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Analysis of Wireless Local Area Network (WLAN) at Sirajul Falah Vocational School, Parung, Bogor

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ABSTRACT

The world of education is currently increasingly prioritizing technology in facilitating and developing the teaching and learning process, such as the Wireless Local Area Network (WLAN) at Sirajul Falah Parung Bogor Vocational School which utilizes technology and computer networks to facilitate the responsibilities and duties of staff, teachers and school principals . Wireless Local Area Network (WLAN) is a computer network that is connected using conducting media (non-cable) using frequencies and standards according to wireless network standards. This research uses observation research methods, interviews and literature studies with the aim of finding out the working system of the Wireless Local Area Network (WLAN) at Sirajul Falah Vocational School Parung Bogor and overcoming the deficiencies found such as poor security systems and user management which often results in a large number of users who illegally used the Wireless Local Area Network (WLAN) at Sirajul Falah Vocational School Parung Bogor which also caused other connection problems. One solution that can be taken to overcome the problems found is to carry out management on the Wireless network, namely activating a different username and password feature for each user who is allowed to access the Wireless Local Area Network (WLAN) network at SMK Sirajul Falah Parung Bogor.

Keywords: Computer Network; WLAN; Network Security; Wireless

INTRODUCTION

In the current era of digitalization, humans are very dependent on technological developments. The current very rapid development of technology cannot be

avoided. Technology now plays a role in various aspects of life, including in the field of education. For the world of education, technology currently has its own role and benefits for students, teachers and existing staff, especially in the use of computer networks(Hendrastuty et al., 2022). A computer network is a group of computers that are connected using protocols and communication media(Kusrini et al., 2023).

Computer networks have two transmission or connecting media, namely using cable media as a connecting medium so that each computer device can communicate with each other, along with the development of technology and human needs for mobility and flexibility. Wireless technology is here to provide the answer, where wireless technology offers various conveniences, freedom and high flexibility(Sumardi et al., 2018). Wi-Fi is a network technology that uses cables as a transmission medium by utilizing electromagnetic radiation or radio waves(Artawan et al., 2021). Computer network connections are fundamental in a network. When the network connection is disrupted then all activities on the network will be disrupted as well(Son, 2020).

Sirajul Falah Vocational School Parung-Bogor is one of the schools that applies computer network technology, namely Wireless Local Area Network (WLAN) to help connect every computer of staff, teachers, principals to computers in the lab to facilitate teaching and learning activities and work assignments. there is internet access. Apart from that, the internet has now become a lifestyle in society, in the world of education the internet has also begun to be used to become an alternative medium for finding sources of knowledge other than books.(Rachawati & Christiana, 2022).

Internet access on the Wireless Local Area Network (WLAN) which is sourced from the computer lab and distributed to all users at Sirajul Falah Vocational School Parung-Bogor still has shortcomings in terms of Wireless Local Area Network (WLAN) network management, poor wireless network security systems and Inappropriate placement of wireless network devices causes uneven internet access. Network security is very important in order to monitor ongoing network access and prevent misuse of resources(Santoso, nd). In network management, one of the areas of concern is policy or security so that the existing system runs well(Ditama et al., 2018).

Seeing this, in this research the author conducted research on Wireless Local Area Network (WLAN) Analysis at Sirajul Falah Parung Bogor Vocational School, by implementing user access management using the user profile feature on the hotspot gateway of the Mikrotik router. A router is a device that has the function of connecting two networks that have differences in the OSI layer(Rahadjeng & Ritapuspitasari, 2018). Mikrotik is a computer network device in the form of hardware and software that can function as a router, filtering tool to switching to user management functions to increase security on the network by creating an account for each user.(Amarudin & Ulum, 2018). Apart from that, the DAPQaqt

Mikrotik is used to regulate internet data traffic and perform filters (Wirabakti et al., 2018)

RESEARCH METHOD

In this research, the author used several research methods as follows:

1. Observation method, namely the author carried out data collection by directly observing the Wireless Local Area Network (WLAN) at Sirajul Falah Vocational School Parung Bogor.
2. Interview Method (Interview), the author collected data by conducting interviews or asking questions directly to Mr Herman Hardiansyah, SI as head of the Computer Lab at SMK Sirajul Falah Parung Bogor, as well as to staff, teachers and students.
3. Literature study, collecting data by reading, studying, from books, scientific articles and other reference sources.

