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Design and Construction of Server Hotspot Networks MikroTik Using the One User-Two Client Method in the Teacher's Room at SMK Negeri 1 Sarudik

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Internet technology has become a necessary tool in everyone's daily life in this digital era. The need for fast and easily accessible communication media has been fulfilled through internet technology. The Internet network has developed into a crucial factor in various aspects of human life, as in the fields of transportation, government, education, and others. In education, internet technology is essential for finding relevant and useful information from various sources around the world. Teachers in a school can access a wide variety of information on various topics. Therefore, every school should have provided hotspot facilities that can be accessed on every laptop and smartphone so that every teacher at the school who is waiting for their teaching schedule in the teacher's room can get internet service to support the learning process to be more efficient. Due to the large number of bottlenecks on networks that are used simultaneously, here the author created a hotspot using a MikroTik router as the main server of the hotspot network, which is divided so that everyone can access it without any problems.

Keywords: captive portal, hotspot, internet network, MikroTik

INTRODUCTION

Everyone in this era of globalization needs to be able to use and understand the latest technology in the field of networks and telecommunications because this can provide a number of benefits for us. Computer networks are commonly used by businesses to collect and process data and increase worker productivity. Computer networks are still being developed with the aim of using wireless or wireless technology. In the information age, this technology has become the standard. Bluetooth and Wi-Fi are features found in many portable devices, and both are used in the wireless data exchange process. This wireless technology is often called Wireless LAN in computer network technology. A hotspot is one or a group of WLAN or 802.11a/b/g Wireless LAN Access Points that cover a small area and allow users to connect with WLAN-enabled devices.

In general, hotspots can only be accessed in public areas. Because the antenna-based access point has not been modified, its functionality is limited to certain rooms. Devices that are outside the hotspot connection category and reach a far RT/RW-net range cannot be reached by a wireless connection on the LAN. A high level of network security is provided by hotspot networks, also known as captive portals. Data is transferred from the internal network to the external network using captive portal authentication techniques. Permissions for data traffic to which you have no access are not granted by the captive portal. Users must register first. Typically, captive portals are used on wireless networks such as hotspots. The way a captive portal works is that the user connects to the internet via Wi-Fi first, then to a DHCP server to get an IP address, and finally uses the web to connect to the captive portal and access the internet.

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According to previous research conducted by Musdalifa at SMPN 3 Mallusetasi, a computer network is a collection of computers connected to each other through communication media and communication protocols, thus enabling computers to exchange and search for information. SMPN 3 Mallusetasi's network architecture integrates three structures – teacher's room, computer lab, and office – along with one wireless access point. This facilitates information retrieval and facilitates the teaching and learning process (Musdalifa, 2019).

The aim of using a MikroTik router for user management at SMA N 1 Lareh Sago Halaban can be achieved based on the author's research findings and the explanation given in the previous chapter regarding the use of a MikroTik router to optimize hotspot server user management. Optimize bandwidth usage to ensure no additional bandwidth is lost. Well-managed bandwidth will ensure a smooth network that will not distract students from their studies.

In addition, because the author filters the network by blocking a number of websites, including Facebook, Twitter, and Instagram, students cannot access websites that are not useful for learning. In addition, by requiring a unique username and password for each user, SMA N 1 Lareh Sago Halaban will be able to prevent unauthorized users from accessing its network. The problem that the author raised in the problem formulation section has been resolved by using a proxy router. Reliable, useful, and efficient product testing results are achieved by administering questionnaires to teachers, students, and computer specialists (Rahmi, 2022).

Based on the research explained above, "Implementation of a Hotspot Network Using MikroTik on Second Home Café," it is possible to build a MikroTik-based hotspot facility on the Second Home Café network using MikroTik RouterOS. Limiting the number of users or clients who can connect to the internet via a hotspot network can be beneficial when using the MikroTik RouterOS feature. There is no trade-off of bandwidth between customers when the Simple Queue method in the MikroTik RouterOS feature is used to divide bandwidth evenly among all users.

