ISSN: 2581-1274

Wireless Network Analysis With Bandwidth Settings In MAN 3 Jakarta Using Cisco Packet Tracer

Willis Puspita Sari [a,1,*]

[a] *University Of Pamulang, Jl. Raya Puspitek, Kec. Pamulang, Kota Tangerang Selatan, Banten 15310, Indonesia*
[1] *Dosen02527@unpam.ac.id* *

ARTICLE INFO

Article history:
Published

Keywords:
Wireless Network Analysis
Bandwidth
MAN 3 Jakarta
Cisco Packet Tracer
Simulation

ABSTRACT

Dependence on wireless networks is increasing along with the development of information and communication technology. Schools are also increasingly adopting wireless network infrastructure to support teaching and learning activities and school administration. This research aims to analyze the wireless network at MAN 3 Jakarta with a focus on bandwidth management using Cisco Packet Tracer software. The methods used include modeling the MAN 3 Jakarta network using Cisco Packet Tracer, configuring wireless network devices such as routers and access points, as well as adjusting bandwidth to optimize network performance. Efficient use of bandwidth in wireless networks is important to ensure smooth and quality access for users. The result of this research is a better understanding of how bandwidth configuration can affect wireless network performance in school environments. By utilizing Cisco Packet Tracer as a simulation tool, users can conduct experiments and gain valuable insight into wireless network management. This research contributes to the development of network infrastructure at MAN 3 Jakarta or similar educational institutions by providing a more in-depth view of bandwidth management in the context of wireless networks.

I. Introduction

At this time, the need for technology and information is increasing due to the many human needs that support humans to use information technology. So at this time, information technology is needed that is fast, short, accurate and efficient in use. This is closely related to bandwidth capacity. Very large bandwidth will also have expensive costs so we have to be wise in using it.

Schools are places where there are quite a lot of internet users. The internet is usually used for the teaching and learning process, managing school administration and to search for various information related to education. Internet use within a certain area cannot be separated from the computer network.

It is hoped that the available bandwidth capacity will allow many users to access the internet simultaneously. Therefore, it is necessary to adjust the bandwidth. Otherwise, the bandwidth will be full when only a few users use it.

Routers and bandwidth are closely related to the OSI LAYER. Where OSI LAYER is an international standard for interconnection system requirements that meet OSI standards to be able to communicate with other systems. In this case the router is at layer 3 of the OSI and the bandwidth is regulated by the router. Therefore, there is a very close relationship between routers, bandwidth and OSI LAYER.

This happened at MAN 3 Jakarta where the problem that arose was the unequal distribution of bandwidth when many users accessed the internet simultaneously. Apart from that, on the network there are sites with content that is not good for the moral and ethical development of students, so a network security system is really needed.

This research uses simulation and implementation methods. The design of the computer network built at MAN 3 Jakarta will be simulated using Cisco Packet Tracer according to the data obtained (requirements analysis). The design result is a new idea that may one day be implemented at MAN 3 Jakarta.

The result of this research is the design of a new network that is used to replace the old network. The new network was created to overcome the problems of the old computer network, from internet connections that had not yet spread to rooms that needed access to the internet and bandwidth management that had not been implemented in the network. The design is as simple as possible to provide convenience in the development carried out by the school. This development will improve the quality of learning and school administration management, so that schools can carry out the teaching and learning process well.

Several studies related to networks are first namely Wireless Networks based on Building Design at Telkom University [1]. The second research is about Wireless Network Throughput Analysis at Bumi Akpelni Polytechnic [2]. Third research, Designing a wireless access point network using Packet tracer [3]. Fourth research, Analysis of Wireless Network Infrastructure and Local Area Network (WLAN) Using Wireshark [4]. Fifth research, Wireless Network With Hierarchical Token Bucket On Mikrotik [5]. Sixth research, network performance Level Analysis Using Mikrotik [6]. The seventh research is building a wireless network on CV.BIQ BENGKULU [7]. The eighth research is performance analysis of wireless network technology in certain room conditions [8]. Ninth research analysis and design of wireless networks using multi factor authentication based wireless [9]. Tenth research, LTE network analysis for multicast D2D system [10].