RESULT AND DISUSSION

The Wireless Local Area Network (WLAN) network at SMK Sirajul Falah Parung Bogor is currently intended for staff, teachers and school principals. Meanwhile, students can access the internet network only through the computer lab. Apart from that, there are several analyzes that the author has carried out, including:

1. Network Scheme

The network scheme of the Wireless Local Area Network (WLAN) at SMK Sirajul Falah Parung Bogor can be seen in Figure 1.

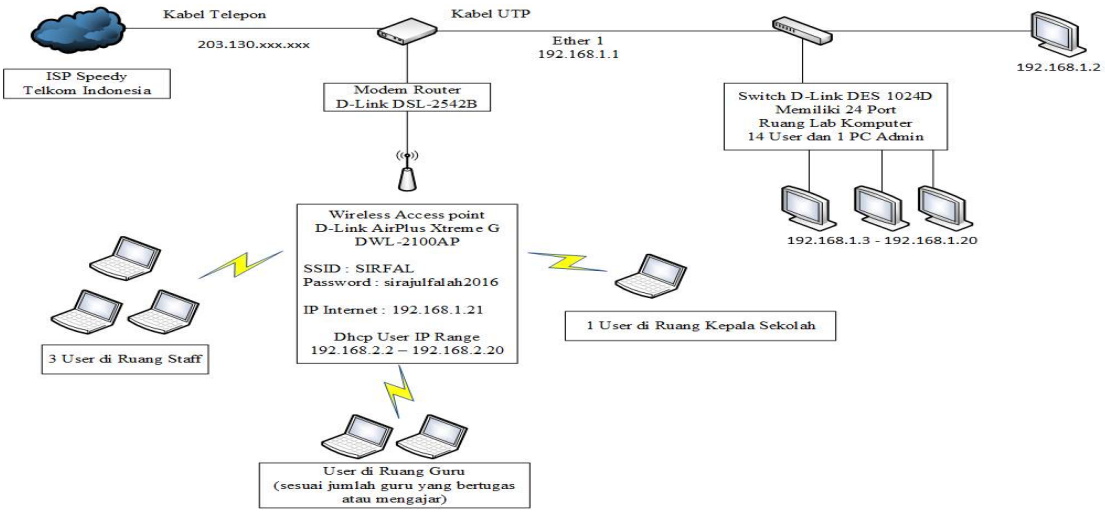

Figure I. Network Scheme of Sirajul Falah Vocational School, Parung-Bogor
Source: IT Staff of Sirajul Falah Vocational School, Parung-Bogor

The information that can be taken from the network scheme at Sirajul Falah Vocational School, Parung-Bogor is as follows:

