Distribute Off-Time Office Internet bandwidth Using Topology Mesh For Surrounding Neighbour

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Abstract. The Internet as one of the very rapidly growing information technology can provide data and information with wide world, complete, and up to date. Users can download and upload data such as the application file, multimedia and text through the Internet network. But for the Internet availability is still less equal access because of the lack of availability of adequate infrastructure, therefore the author make the utilization of bandwidth that can be establish Internet balancing although still on a small scale. By this research the authors use bandwidth from PT. Deltauli Home Teknikarya that where bandwidth necessity on when time off-time unused office, where the office always pay full for Internet connection even though at the time of the off-time. It’s many of the available bandwidth, so that the author is trying to take advantage of the bandwidth at the time of the off-time the office to be used by the community using radio connection link and use the RADIUS server as management and SMS server to send the user and password to the users who want to enjoy free internet connection.

1. Introduction
The development of the current age demands of human life is not removed from the internet technology. The Internet as a source of information can simplify and speed up a work good in education, literacy field, health, commerce, government and other fields all take advantage of the internet as the summer information. For this reason, the government in demand can provide sufficient infrastructure to provide internet distribution throughout the territory of Indonesia.

According to Rudiantara MenkomInfo that internet network in Indonesia have not spread to all across the archipelago, one is a problem is the telecommunication infrastructure yet to reach all the area, there is a gap between the capacity in rural areas and large cities [1]. According to Niskarto Zendrato in a thesis entitled Analysis of the distribution of bandwidth off-time has held various using mikrotik and radius server [2]. Explain that the bandwidth utilization on off-the-shelf the office by the radio connection link and use the RADIUS server as management and SMS server to send the user and password to the users who want to enjoy the connection Internet.

In general all government offices and industry has been using the internet as a means of supporting the work. Each of the office usually take advantage of unlimited package that is provided by the
provider. Office hours are at 8 am up to at 5pm where on the hours of the internet will be used with maximum by all employees in the work. After the hours of the office finished usually internet usage will be low and of course this situation can be used for distributed internet usage for the surroundings of the community.

1.1. Formulation Of Problem

The formulation of the problem in this research is how to build a system and distribute bandwidth in Off-Time Office to spread to the general public so that the public can enjoy internet fast and quality.

1.2. Limitation Of Problem

Now the limitations of the problem in this research is : 1. The Bandwidth used in this research is from the office on the off-time 2. Using Mikrotik RouterOS as management bandwidth 3. Using WIFI Network 2.4 Ghz to spread to the community 4. Use the 5 Ghz Frequency for mesh relationship between offices 5. Use FreeRADIUS Server as user management and control 6. Research areas in the area surrounding Pancurbatu.

1.3. Research Aims

The purpose of this research is to analyze the unused internet usage on the office to be used by the community that has not been coverage internet network a fast and cheap.

1.4. Benefit Research

Now the benefits that can be obtained from this research is as follows : 1. Help the government especially bent on in some small matter in equitable access to the internet. 2. Add insights and documentary captures the knowledge and can become a means of entertainment with the presence of the internet is fast and cheap. 3. Growing public interest in selling or buying goods with discounted rates online.

2. Literatur Review

2.1. Network Definition

The network is a collection of hardware that is connected to each other through a medium such as copper cables, optic cable, micro waves and the infrared so that allows for the exchange of data. The hardware can be computer, PDA, printers and other hardware that is able to send and receive data [3]. The computer network is a single computer model that serve all computing tasks of an organization that is replaced by a collection of a computer that is separate settlements but are related to each other in carrying out their tasks [4]. The computer network is two or more computers that are connected and can share data, applications, computer equipment and internet connection or some combination of it. The benefits of the computer network to fill needs by reassignment is Resource, it sharing the aim of the whole program, equipment, especially data can be used by everyone who is without affected the location of the resource and users in other words resource sharing is an effort to remove obstacles to the distance.

2.2. Mikrotik

Mikrotik originally a small company founded by John Trully and Arnis Riektins in Latvia. John Trully is a American nationals who emigrated to Latvia while Arnis is a graduate of physics and mechanics both met in 1995. Mikrotik began to be used in Moklova around 1996 using Linux system and MS-DOS which combined with the technology of Wireless LAN (WLAN) Aeronet 2 Mbps speed. Although using wireless technology basically mikrotik holding the principle of building a reliable router program can be used throughout the world. This time Latvia became the center of research development Mikrotik because John and rot away when they start to help other countries including Sri
The first Linux is used in the development of the kernel Mikrotik 2.2 developed with the help of 5-15 staff Research and Development (R&D) [5]. According to Arnis, in addition to rely on the staff of the R&D in his own Mikrotik environment, they also recruit release and a third party develop a Mikrotik protocol [6].

