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Computer Network Design Using PPDIOO Method With Case Study of SMA Negeri 1 Kunir

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Abstract

The development of technology is very beneficial for the world of education, such as the use of the internet in finding and managing information and can help in the teaching and learning process. Before using the internet, there was a computer network that played an important role in it. In building a computer network, a concept or method is needed in designing it, and here the PPDIOO method will be used and uses two types of network topologies, namely star and ring topologies. The PPDIOO method consists of several stages, namely Prepare, Plan, Design, Implement, Operate and Optimize. The device that will be used in designing this computer network will use Cisco Packet Tracer. In designing this computer network, several requirements are obtained including Server-PT, PC-PT, Access Point-PT, Router-PT, Switch, Straight-Throught Copper cable and Cross-Over Copper cable. With the design of this computer network, it can help schools in the teaching and learning process and can improve the quality of teaching, the quality of knowledge and the quality of the abilities of students and teachers and by using the PPDIOO method can improve adequate network performance.

Keywords: *Education, Technology, Computer Networks, PPDIOO Method, Network Topology*

1. Introduction

In this era of the industrial revolution 4.0, the development of technology and information is growing rapidly. All activities carried out by humans have mostly used technology to make activities easier, technology users are also increasingly starting from government agencies, the private sector, to the world of education. The development of technology is very beneficial for the world of education, such as the use of the internet in finding and managing information and can help in the teaching and learning process. To be able to access the internet, it is necessary to have a computer network. A computer network is a system consisting of two or more computers that are connected to each other through transmission media or communication media so that they can share data, applications and share computer hardware. The absence of a computer network system for sharing data in processing and storing data, so that it still uses personal computers, results in obstacles in retrieving and checking data from one computer to another due to waiting for the availability of flash disks for data transfer (Rohman, 2013). With a computer network, we can access our files as well as other people's files, sending data quickly and efficiently that has been disseminated over a network, such as an internet network.

Computer networks are very useful for schools such as SMA Negeri 1 Kunir because this school still uses personal computers. The computer network design at SMA Negeri 1 Kunir was carried out to determine the needs needed in building a computer network. The network design design at SMA Negeri 1 Kunir will be built in classrooms and several rooms that require computer networks. This is done so that the computer network at SMA Negeri 1 Kunir can run well so that it can help in the teaching and learning process and in data exchange.

2. Reseach Methods

2.1. Computer Network

A computer network is a system consisting of two or more computers that are connected to each other through transmission media or communication media so that they can share data, applications and share computer hardware. In building a computer network that has a wide coverage, additional equipment is needed including Hubs, Bridges, Switches, Routers and Gateways as the interconnection[3].

2.2. PPDIOO Method

In building a computer network, a computer network design method is needed. There are 3 types of computer network design methods, namely:

a. Bottom-up Method
b. Top-down Method
c. PPDIOO method

The PPDIOO method is a network design method from Cisco designed to support network development. The main advantage of PPDIOO is to lower TCO (total cost of ownership). PPDIOO also increases network availability because it uses a solid design network operation validation way. It also speeds up access to network and application resources (Verawati, 2016). The PPDIOO method consists of several stages according to its name, namely Prepare, Plan, Design, Implement, Operate and Optimize. The network life cycle model with the PPDIOO concept can be seen in Figure 1.

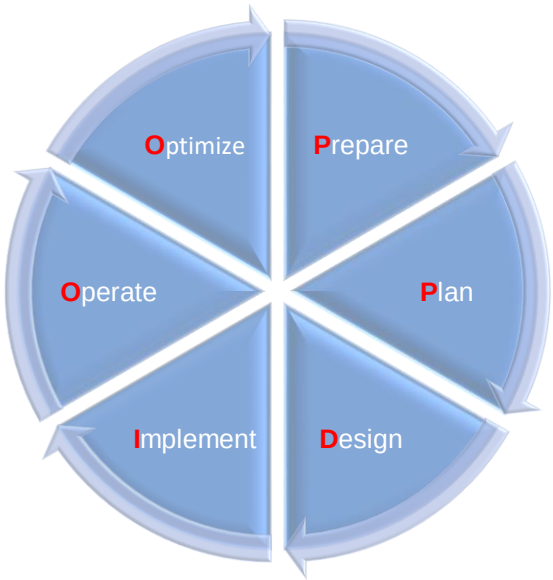

Figure 1. PPDIOO Method Cycle Model

The following is an explanation of the stages in the PPDIOO method:

a) Prepare
Define the needs, strategies, and architectural concepts by adjusting the finances of the organization or company.

b) Plan
Identify network requirements based on purpose, facilities, and user needs. Descriptions of the characteristics of a network are performed to assess the network.

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A GAP analysis is performed on the best design by looking at the behavior of the operational environment.

c) Design
Designing network designs in accordance with needs, technical requirements and analysis results that are comprehensive and detailed.

d) Implement
Applying all things that have been designed in accordance with the design and analysis that has been done before.

e) Operate
Realtime testing of the system is carried out whether the system built is in accordance with the design. If there are things that are still lacking, it will be used as a reference for improvement in improving service quality.

f) Optimize
It involves proactive awareness of network management to identify and resolve problems that arise in the future.

2.3 Network Topology

Network topology is a form of network structure that is built / installed as needed and is used to connect one computer to another using wired or wireless media.

a. Star Topology
network topology that uses a switch / hub to connect between client nodes. Star topology is a topology that is often used for network installations in general.

b. Ring Topology
Topology that connects between PCs without using intermediary media such as hubs or switches.

c. Bus Topology
Topology that uses the backbone as the connecting medium or uses the main cable as the center of data traffic. Generally used on small-scale networks.

d. Tree topology
The topology is a combination of star and bus topologies. The infrastructure in this topology is quite complicated and requires special installation. This topology uses a backbone that functions as a network path.

e. Mesh topology
The topology is designed in terms of selecting multiple network routes. In the mesh topology, there are many routes that function as backup paths when the other lines are down.