a. The ISP (Internet Service Provider) on the network at SMK Sirajul Falah Parung-Bogor uses Speedy with a bandwidth of 2 Mbps. Serves as an internet access service provider.
b. Uses 1 ADSL modem which functions as a link between the ISP (Internet Service Provider) and the switch and access point devices. The adsl modem used is the D-Link DSL-2542B type which has 4 ethernet ports.
c. The network at Sirajul Falah Vocational School Parung-Bogor uses 1 switch, which is used as a central switch which functions as a link between the adsl modem and the Admin PC (Personal Computer) and client PC (Personal Computer) located in the computer lab room at Sirajul Falah Vocational School Parung-Bogor . The switch used is a D-Link DES 1024D which has 24 ethernet ports.
d. 1 Wireless access point which functions to connect clients connected via wireless media to the network at Sirajul Falah Vocational School, Parung-Bogor. The wireless access point used is the D-Link AirPlus Xtreme G DWL-2100AP.
e. 1 admin PC which functions to manage or configure network traffic at Sirajul Falah Vocational School, Parung-Bogor.
f. The client functions as a user of the Sirajul Falah Vocational School Parung-Bogor network services. The clients connected to the Sirajul Falah Parung-Bogor Vocational School network are:
    1) 14 PCs (Personal Computers) in the computer lab at SMK Sirajul Falah Parung-Bogor. Which is connected to a network using cable transmission media (LAN).
    2) 3 laptops connected via wireless transmission media (WLAN) at SMK Sirajul Falah Parung-Bogor in the staff room. Used by administrative staff, financial staff and other staff.
    3) The number of teacher laptops depends on the number of teachers on duty at that time, so the exact number cannot be stated. The teacher's laptop is connected to the network via wireless transmission media (WLAN) at Sirajul Falah Vocational School, Parung-Bogor. The teacher's laptop is located in the teacher's room.
    4) 1 laptop used by the principal in his room is connected to the network of SMK Sirajul Falah Parung-Bogor. The principal's laptop is also connected via wireless media.
g. The cable used to connect all the devices that form the network at Sirajul Falah Vocational School Parung-Bogor is a twisted pair cable, namely UTP Cat 5e cable and uses RJ 45 as the connector, while the cable that connects the ADSL modem to the ISP is a telephone cable.
h. The wireless network (WLAN) at Sirajul Falah Vocational School, Parung-Bogor uses the 2.4 GHz frequency and uses the 802.11g standard.

2. Proposed Network

Based on analysis carried out by the author on the Wireless Local Area Network (WLAN) network at SMK Sirajul Falah Parung Bogor. The author proposes an application*access management*The user uses the user profile feature on the hotspot gateway of the Mikrotik router to improve the quality of the Wireless Local Area Network (WLAN) network at Sirajul Falah Vocational School Parung Bogor. The following is the proposed network scheme that the author proposes to improve the quality of the Wireless Local Area Network (WLAN) network at Sirajul Falah Vocational School Parung Bogor, which can be seen in Figure 2.

