loss of the network connection.

Zhou et al. (2013) show that coverage optimization become big challenge in deployment of WLAN. The researcher proposed a solution to self-optimization coverage performance with adjust the power of each beam AP and Received Signal Strength (RSS) and Signal to Interference ratio (SIR) of the sensor. With this solution, the researchers able to improve the performance of coverage and saving cost.

Overlapping eventually make more users within the same coverage area with some AP. AP placement require different frequency channels between neighboring AP to operate in order to avoid co-channel interference within APs. In addition, to increase capacity, the Access Point (AP) must be assigned the appropriate channels and consumers need to make intelligent decisions about which AP to associate with. Furthermore, the decision on the channel assignment, and unity must be based on a global view of the entire campus WLAN, from the point of view of the individual local clients or AP.

Study of Abbasi et al. (2011) show that the importance of the issues channel assignment to minimum availability of orthogonal channel of WLAN. The authors find an efficient method to utilize channel overlap of 2.4 GHz band, was achieve high throughput to minimum

interferences within backhaul and directional antennas. The researchers propose channel assignments that have the limited number of channels, the concept to assign the sets of channels to connect in the interference area of each node, where the nodes are works with directional antenna. The study has found by (Abbasi et al., 2011) that can decrease the channel interference and increase the throughput.

In a study conduct by (Tewari and Ghosh, 2014), it was shown that the frequency assignment and the association control entertainment be an important roles and its should be considered simultaneously to improve the network performance. The researcher use greedy algorithm that deal with the frequency assignment and the association control to increase the throughput.

This thesis, use inSSIDer software and AirCheck™ Wi-Fi Tester tool to analyze the coverage of each AP. The software can check channels which AP is configured and to identify overlapping networks. In addition, AirCheck™ Wi-Fi Tester will also be used to study the tester to make sure the data can use the software inSSIDer is accurate. When the network overlapping happens, WLAN performance will be of the network reduced. After receiving data from the software, the data will be analyzed and then their new settlement campus WLAN AP to use the network simulation.

- **1.3 Problem Statement**

KPTM Batu Pahat is one of the campuses that developed WLAN. There are many issues in the implementation of WLAN in Kolej Poly-Tech MARA (KPTM) Batu Pahat, which is the coverage of WLAN limited to access, slow connection, sometimes it can be shared sometimes