Based on the access time specified in the voucher package, customer bandwidth usage can be limited effectively by creating a voucher package using the MikroTik RouterOS User Manager feature. As part of hotspot network maintenance, the Second Home Café cashier can monitor bandwidth traffic using the Torch and Graphing features found in the Tools menu. In 2018, Anisah Purnamasari, a teacher at SMK Negeri 1 Sarudik, a vocational highschool, can use the teacher's room facilities for lesson preparation, administrative tasks, and other needs. Currently, it is difficult for teachers to access the internet to support their work because the teacher's room lacks Wi-Fi and hotspot capabilities. Therefore, so that teachers can access the internet in their classrooms, a MikroTik-based hotspot server is needed.

MikroTik Hotspot selection is based on firewall and filtering features that allow it to control network bandwidth and security. One user-two client will be the authentication method used, so each user can access using two devices at once. This aims to enable teachers to use their laptops and smartphones to access the internet simultaneously with this method. Teachers will find it easier to support their work because of this. It is hoped that the installation of the MikroTik hotspot server can increase teacher productivity at SMK Negeri 1 Sarudik by enabling internet access in the classroom.

Additionally, teachers do not use bandwidth efficiently at school because there are no Wi-Fi routers. This is comparable to the emergence of slow connection problems caused by a relatively high number of clients on the network. The use of computer network is increasing, especially at SMKN 1 Sarudik, and this has given rise to discussions about network implementation and management. We must be able to group each network based on location and use case because each network implementation strategy varies depending on the needs of each user.

Therefore, in the description of the problem, the author shows initiative by creating a MikroTik hotspot network which functions as a data traffic controller to solve network performance problems through the use of authentication security methods involving users and passwords that will be input on a captive portal, where the author's clients limit their rights. Access for each user on two devices can prevent several users from logging in simultaneously – which is a problem that must be resolved – before hotspots can be connected to the internet via wireless LAN, but still makes it easier for customers to get internet access in the field of scientific development they are involved in. After that, the author uses a model approach. Network Development Life Cycle (NDLC), namely Analysis, Design, Simulation Prototyping Implementation, Monitoring, Management.

Furthermore, considering the situation described above, the author chose the title of the article as "Design and Building of a Mikrotik Server Hotspot Network Using the One User-Two Client Method in the Teacher's Room at SMK Negeri 1 Sarudik".

METHOD

Research Stages

To design a network system, we must first analyze its requirements. This process is known as the research phase, and continues until all tissues are functional.

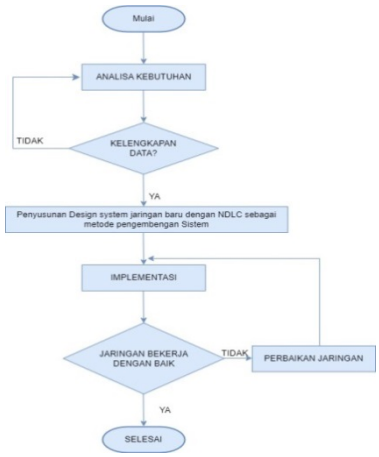

Figure 1. Design process flowchart

The flowchart explains the flow of designing and implementing the hotspot network at SMKN-1 Sarudik, which is as follows:

1. Needs analysis, at this stage the researcher starts with a field survey and analyzes all the needs to launch the hotspot network design, including software, hardware and data requirements needed in this research.
2. Data collection, at this stage the researcher begins to collect and search for the data needed for research which will soon be implemented directly at SMKN-1 Sarudik.
3. Data completeness, which is the stage of identifying all the completeness of the data we have obtained, and if all the data is complete then we can proceed to the stage of preparing a new network system design using NDLC as a system development method. However, if the data we collect is not complete then we have to start data collection again.
4. Preparing a private network hotspot system design using the one user-two client method as user management and using NDLC (Network Development Live Cycle) as an approach model for system development.
5. Implementation, namely implementing the hotspot network design directly.
6. The network is working well, and this is where we determine whether the network design we have designed is running well or not, if everything is going well then the design we have created is complete, but if not, like it or not, we have to repair the network until it really works well.

