

# THE IMPROVEMENT OF COMPUTER NETWORK PERFORMANCE WITH BANDWIDTH MANAGEMENT IN KEMURNIAN II SENIOR HIGH SCHOOL

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**Abstract:** This research describes the improvement of computer network performance with bandwidth management in Kemurnian II Senior High School. The main issue of this research is the absence of bandwidth division on computer, which makes user who is downloading data, the provided bandwidth will be absorbed by the user. It leads other users do not get the bandwidth. Besides that, it has been done IP address division on each room, such as computer, teacher and administration room for supporting learning process in Kemurnian II Senior High School, so wireless network is needed. The method is location observation and interview with related parties in Kemurnian II Senior High School, the network analysis has run and designed a new topology network including the wireless network along with its configuration and separation bandwidth on microtic router and its limitation. The result is network traffic on Kemurnian II Senior High School can be shared evenly to each user; IX and IIX traffic are separated, which improve the speed on network access at school and the implementation of wireless network.

**Keywords:** Bandwidth Management; Wireless Network

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## INTRODUCTION

Kemurnian School was established in 1978 by a man named Haris Lamuda that has passion and notion in advancing education in Indonesia. When Kemurnian School was first established, it only opened kindergarten and elementary school located in Central Jakarta and two years later it opened the secondary level of education, which was senior and high school. With the hard working, Kemurnian School kept developing and in 1988 Kemurnian School II was built followed by Kemurnian III Citra in 1997.

In running the operational activity, Kemurnian School II makes local network for communicating to the school's internet network using internet Telkom ASTINet provider. The used topology at this time is star topology, which the computer is connected directly to switch by using UTP cable. In Kemurnian School II, the network is divided into 3 parts, which are administration room, teacher room and computer room with the total of connected computer is 45 computers. The network has 4 D-Link switches, where three switches connect to Wireless TP-Link router for communicating to internet as shown in Fig. 1.

After doing survey and interview, the problem on the network is the absence of regularly bandwidth allocation on each computer, so if there is a user who

does not use the full allocated bandwidth, it means that the user can waste the existed bandwidth. The setting of bandwidth is done on TP-Link router so there is no optimum use of the available bandwidth. There is no segmentation of IP address for computer room, teacher room and administration room. The IP segmentation is carried out flatly and dynamically generated by the router using DHCP [x]. The absence of monitoring tools is used to observe the network condition. The half of the used network use UTP cable, which centered on computer and teacher room, so it is obstructing if there is an activity in classroom and events at school that need support of computer network. The other problem that should be concerned is the switch in lab room is connected cascade with the switch above it.

