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Development of a Network Security System with Mikrotik in SMK Muhammadiyah 2 Kuningan

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ABSTRACT

Currently the internet is used and utilized in all fields of human life both in the economic, government, and even now the internet has been widely used in the world of education as a support in the learning process. One of the uses of the internet in learning is to look for subject matter in the form of articles, pictures and even videos. But not all things that are on the internet are good, there are a lot of negative content that needs to be filtered to prevent internet abuse by students, for example accessing graphic porn content, opening social media sites on Facebook, Instagram and even watching video shows on YouTube while learning takes place.The main purpose of this study is to control and prevent internet abuse by students at SMK Muhammadiyah 2 Kuningan by blocking sites that are not needed during learning and user management and bandwidth management with Router Mikrotik so that internet connections are stable. The results of the research carried out successfully implemented with the results, sites containing negative content were blocked, the internet connection became stable due to the even distribution of bandwidth that was set up through a proxy router.

1. Introduction

Internet network is currently needed in various fields in human life, one of which is in the field of education. Evidenced by the rise of the use of online learning systems (e-learning) which certainly requires a stable and smooth internet connection to access the e-learning sites both sites provided by schools or leading e-learning sites for example, Teachers' Rooms and Edmodo. In addition to online learning, the use of the internet in the world of education is commonly used and used by students or teachers to find information about learning material, whether in the form of articles, pictures and videos.

SMK Muhammadiyah 2 Kuningan is one of the many vocational schools in Kuningan regency that utilizes internet networks to support the learning process especially for Computer and Network Engineering (TKJ) majors whose productive learning processes are inseparable from computer networks. Therefore the authors argue the need for an increase in network security systems to prevent misuse of the internet while learning and maintain school internet connections to be stable and smooth.

2. Literature Review

a. Computer Networks

According to Iwan Sofana (2013: 3) [1] in his book entitled building computer networks. Understanding a computer network is a collection of several computers that are connected to each other through intermediary media cable or wireless (wireless) with the existence of a network of computers can exchange data and share hardware such as printers.

b. Mikrotik Router

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According to Iwan Sofana (2017: 8) [2] Mikrotik Router is a network hardware made by Mikrotik that functions to run the RouterOS system which has many benefits for managing internet networks for example, user management, bandwidth management, website blocking and so forth. Examples of Mikrotik Routers that are widely used are: RB750, RB751U-2HnD.

c. User Management

User management is a step taken by the network manager to provide policy to users who will access an internet network service, users will be given a user and password which can later be used to enter internet services by using user management of internet users who do not have a user login. will be able to enter into network services. Another benefit is that network managers can find out who and what rooms are using internet access services.

d. Bandwidth Management

Bandwidth Management is an internet network management mechanism that has a function to manage or regulate internet speed either download or upload. By doing bandwidth management the internet network that is owned can be divided and adapted to the needs of each room or network user. With the existence of bandwidth management can minimize the use of excessive bandwidth by users because each room and network users have been given bandwidth that has been set and will not be able to exceed the bandwidth limit of what has been configured. In. According to Sophisticated Andika (2016: 19) [3] Bandwidth management is a network management technique as one of the efforts of network providers to provide fair and satisfactory network performance.

e. Blocking Website

Website Blocking is one of the proxy features that serves to block a website page, be it a website page with http or https website pages. By utilizing this website blocking feature allows users to build a healthy internet in the work environment or in a company agency because this feature can minimize the misuse of the internet by users by blocking sites with negative content or social media that is accessed not on time.

3. Research Methods

The subject in this study was the Development of a Microtic Network Security System at SMK Muhammadiyah 2 Kuningan. It is known that SMK Muhammadiyah 2 Kuningan has 6 computer laboratories with different number of computers in each of them:

a) Network Lab 1 (40) Computer Unit.
b) Network Lab 2 (40) Computer Units.
c) Digital Simulation Lab (40) Computer Units.
d) Software Lab (35) Computer Unit.
e) Hardware Lab (20) Computer Unit.
f) RPL Lab (20) Computer Unit.

In this research several network security systems will be added including: User management, bandwidth management, website blocking which can support the learning process in a computer laboratory and prevent internet abuse by students.

a. Interview Method

In this study the authors use an unstructured interview method, according to Sugiyono (2017: 197) [4] Unstructured interviews are free interviews wherein in this interview researchers do not have to use interview guidelines that have been arranged systematically and completely for data collection .
In this case the author only takes an outline of the problem that will be asked to be clearer and valid.

b. Observation Method

According to Sugiyono (2017: 203) [5] Observation is one of the data collection techniques that has more specific characteristics when compared to other techniques such as interviews and questionnaires. If in interviews and questionnaires can not be separated from communication with people, then the

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observation is not limited to that, but also related to other natural objects, such as places and objects of research.

c. Literature Study

To get data that is theoretical, the writer conducts a literature study by reading literature that is relevant to the research that the author is doing. The author also looks for references from various sources both from books and journals that are still related to the issues raised by the author.

d. Hardware Requirement Analysis

The hardware devices needed in the development of a network security system with this proxy are:

a) Modem.
b) RouterBoard 951-Ui.
c) Switch.
d) Personal Computer.

e. Software Requirement Analysis

Software needed in this study are:

a) Winbox is used for network configuration with routerboard.
b) Web Browser (Google Chrome or Mozilla FireFox).
c) Cisco Packet Tracer for designing network topology.

f. Analysis and Planning

According to Eko Purwanto (2015) [6] Analysis and Planning is a planning step taken to think about what steps should be taken before activities are carried out such as creating a network topology and configuring the router.