Study Theory

a. Captive Portal

Verification By requiring users to authenticate with the server and then navigate to a web page where they can log in to the hotspot for users who have registered as authorized users, Captive Portal aims to prevent users from accessing the internet. Users can resume regular internet access after successful login. According to Sharma and Benith (2014), the Captive Portal authentication method uses a dynamic firewall that by default denies access to unauthorized users. The authentication method for Captive Portal reacts to each Hypertext Transfer Protocol (HTTP) request. from users through web browsers by offering web pages that help verify the identity of genuine users. The Media Access Control address (MAC address) of the user's WLAN Network Interface Card (NIC) is registered in the portal after the user logs in with the correct username and password, and the user data transfer process

is then routed normally.

b. Hotspot

A hotspot is a physical location where people can access the Internet, usually using Wi-Fi, through a wireless local area network (WLAN) with a router connected to an Internet service provider (ISP). Most people refer to these locations as “Wi-Fi hotspots” or “Wi-Fi connections”. Simply put, a hotspot is a physical location where users can connect their mobile devices, such as smartphones and tablets, to the Internet wirelessly.

Hotspots can be in private or public locations, such as coffee shops, airports, hotels, or even airplanes. While many public hotspots offer wireless access on an open network, others require a fee. In the next part of this article you will learn how to connect a mobile device to a Wi-Fi hotspot.

c. Internet Network

A group of two or more computers is called a computer network. A communications system will be used to connect these computers to each other. Each computer connected to this network can exchange data, software, and other computer resources such as storage devices, printers, and so on. Emails and data files can be sent over computer networks that connect computers located in different places (upload) and download files from other locations, as well as engage in other activities that involve accessing information from different locations. A computer can use the resources of other computers on the same network, which is the main function of a computer network (Tanenbaum, 2000).

d. MikroTik

A standalone Linux-based operating system called MikroTik was created specifically for use on PCs that are used as routers. MikroTik is designed to be very easy to use for computer network administration tasks such as designing and building small to large scale computer networks. Founded in 1995, MikroTik's initial goal was to develop into a wireless Internet service provider (ISP). Currently, MikroTik is very popular in Indonesia and provides services to many wireless ISPs for Internet access in various countries in the world. The standard PC-based hardware that runs MikroTik is renowned for its reliability, error-free processing of various types of data packets, and ability to control quality. MikroTik computer-based routers are a great tool for ISPs who want to run a variety of applications, from the simplest to the most complex.

RESULTS AND DISCUSSION

Design Results

The proposed new system is to redesign the Hotspot Server network using a RouterOS proxy in Winbox to configure and manage users, where later the Admin will provide internet access with the User system and each user must be registered first by the server and must have the status of Principal, Teacher.

Hotspot Configuration

1. First, we set the WLAN for the hotspot by double clicking on the WLAN, then there we will set the mode > band section and we will change the SSID according to the name of the hotspot that we will create, then we will set the Wireless Protocol section and so on, then click Apply and OK.

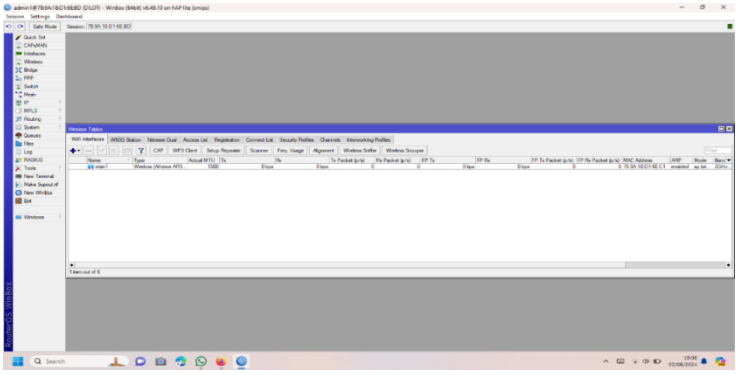

Figure 2. WLAN Hotspot Configuration

2. Next, go into the Hotspot settings, first we click on the top, namely "Hotspot Satup" here we will select the Hotspot path that we will use and give a name to the DNS/Web that will be addressed later.