3. Result and Discussion

The computer network design was carried out using the PPDIOO method and was built using 2 topologies, namely star and ring topologies. The network design will use a network device developed by Cisco, namely Cisco Packet Tracer 6.0.

From the analysis conducted at schools, there are several types of rooms where computer networks are most likely to exist. A computer network will be built in every room in each building. The building in SMA Negeri 1 Kunir is divided into 5 parts, namely building one which includes the teacher's room, principal, student council room and class room, building two which includes the BK room, practicum laboratory and class room, building three which includes a practicum laboratory and classrooms, building four which includes computer laboratories and classrooms and building five which includes classrooms and canteen. In each room, internet access will be provided through the existing access point and connected to other rooms. For teaching and learning activities, Wi-Fi will be provided for students to make it easier for them to find references during learning activities which are located at certain points. List of rooms can be seen in table 1.

Table 1 List of Rooms

No	Room Name	Quantity
1	Headmaster Office	1
2	Teacher’s Room	1
3	Classrooms	17

4	Student Council Room	1
5	Computer Lab	1
6	Practicum Labs	2
7	Library	1
8	BK Room	1

Based on table 1 above, the tools to be used in designing a computer network on Cisco Packet Tracer can be seen in table 2.

Table 2 List of Tools

No	Tool's Name
1	Sever-PT
2	PC-PT
3	Access Point-PT
4	Router-PT
5	Switch
6	Copper Straight-Throught
7	Copper Cross-Over

From the list of rooms and the list of tools above, a network design can be generated as shown in Figure 2.

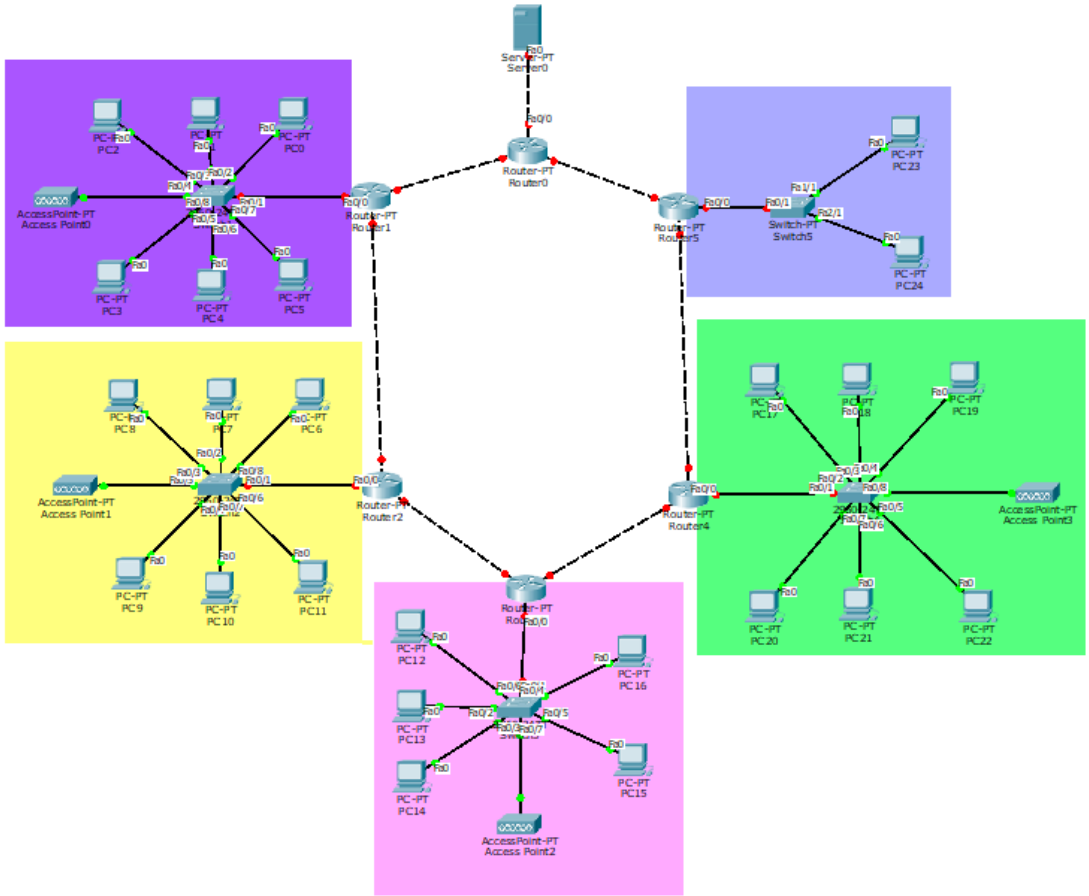

Figure 2. Computer Network Desain

4. Conclusion

From the results of this study, the design of computer network designs at SMA Negeri 1 Kunir, the needs needed in building a computer network include Server-PT, PC-PT, Access Point-PT, Router-PT, Switch, Straight-Throught Copper cable and Copper Cross-Over cable. With this computer network design can help in the teaching and learning process and can improve the quality of teaching, the quality of knowledge, the quality of the ability of students and teachers.

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With the use of the PPDIOO method can improve network performance that can be adequate for schools. In real implementation of this computer network, a detailed analysis and a complex understanding of the system to be built are required.

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