4. Results And Discussion

In this chapter we will discuss how to configure and research results.

a. Network Topology

The network topology that I use in this study is a star topology by using a switch as an intermediary for connecting networks between computers, and below this writer shows the topology design that has been designed.

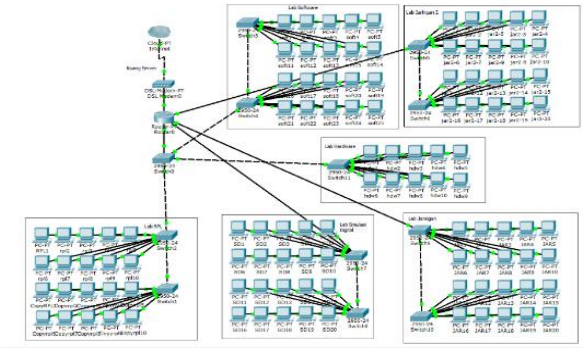

Fig 1. Network Topology

Information:

1) The topology that the author designed is the star network topology.
2) Network devices used in the design of the network topology are:
   a) Modem: Is a network device that is connected to an ISP that connects a school network to an internet network, in this case the connected internet network is not directly connected to

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the client computer but is connected first to the Routerboard to be managed by its network services.

b) RouterBoard: Is a network device that functions for the management of a good network service, firewall, hotspot, routing, website blocking, bandwidth management and so forth. After the internet network is connected to the router, the internet network will be spread by the router to the switch devices that exist in each computer laboratory.

c) Switch: A network device that acts as a gate or door that connects 1 computer to another computer, and as a liaison between other network devices such as: modems, routers or switches in this study the author uses a 24 port switch. Each laboratory in the study area has installed 2 switches with 24 ports except for the hardware lab which only has 1 switch.

d) Computer Client: Is a computer used by students for practice.

b. Mikrotik RouterBoard Configuration

In this section the author will explain about the steps to configure the proxy routerboard starting from the configuration of IPAddress, gateway, DNS, hotspot blocking website and bandwidth management.

There are 2 ways to configure the network, namely the Command Line Interface (CLI) and the Graphic User Interface (GUI). In this research I will use both to make it faster and simpler.

For configuration via CLI, just enter the proxy terminal then type the source code and click enter to execute.

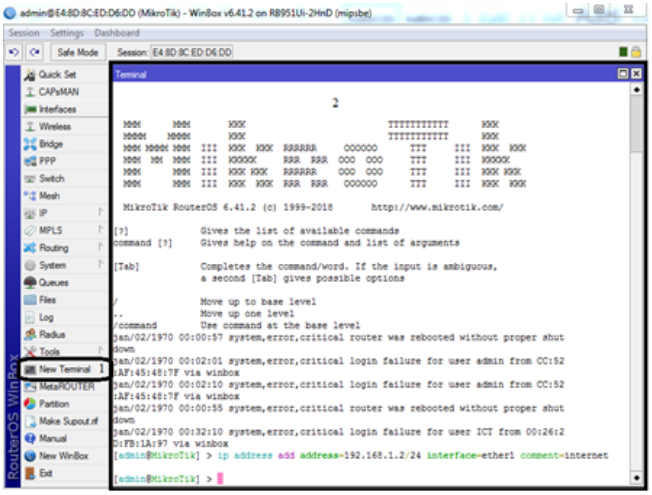

Fig 2. Microtic Terminals

Configuration Table and source code microtics

NO	Table Configuration and Source Code	
	Konfigurasi	***Source Code***
1	Konfigurasi Ip Address	ip address add address=192.168.1.2/24 interface=ether1 comment=internet ip address add address=10.10.10.1/24 interface=ether2 comment=jaringan1 ip address add address=20.20.20.1/24 interface=ether3 comment=jaringan2 ip address add address=30.30.30.1/24 interface=ether4 comment=simdig ip address add address=40.40.40.1/24 interface=ether5 comment=lab
2	Konfigurasi Gateway	ip route add gateway=192.168.1.1
3	Konfigurasi Firewall	ip firewall nat add chain=srcnat out-interface=ether1 action=masquerade
4	Konfigurasi Halaman Login	ip hotspot setup Select interface to run HotSpot on hotspot interface: ether2