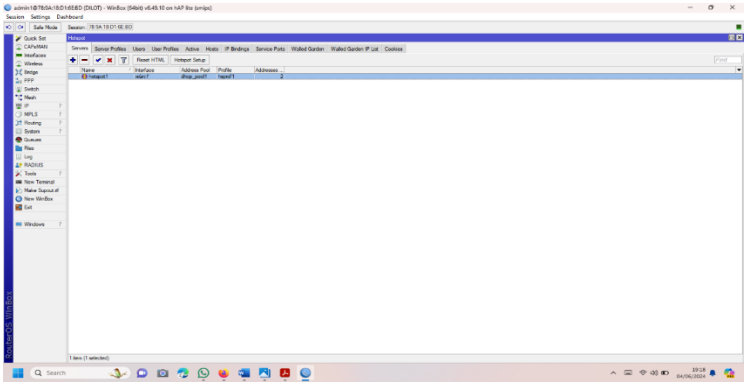

Figure 3. Hotspot Server Configuration

3. This is the display after the configuration is complete. Here we can see the DNS Name that was created earlier, namely Smkn1sarudik.net.id

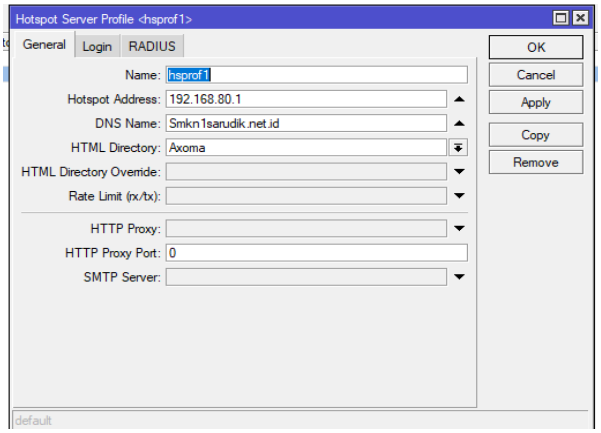

Figure 4. Display after configuration on the server

4. First, click the "+" sign, then we give a user name, then here we will create how many shared device users will log in simultaneously on the user profile that has been created. Here I give 1 user only 2 devices that will be able to log in simultaneously. Next, we will use the Incoming Packet Mark and Outgoing Packet Mark parameters to perform Bandwidth Share and then enter the same name as the user created earlier.

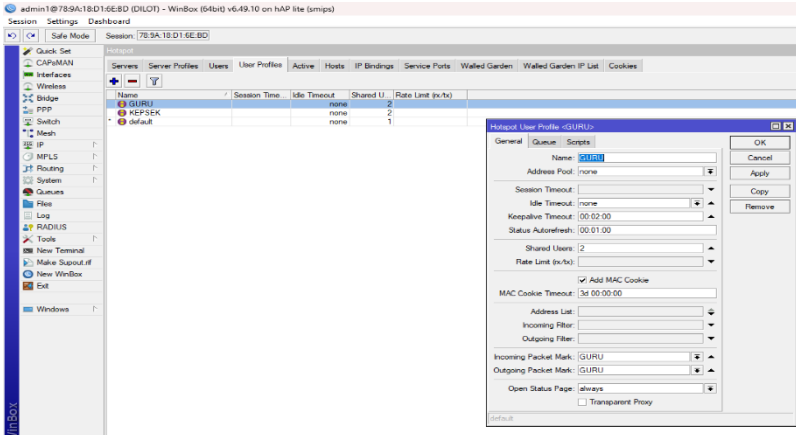

Figure 5. Configure Hotspot User Profile

5. If the user profile has been created, then we create a username and password that will be used to log in later, then click the "+" sign then enter the name and password that we want, don't forget to direct the profile according to what was created previously.