2.3. Bandwidth
Bandwidth is the number of bits that can be transmitted in a network on a specific period of time. As an example of a network that has a bandwidth 10 Mbps means that network capable of delivering ten million bits per second. Bandwidth also determine how long the time required for every bit transmitted data on 10 Mbps, 0.1 microsecond time required to transmit every bit [7]

Bandwidth is a counting the consumption data available on a telecommunication. Calculated in units of bits per seconds (bits per second). [8] Note that the bandwidth that indicated wireless communication, modem data transmission, digital communication, electronics is bandwidth that refers to the analog signal that is measured in units of bits per second.

2.4. Radius Server
RADIUS (Remote Access Dial-in User Service) Server or in this research is called as authenticator server is an access network model which separates the three kinds of control function, namely Authentication, Authorization, and Accounting, for independent processed. In this research, RADIUS server that is used is the freeradius which is application from RADIUS Server.[9] AAA protocol (Authentication, Authorization, Accounting) set the mechanism how the procedures to communicate both between client to domain network and between the client with a different domain to ensure the security of data exchange.

2.5. Mesh Topology
The mesh topology is a computer network topology that connect all of the computers in full, this topology topology is most complex compared with the other network topology. This type of topology many used by your internet service provider (ISP). [10] The concept of this topology is each computer in your network are connected to each other so that if the failure occurs on one of the computer has no effect on another computer or effect on the network. This mesh network topology apply the relationship between central full. The multitude of this channel must be prepared in order to form a network of mesh topology namely central number of minus 1 (n-1, with n is the number of central).

Type of Mesh Network Topology Connection . Topology connection type on the mesh network topology consists of 2 types of both the mesh topology include: 1. The Mesh Topology Fully Connected Mesh Topology Fully Connected has main characteristics where each computer in your network are connected to each other in full. For example if there are 5 computers in the network then one computer will be connected to 4 other computers. 2. The mesh topology partial connected in mesh topology this type has characteristics that each computer in the network is not all computers will be connected with other computers so that there are some computers that are connected to each other and some of the computer does not relate to each other [11-12].

3. Research Metodology
In this study, the authors use research methods as Analyze the effectiveness of the network, the implementation of network topology and testing the application of network topology. 1) Analysis of network effectiveness Analysis of network effectiveness applied; 2) direct field observations with questionnaires to users. Direct field observations with questionnaires to the user make a number or multiple questions and then distributed to the user, the user, in this case, is the community; 3) Direct Field observation (test case / technical). Direct field observation (test case / technical) Perform observation of patients in network management Local Area Network (LAN) PT Deltauli This technique is managed by PT Deltauli NOC Engineering; 4) in Figure 1 is part of the Network Topology implementation. Implementation of network topology design topology and perform a
number of topology testing; 5) in Figure 2 is part of the implementation of Network Topology Apply topology and see results through a number of Tests.

![Figure 1. The mesh network topology design.](image1)

![Figure 2. Standalone network topology design.](image2)

4. Result

4.1.1 Results of the use of bandwidth with Management

Bandwidth Usage with management also can perform these settings capacity restrictions or speed that evenly on each user or user in the use of the internet facilities bandwidth in off-time the office so that the bandwidth capacity of the internet connection is divided on average each user or user (user). Below can be seen the results of the division of bandwidth internet connection that evenly on each user or user (user) as below:

![Figure 3. Results of the distribution of bandwidth capacity with the management.](image3)

4.1.2 The location of the radio transmitter

On this research, location used as a radio transmitter located at PT Deltauli teknikarya that will be transmitted to the location of the Pancurbatu with distance or wide coverage. The process of the spread
of the internet facility will diserbarkan bandwidth through POP (Point Of Presence) which is located at the location of the Pancurbatu. Below can be seen the results of the distance between the POP Pancurbatu to PT Deltauliteknikarya Home through google eart as below:

![Distance between POP Pancurbatu to PT Deltauliteknikarya Home](image)

**Figure 4.** The results of the distance between the pop pancurbatu to pt deltauliteknikarya home.

The location of the signal coverage Internet connection that can be accessed the community. The use of the internet facility bandwidth that spread to the community has a very wide coverage so that the community can enjoy the internet facility on the radius ± 1 Km marked on the green line. Below can be seen the results of signal coverage internet location that can be accessed by the community through google earth.

![Location of signal coverage internet](image)

**Figure 5.** The results of the location signal coverage internet connection.

5. **Conclusion**

After the research is done then the conclusion that I can deduce that internet distribution is unused in the offtime computer runs fine, the public can access the internet at the Office during the offtime. On a standalone network topology if the internet disconnected so no backup of internet lines while if using mesh network topology then if any one or more of the Office network is cut off then it could be replaced by other office network so the internet can continue to be accessed by the public.

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