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NO	Table Configuration and Source Code	
	Konfigurasi	***Source Code***
		Set HotSpot address for interface local address of network: 10.10.10.2/24 masquerade network: yes Set pool for HotSpot addresses address pool of network: 10.10.10.2-10.10.10.254 Select hotspot SSL certificate select certificate: none Select SMTP server ip address of smtp server: 0.0.0.0 Setup DNS configuration dns servers: 202.134.10.1,202.134.0.155 DNS name of local hotspot server dns name: smkm2-kuningan.sch.id Create local hotspot user name of local hotspot user: admin password for the user: Kun1ng4n
5	Konfigurasi Blokir Facebook	Ip firewall layer7 add name = facebook regnep ^.+(facebook.com).*$ firewall rules add chain = foward protocol = 6(tcp) dst-port =80,443 advanced layer7protocol =facebook action = drop
6	Konfigurasi Blokir Youtube	Ip firewall layer7 add name = youtube regnep ^.+(youtube.com).*$ firewall rules add chain = foward protocol = 6(tcp) dst-port =80,443 advanced layer7protocol =youtube action = drop

For other configurations, the author uses the GUI feature, which is a feature that uses graphics or images, the configuration method is only a click away because the menus are clear.

1) User Management Configuration: In user management configuration at SMK Muhammadiyah 2 Kuningan using the names of the computers of each laboratory for example computers in software laboratories are given user: Software1 to software40 for password number 1.

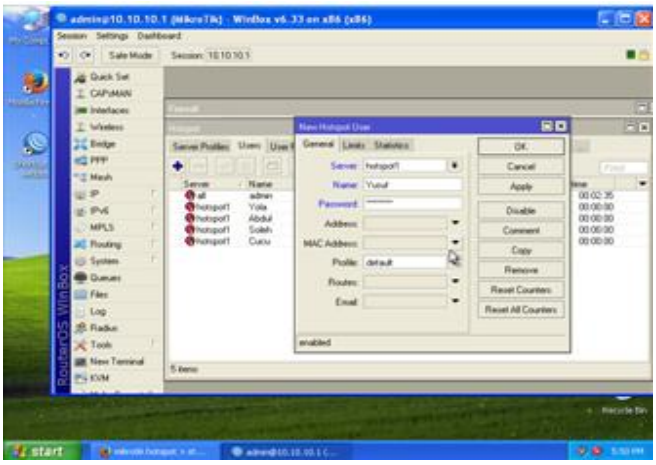

Fig 3. User Management

2) Bandwidth Limit Configuration: which is implemented in SMK Muhammadiyah 2 Kuningan, is 10 MBps in each computer laboratory.

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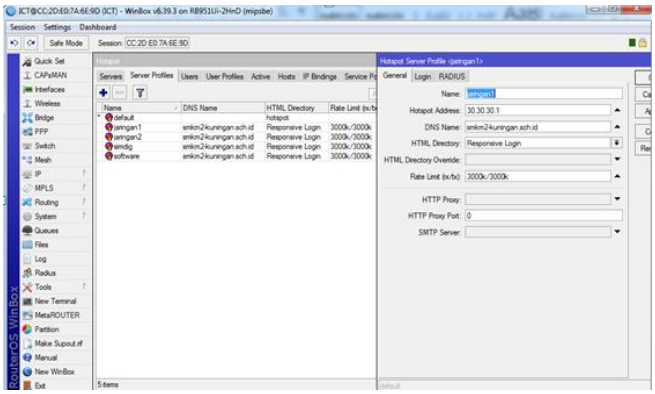

Fig 4. Limit Bandwidth

5. Conclusions

In accordance with the discussion in this paper, the author obtained several conclusions, including:

a. All connected network devices do not experience problems even though all laboratories are used simultaneously.
b. Each laboratory gets a bandwidth of 10 MBps.
c. Every student who wants to be connected to the internet must first enter their user and password.
d. Network administrators can monitor the number and speed of internet access accessed by students.
e. Admin can at any time sever internet access of students who spend bandwidth.
f. Social media sites, and other negative sites are blocked.

6. References

[1] Iwan Sofana. 2013. Building a Computer Network. Bandung: Bandung Informatics.
[2] Iwan Sofana, 2017. "Microtic-Based Computer Networks". Bandung: Bandung Informatics.
[3] Ajika, Sophisticated, 2016 "BANDWITH MANAGEMENT USING ROUTERBOARD MICROTICS IN INDONUSA POLITECHNIC SURAKARTA".
[4] Sugiyono. 2017. Education Research Methods Quantitative, Qualitative, and R & D. Approaches: ALFABETA, cv.
[5] Sugiyono. 2017. Education Research Methods Quantitative, Qualitative, and R & D. Approaches: ALFABETA, cv.
[6] Purwanto, Eko, 2015 "IMPLEMENTATION OF HOTSPOT NETWORK USING MICROTIC ROUTER AS A LEARNING SUPPORT (Case Study: SMK Agung Agung Tirtomoyo Wonogiri).

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