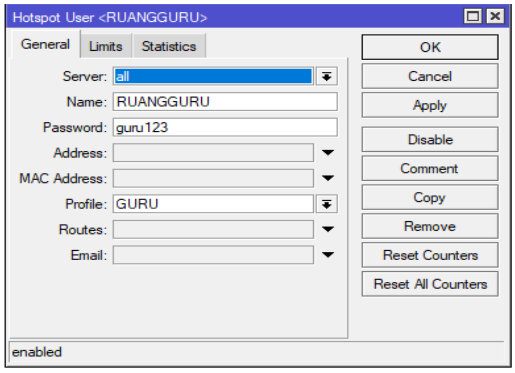

Figure 6. Ruangguru User Hotspot

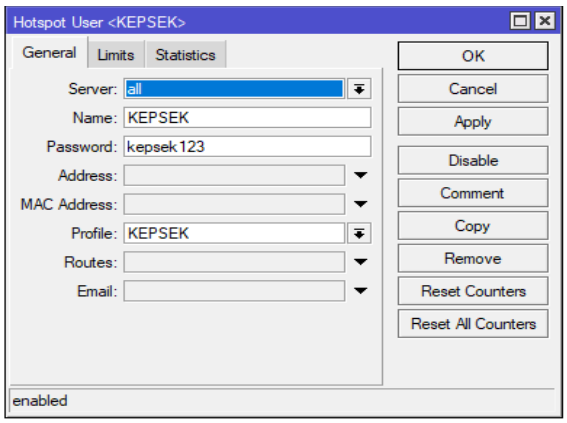

Figure 7. Kepsek User Hotspot

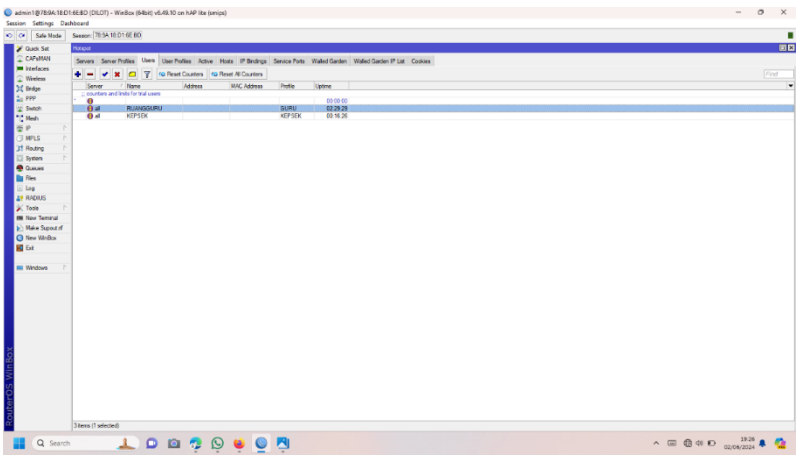

Figure 8. User display that has been created

6. After configuring the Hotspot in Winbox, the hotspot network can be accessed by users via laptop or smartphone with the network name "SMKN1SARUDIK".

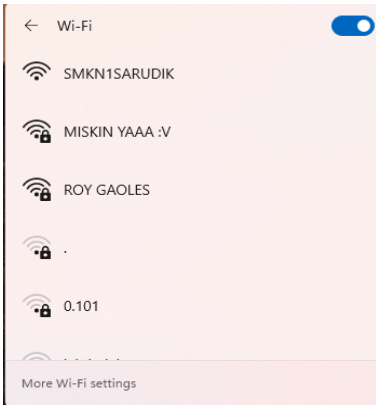

Figure 9. Display Connection to Hotspot network

7. Next, after logging into the network, we will automatically be directed to the login page as in Figure 10. There we will enter the Username and Password. First, we will log in to RUANGGURU first, before logging in we will not be able to access the internet at all.

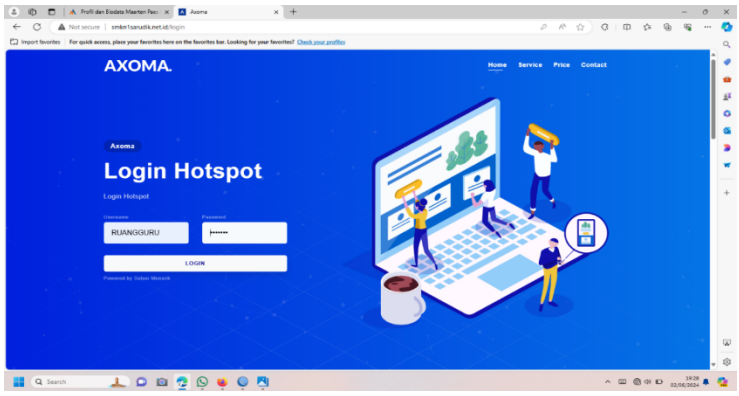

Figure 10. Login Page on Laptop/Pc.

8. Before accessing the internet here I will use Simple Queue to divide internet data access that will be used by devices that use the Hotspot. Here we will give how many Mb for Download and how many Mb for Upload.