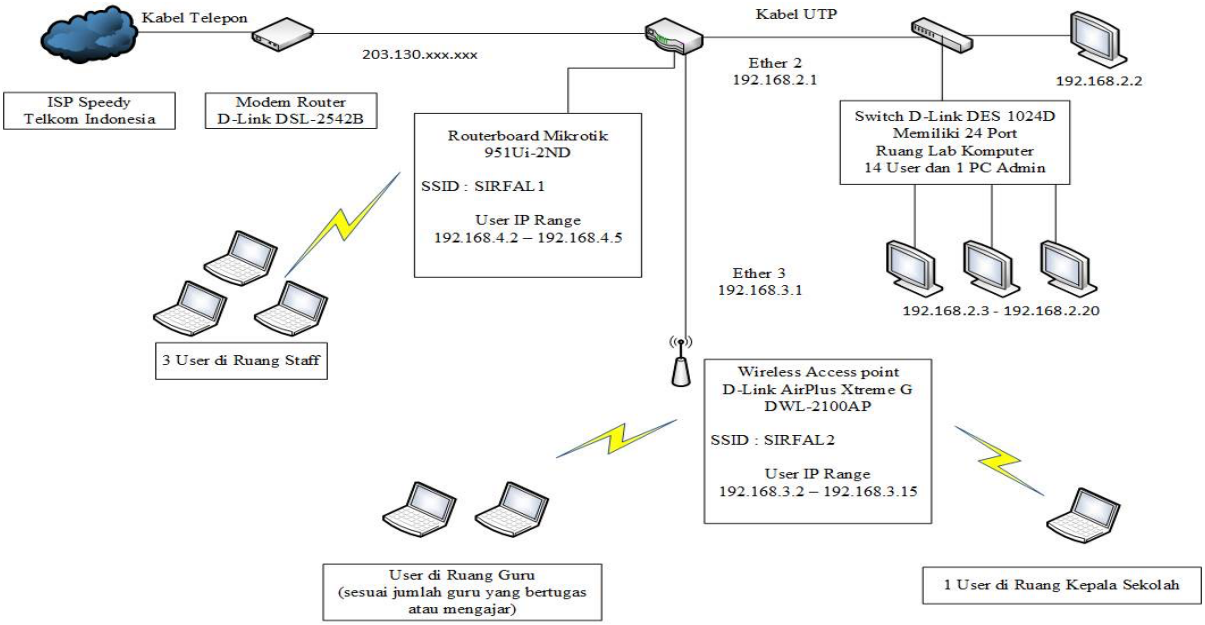

Figure 2. Scheme of the Usulah Vocational School Sirajul Falah Parung-Bogor network

Source: research (2023)

On the author's proposed network also adds a network device in the form of a Mikrotik 951Ui-2ND routerboard. Apart from adding network devices, the author also provides a proposed IP address for the Wireless Local Area Network (WLAN) network at Sirajul Falah Vocational School, Parung Bogor, as follows:

Table 1. List of IP Addresses for Proposed Networks

No	Hardware	*IP Address*	*Subnets*
1	D-Link DSL-2542B modem - Public IP	203.130.xxx.xxx	-
2	Mikrotik Routerboard 951Ui-2ND -Ether 2 -Ether 3 -Wlan1	 192.168.2.1 192.168.3.1 192.168.4.1	 255.255.255.0 255.255.255.0 255.255.255.0
3	Admin PC	192.168.2.2	255.255.255.0
4	PC user computer lab	192.168.2.3-192.168.2.20	255.255.255.0
5	Wireless Access Points D-Link AirPlus Xtreme G DWL-2100AP	192.168.3.1	255.255.255.0
6	Users connected to the Wireless Access Point D-Link AirPlus Xtreme G DWL-2100AP	192.168.3.2-192.168.3.15	255.255.255.0
7	Users connected via the Mikrotik Routerboard 951Ui-2ND	192.168.4.2 – 192.168.4.5	255.255.255.0

3. Advanced Configuration

a. Configure the user profiles feature on the hotspot gateway on the Mikrotik 951Ui-2ND router. So that later each user will have a different password to be able to connect to the SSID that has been determined for each user.

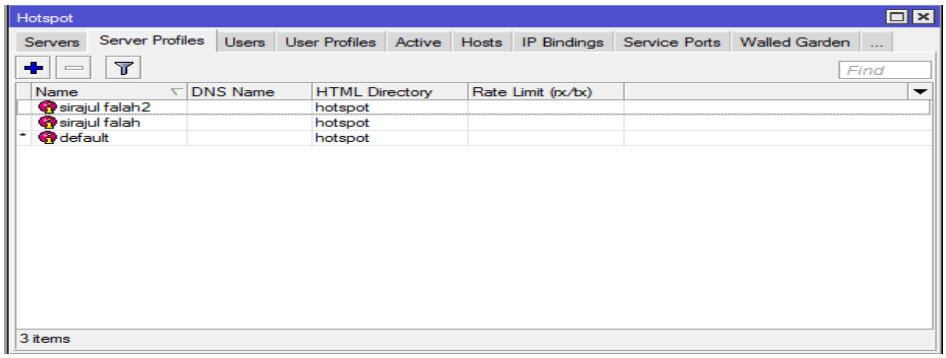

Figure 3. Steps to Configure Server Profiles for Each User
Source: research (2023)