II. Method

In this research, a simulation analysis will be carried out on a network. A network that describes how the network is formed, can be in the form of a simulation with Cisco Packet Tracer. To obtain the data needed for this research, library techniques were used, namely studying various books, literature, articles on the internet, and other library materials related to this research. This research uses the following flowchart as in Figure 1, with the following stages:

1. Needs analysis, at this stage the researcher analyzes various needs in the form of software and hardware as well as data needed in the research to be carried out.
2. Data collection, at this stage the researcher collects data and various needs that will be used in designing a computer network.
3. Data collection was carried out using library research, namely collecting data obtained from various books, articles, journals, and so on as support for writing papers for the Network Management UAS assignment.
4. Data completeness, is the stage where the completeness of the data obtained is identified, if the data is complete it will proceed to the network design preparation stage, if the data is not complete, data collection will be carried out again.
5. Preparing a network design using simulation, at this stage the researcher creates a computer network design according to the data obtained and simulates it using Cisco Packet Tracer.
6. Making a report, after everything has been done and no errors appear, the researcher will make a final report.

In our opinion, the needs analysis needed to analyze the wireless network at MAN 3 Jakarta is:

a) Computer network at MAN 3 Jakarta.
b) Internet access at MAN 3 Jakarta.
c) Bandwidth management on computer networks with Cisco Packet Tracer.
d) Addition of access points.

7. e) Analysis of the hardware required: computers located at MAN 3 Jakarta, 1 ADSL modem unit, 21 computers in the computer laboratory, 1 Mikrotik router unit, 2 24 port switch units, UTP cable, 1 access point unit.

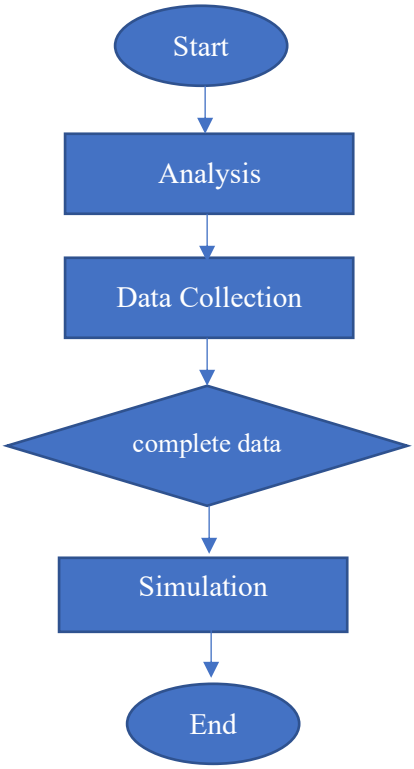

Fig 1. Research Flowchart

III. Results and Discussion

Simulation computer networks in Figure 2 are built using star topology with Cisco Packet Tracer. The network is used for the 1st floor, 2nd floor and access point. Telkom Speedy and will be the source of the internet network for the computer network that will be built. The proxy router will divide the network into three, and forward the internet network to all of these networks. The router in distributing data packets to each host will be assisted by two computer switch units that will connect each host on the 2nd floor. An access point will be installed on the 1st floor so that it can be used by students or teachers who want to connect to the internet.

Tables 1, 2 and 3 show the download and upload speed results for each network. The bandwidth speed appears to be in accordance with the bandwidth management that has been designed because it has almost the same average speed, it's just that there are several clients in the test that have final results that exceed the provisions due to delays in connecting to speedtest.net, because these clients are the most lastly, in completing the connection test (download or upload) so that traffic on the network has decreased and in each test it usually only occurs on one client.