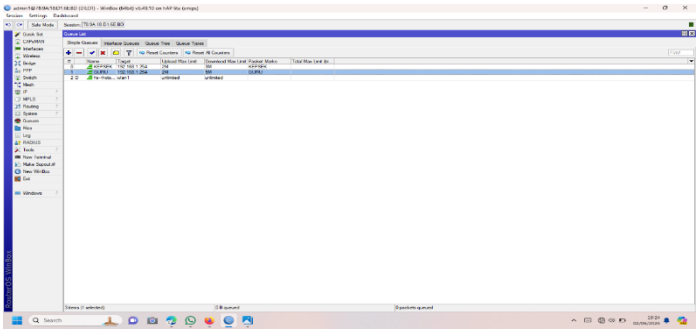

Figure 11. Configuration on*Simple Queue*

9. This is the result of sharing the data that we created earlier and tried it through a speed test.

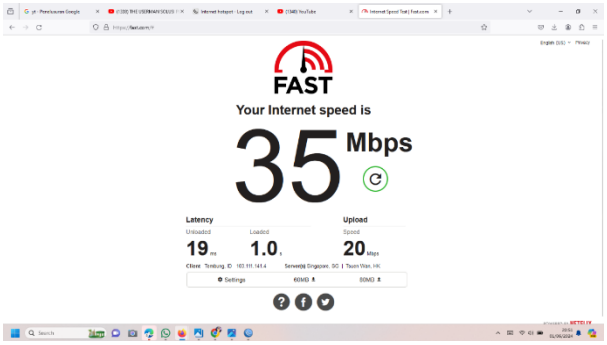

Figure 12. Speed test

10. After we have shared the data and successfully logged in, now we can access the internet as on this page, which indicates that we can access anything on our laptop/PC.

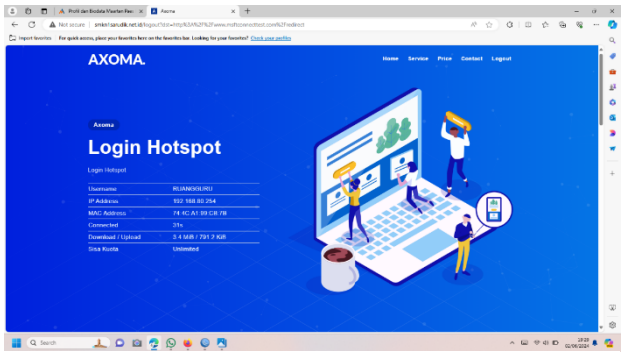

Figure 13. Page after successful login

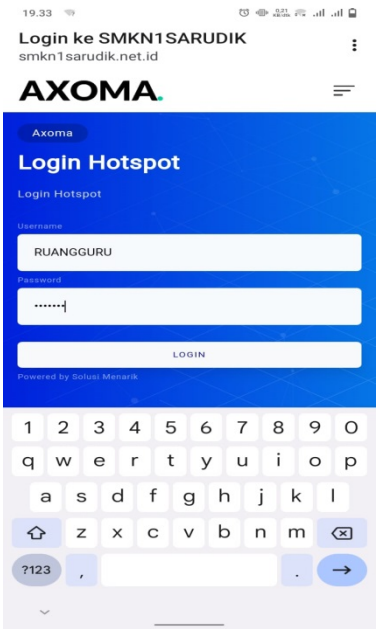

Figure 14. Android Login Page

CONCLUSION AND SUGGESTION

Based on the research I conducted at SMKN 1 SARUDIK, it can be concluded that the things discussed can actually be said to be relatively simple, but unfortunately not everyone understands how to build the Wi-Fi Hotspot infrastructure itself, which is due to the lack of information they have about what is needed to build a hotspot. That building a wireless network with a MikroTik hotspot server system makes it easy to share data that is designed with MikroTik quite easily and effectively if you know the basics of networking and have the concept of hotspots which are applied in the teacher's room. Winbox is used to manage users and manage the amount of data distributed to each user using the One User-Two Client method. Each user's Internet use does not experience slow Internet problems because each user has been assigned a quota amount without reducing the traffic of other users.

Based on the conclusions I wrote above, I as the author provide the following suggestions carry out physical security or place the network hardware or hardware in a special room to avoid physical damage and reduce the risk of the hardware coming into direct contact with surrounding objects, and to avoid rodents such as mice. Add a Firewall as security for the Internet route. By adding a voucher system for users around the school if expansion is needed.

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