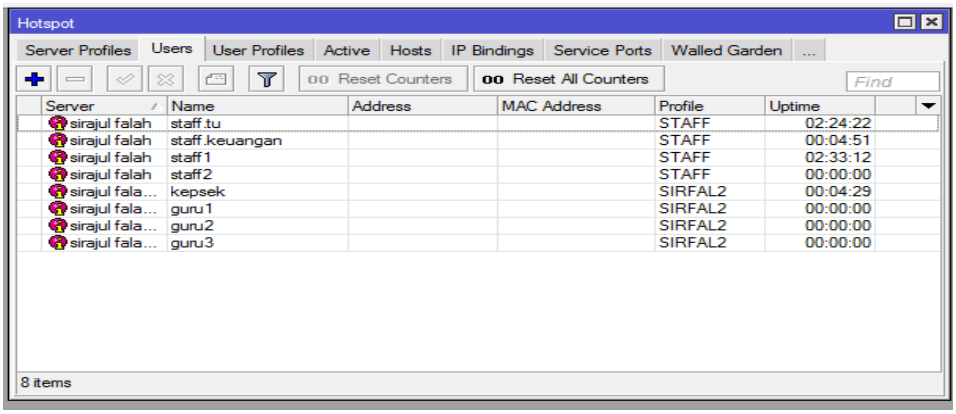

Figure 4. Configuration steps for creating wireless users
Source: research (2023)

b. The wireless access point configuration is given IP 192.168.3.15 which is the DHCP IP from the Mikrotik 951Ui-2ND Routerboard. Then the DHCP feature on the wireless access point is disabled

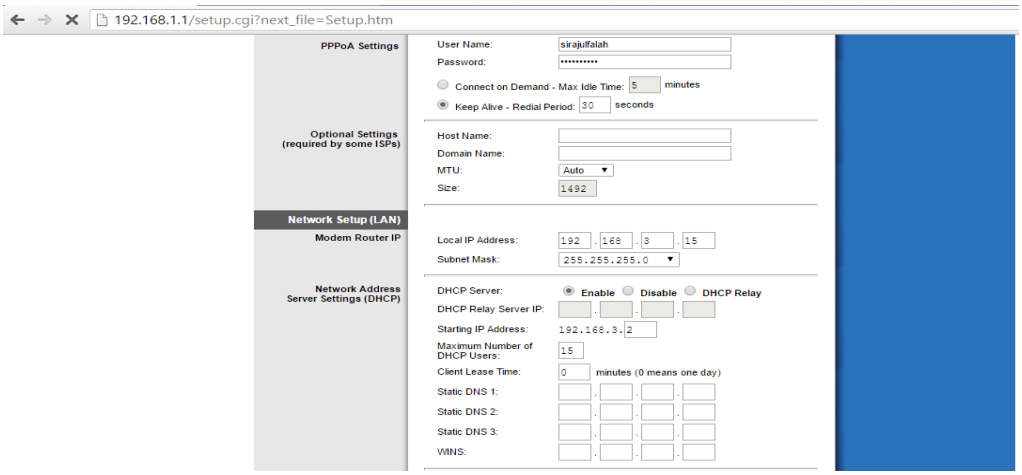

Figure 5. Wireless Access Point Configuration Steps
Source: research (2023)

4. Test result

When the configuration carried out is successful, several things will be found that are indicated by the test results on the wireless network as follows:

a. Testing the wireless SSID that has been created, where the SSID read by the user's device must match what has been previously configured on the Mikrotik routerboard