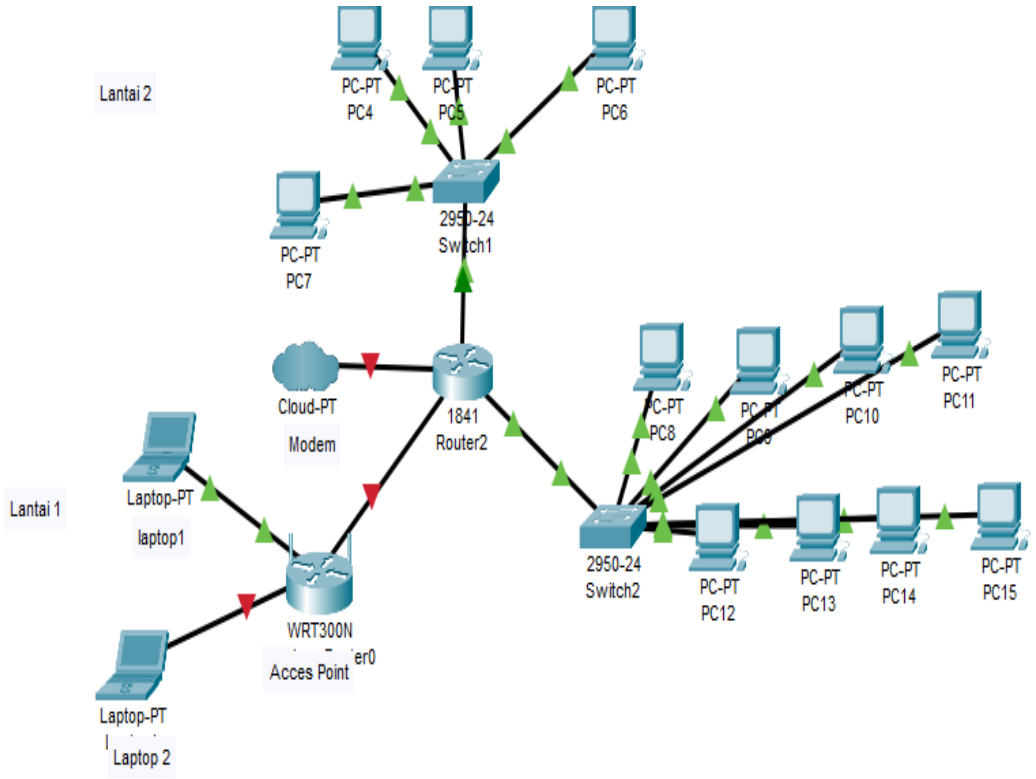

Fig 2. Analysis with Cisco Packet Tracer

Therefore, clients who experience delays can be ignored. So it can be concluded that bandwidth can be shared fairly in each network.

Table 1. Internet speed hotspot network 192.168.4.0/24

Client	IP Address	Download (Mbps)	Upload (Mbps)
1 Client	192.168.4.51	1,48	0,50
2 Client	192.168.4.51	0,65	0,50
	192.168.4.52	-+0,75	0,00

Table 2. Experiments on network 192.168.2.0/28

Client	IP Address	Download (Mbps)	Upload (Mbps)
1 Client	192.168.2.2	1.48	0.50
2 Client	192.168. 2.2	0.77	0.24
	192.168. 2.5	0.74	0.24
3 Client	192.168. 2.2	0.48	0.19
	192.168. 2.3	0.50	0.20
	192.168. 2.5	0.51	0.19
4 Client	192.168. 2.2	0.41	0.20
	192.168. 2.3	0.37	0.11

Client	IP Address	Download (Mbps)	Upload (Mbps)
	192.168. 2.4	0.37	0.15
	192.168. 2.5	0.36	0.22
5 Client	192.168. 2.2	0.45	0.44
	192.168. 2.3	0.30	0.06
	192.168. 2.4	0.36	0.22
	192.168. 2.5	0.31	0.05
	192.168. 2.6	0.36	0.07