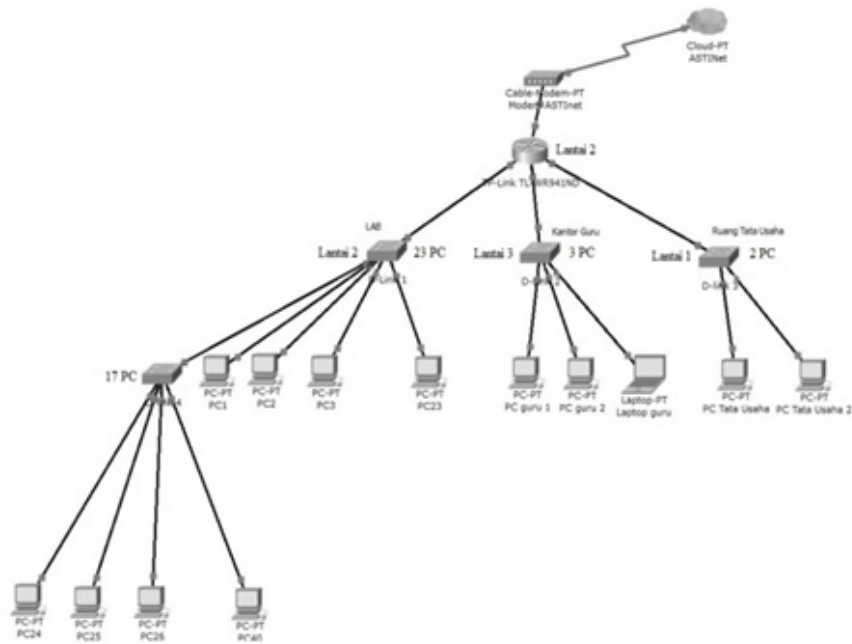


Fig. 1: Network Topology of Kemurnian II Senior High School

## METHOD

The used method on network designing in Kemurnian Senior High School is using top-down network design [1]. This methodology is same with methodology presented by Ref. [2] and Reff. [3] that is well-known as DBLC and Waterfall but it is modified for the need of network designing. The outline of the used design stages in top-down network design include the identification of needs and client's purpose, logic network design, physic network design and evaluation [1]. The identification of needs and purpose on this case using the technique of interview

and observation, by doing that, the solutions for this problem in Kemurnian II school are the expansion of wireless scope, blocking certain websites and distributing IP address.

From the solution above, then it continues with logic design stage that is depicted in Fig. 2. The outline of the design is not really different with the previous network. With the expansion of a router that connected to the center router in the second floor using bridge. Then switch in lab room that previously cascade with the switch above it like in Fig. 1, is connected directly to the router.

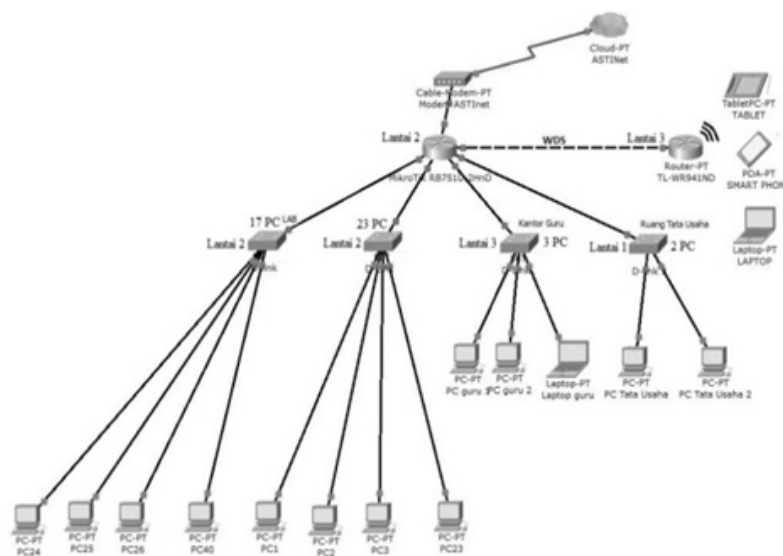


Fig. 2: Network Design of Kemurnian II Senior High School

From the result design that has been explained before, it continues in device selection to realize the network. To realize the wireless network, the two devices that are supporting the wireless are needed, which are Microtic RB751U-2HnD [4] and TP-Link TL-WR941ND [5]. While for switch, it is used D-Link DES-1024A [6] and DES-1008A [7].

For placing a wireless router, it needs knowledge about coverage area, location sketch and the amount of user in an area. It is needed for achieving a good network performance. Therefore, it is decided to place the microtic RB751U-2HnD router wireless that will be used in the second floor in Kemurnian II Senior High School. The purpose is

the microtic router wireless has strategic placement for sharing the computer network on computer lab in the 2nd floor and the administration room in the 1st floor. And router wireless TP-Link TL-WR-941ND will also be used in the 3rd floor of Kemurnian II Senior High School with purpose the router wireless TP-Link has a good coverage area for classes in Kemurnian II Senior High School, in other words the user in X, XI, XII classrooms and hall room that wants to connect to the wireless network can well-connected. The router wireless placement in the 3rd floor in Kemurnian II Senior High School can be seen in Fig. 3 and for the 2nd floor in Fig. 4.