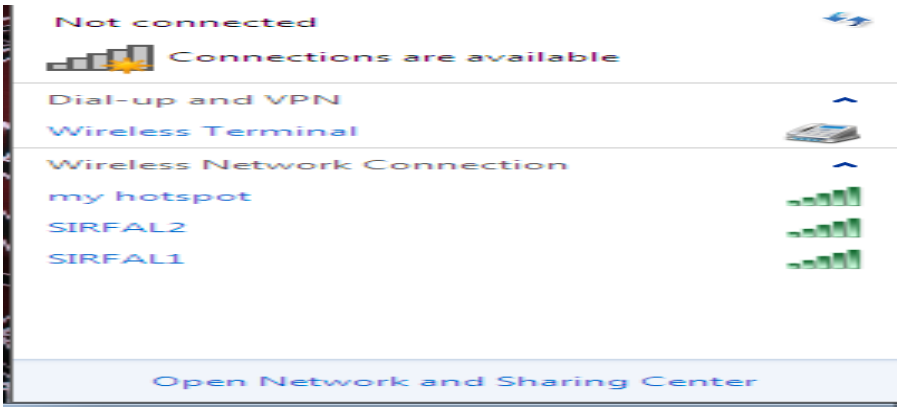

Figure 6. Wireless SSID

Source: research (2023)

b. Automatic IP address testing obtained on user devices connected to a wireless network

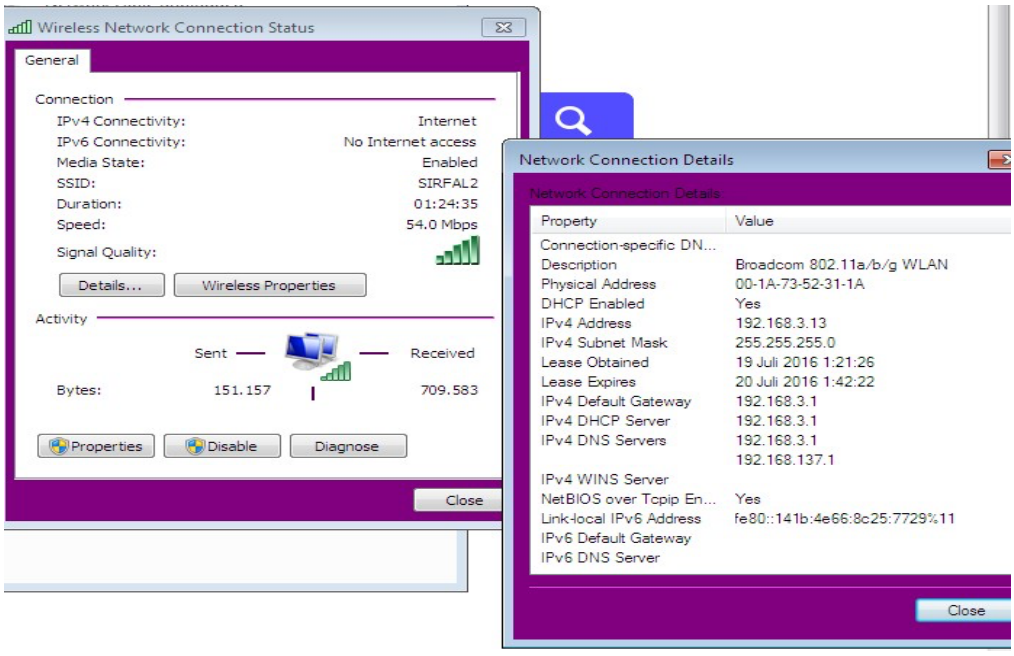

Figure 7 IP Address Checking Results

Source: research (2023)

c. If the clientwant to access the internet, they must enter the username and password that have been registered on the Mikrotik 951Ui-2ND Routerboard, as follows:

Figure 8. Results of checking the principal's user and password
Source: research (2023)

Figure 9. Results of checking financial staff user and password
Source: research (2023)

CONCLUSION

In this research regarding Wireless Local Area Network (WLAN) at Sirajul Falah Vocational School, Parung, Bogor, several deficiencies were found in network management and network security. By looking at the results of implementing user access management using the user profile feature on the hotspot gateway of the Mikrotik router on the Wireless Local Area Network (WLAN) at SMK Sirajul Falah Parung Bogor, every user who can join the network must first be registered and given a password. So implementing user access management using the user profile feature on the hotspot gateway of the Mikrotik router can be used as an alternative for problems related to poor user access, thereby disrupting network security and usage.

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