Table 3 Experiments on network 192.168.3.0/27

Client	IP Address	Download (Mbps)	Upload (Mbps)
1 Client	192.168.3.3	1.96	0.49
2 Client	192.168.3.3	1.23	0.33
	192.168.3.4	1.01	0.27
3 Client	192.168.3.5	0.66	0.17
	192.168.3.6	0.68	0.39
	192.168.3.7	0.70	0.17
4 Client	192.168.3.3	0.52	0.36
	192.168.3.4	0.51	0.12
	192.168.3.5	0.49	0.15
	192.168.3.6	0.81	0.19
5 Client	192.168.3.3	0.37	0.10
	192.168.3.4	0.43	0.13
	192.168.3.5	0.36	0.13
	192.168.3.6	0.36	0.08
	192.168.3.7	0.49	0.48

IV. Conclusion

Based on the network system analysis that has been carried out, the following conclusions can be drawn:

1) The use of star topology aims to make it easier for schools to develop network systems.
2) The bandwidth management carried out is in accordance with the design results, where the allocation for each client is in accordance with the specified allocation.
3) The bandwidth management carried out will make it easier for each client to enjoy the internet connection that has been built without competing for bandwidth from other clients.
4) The development of a new computer network can replace the old network, and can fix the problems of the old network.

5) The teaching and learning process and school administration will feel smoother because the internet connection is running well

Acknowledgement

The author would like to thank to the principals, teachers, and all the officials of MAN 3 Jakarta for their support, data supply and welcomed atmosphere since the completion of this research. I would also thank my friends and colleagues for their assistances in completion of this article.

References

[1] M. Fathinuddin, U. Yunan, K. Septo, A. M. Rompas, and M. Hibban, "Optimasi Jaringan Komputer Nirkabel berdasarkan Desain Bangunan pada Universitas Telkom Optimizing Wireless Network based on Building Design in Telkom University," vol. 10, 2023.

[2] M. R. Wardana and D. B. Santoso, "Analisis Throughput Distribusi Jaringan Nirkabel Pada Politeknik Bumi Akpelni," vol. 8, pp. 558–567, 2023.

[3] D. Haryanto *et al.*, "PERANCANGAN JARINGAN WIRELESS ACCESS POIN MENGGUNAKAN," vol. 7, no. 1, pp. 53–60, 2022.

[4] T. Yusnanto, M. A. Muin, and S. Wahyudiono, "Analisa Infrastruktur Jaringan Wireless dan Local Area Network (WLAN) Meggunakan Wireshark Serta Metode Penetration Testing Kali Linux," vol. 04, no. 04, pp. 1470–1476, 2022.

[5] H. Agung, P. T. Informatika, F. Teknik, and U. B. Mulia, "PENGIMPLEMENTASIAN JARINGAN WIRELESS DENGAN HIERARCHICAL TOKEN BUCKET PADA MIKROTIK DAN SQUID PROXY," vol. 6, no. 2, pp. 63–72, 2017.

[6] D. Qadri and T. Y. Arif, "Analisis Tingkat Kinerja Jaringan Wireless IEEE," vol. 6, no. 2, pp. 21–26, 2021.

[7] D. Sharon and R. Supardi, "MEMBANGUN JARINGAN WIRELESS LOCAL AREA NETWORK (WLAN)," vol. 10, no. 1, pp. 35–41, 2014.

[8] A. Kinerja, T. Jaringan, W. Pada, T. Informatika, I. Sains, and T. Akprind, "WIRELESS LOCAL AREA NETWORK (WLAN)," vol. 4, no. 2, pp. 48–62, 2016.

[9] M. Rusdan and M. Sabar, "Analisis dan Perancangan Jaringan Wireless Dengan Wireless Distribution System Menggunakan User Authentication Berbasis Multi-Factor Authentication," vol. 02, no. 01, pp. 17–24, 2020.

[10] U. S. Kuala and B. Aceh, "Throughput Analysis on LTE Network for Multicast D2D System," vol. 4, no. 1, pp. 7–12, 2019, doi: 10.31572/inotera.Vol4.Iss1.2019.ID69.