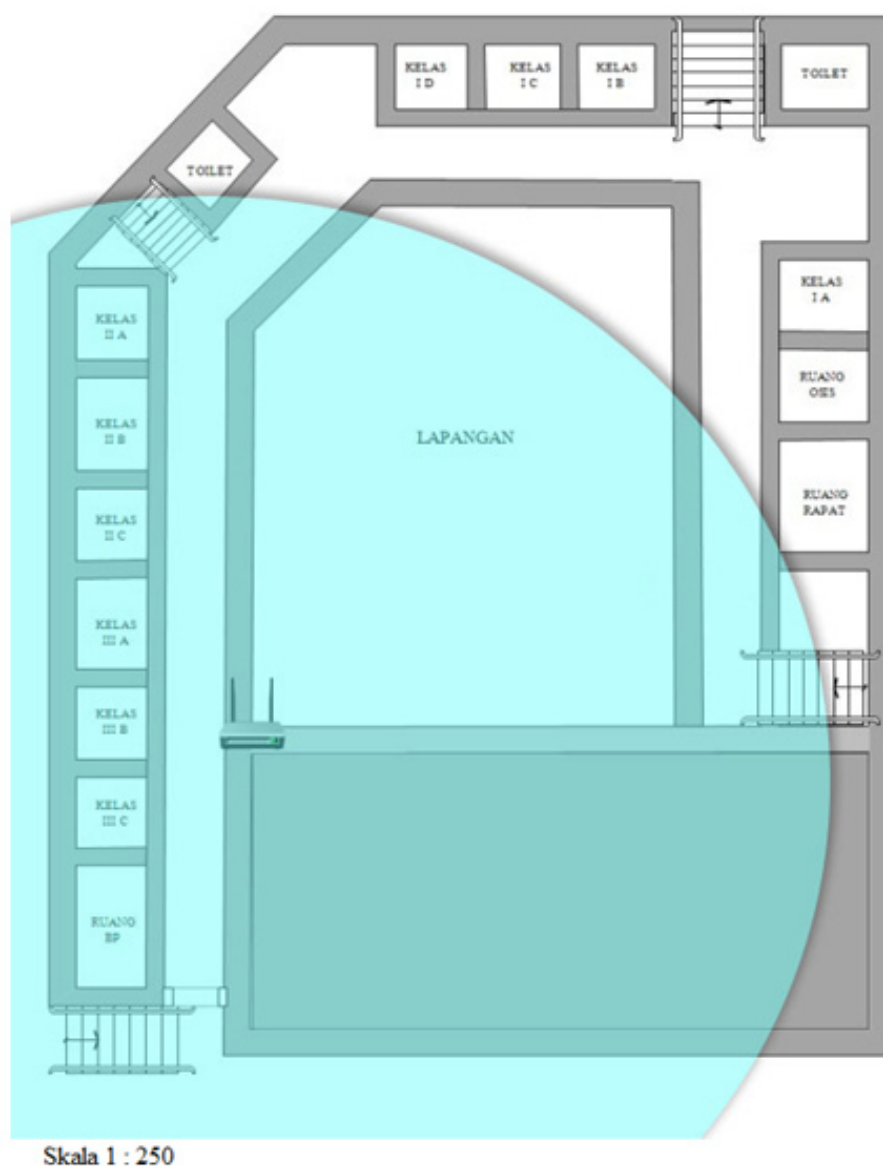


Fig. 3: Router Wireless TP-Link in The 3rd Floor in Kemurnian II Senior High School

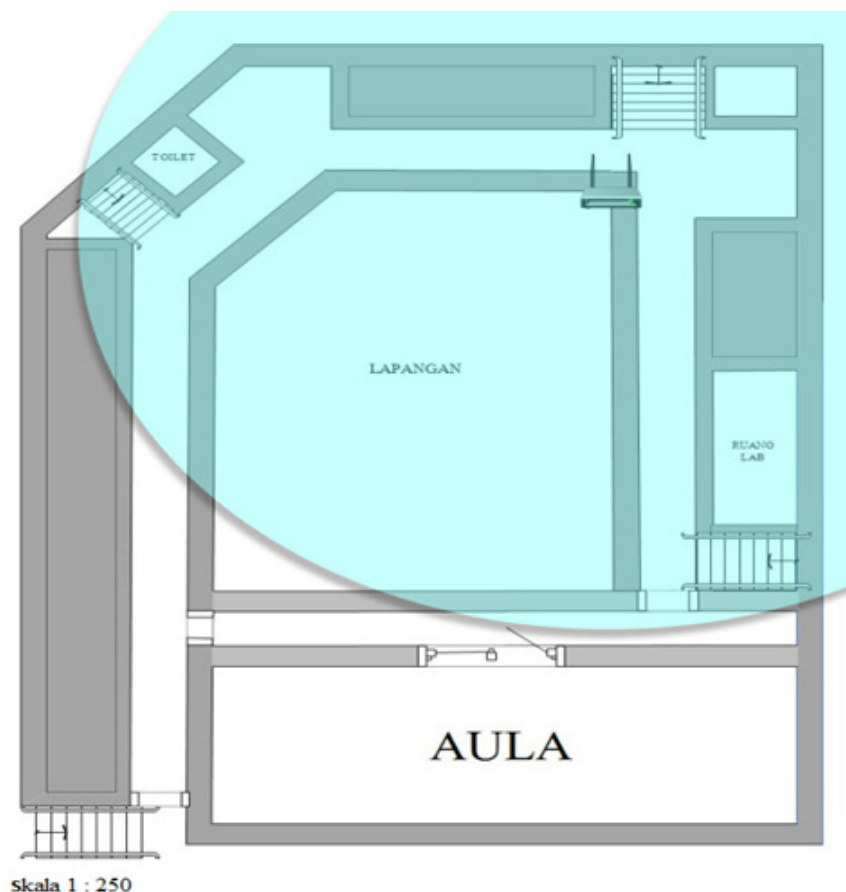


Fig. 4: Router Wireless TP-Link in The 2nd Floor in Kemurnian II Senior High School

## RESULTS AND DISCUSSION

Based on the suggested proposal in the troubleshooting of network topology in Kemurnian II Senior High School it is decided to replace the old network router using microtic router. It has been done troubleshooting bandwidth division, IP address division in each room and mobility to access

the internet with Wi-Fi network. By using WDS technique has been attached 2 pieces of wireless router that is placed on the 2nd floor and 3rd floor, and successfully implementing a Wi-Fi network as an additional network that previously do not exist at the high school Purity II.

Table 1. The Comparison of The Old and New Network

| Aspect        | Old Network   | New Network with Microtic   |
|---------------|---|---|
| Mobility      | From the term of mobility, the cable network does not provide mobility factor. So the jobs that need mobility become disturbed.   | Wi-Fi gives high mobility factor, which helps jobs that need high mobility.   |
| Maintenance   | In the maintenance of the previous network, it is hard to be handled because there is no network division in each room. So if there is damage, it has to be traced one by one from the end of the cable to the other end. | Easy in maintenance because if there is damage, the microtic router can detect the problem part and directly handled because of the network division.   |
| Accessibility | It can only be accessed by local network, which is teacher, computer, and administration room with total of 45 clients.   | Besides the local network, there is wireless network that can connect with 200 clients, due to the limitation of internet access bandwidth for wireless network; it limits and can only be accessed limited for 16 clients. |

## CONCLUSION

The result of the network system evaluation is new network has more advantages than the old network, such as mobility, maintenance and accessibility. In local network of Kemurnian II Senior High School includes lab, administration and teacher room still using IP static, while in wireless network using IP dynamic from DHCP server because it is needed for IP address distribution for guest who wants to access the wireless network. Microtic router can manage the bandwidth division accurately in limit bandwidth both local and international website. By having microtic router, it can block certain website that can be adjusted with the school's needs.

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