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ANALYSIS AND IMPLEMENTATION OF COMPUTER NETWORK SYSTEMS USING SOFTWARE DRAW.IO

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Article Info	Abstract
	Computer Networks Refers To Computing Devices That Are Connected And Can Exchange Data And Share Resources With. These Network Devices Use A System Of Rules, Known As A Communication Protocol, To Transmit Information Via Physical Or Wireless Technology. Two Computers Can Be Said To Be Connected In A Network If Both Have The Ability To Communicate And Exchange Information. The Author Chooses A Place At The Patria Gadingrejo Pringsewu Senior High School, Lampung. Computer Network Implementation Using Star Topology. In This Paper, A Computer Network Is Simulated At Patria Gadingrejo Pringsewu High School, Lampung, INDONESIA. Using Draw.Io Software As A Simulation Tool. Simulation Data Obtained From Computer And Network Engineering Laboratory Room, Accounting Laboratory Room And General Laboratory Room. Each Laboratory Room Has 1 Switch And 1 Wireless Router. The Performance Analyzed Is Packet Loss, Delay And Throughput. The Simulation Results Using Draw.Io Software Show That The Delay That Occurs In The Computer And Network Engineering Laboratory Is 30.4 Ms, The Accounting Laboratory Is 43.4 Ms And The General Laboratory Is 50.2 Ms. While The Entire Room Does Not Experience Packet Loss During The Simulation Process. The Throughput Results For TKJ-Laboratory Rooms Are 0.51 kbps, For Akuntansi-Laboratory Rooms Are 0.38 Kbps And for general Laboratory Rooms Are 0.37 kbps.

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INTRODUCTION

The digital era is an era in which technological changes occur rapidly that touch all areas of life so that people feel helped in carrying out services and wide coverage[1]. In this era Improving the service of data and information sources is an essential IT role[2]. So Computer Network System is so important, one of them, is the primary domain in the computer networking world where artificial immune systems (AIS) have been applied[3].

Computer networks can be applied in schools, offices and campuses. Patria Gadingrejo Senior High School is one of the educational institutions in Lampung, which requires support for using a computer network. In this case, the Patria Gadingrejo senior high school already has a computer network with a star topology in the process of sending information, but some problems occur such as slow data transmission and Unstable internet connection. This resulted in decreased network performance and work being hampered. The author implements a computer network using draw.io software because using a simulation is easier and faster than other simulations. Simulation data collection was

carried out at Patria Gadingrejo Pringsewu High School, Lampung.

Consequently, to facilitate the university in enforcing computer networks, similarly to the knowledge of the shortcomings and advantages of the school computer network. Magnitude the benefits of currently developing information technology systems, a new system is needed to support the needs of the Internet network [4].

Figures and Tables Two computer systems may be said to be interconnected in a network if each has the functionality to speak with each unique and change information. [5] Media verbal exchange isn't always best thru cables, but additionally the use of microwave media, optical fibres, to wireless models. versions in the collection, transportation, storage and processing of information can be more and more out of place, simply so a stylish device can be created to make it much less complex for humans to increase information device generation. computer and communication systems make the improvement of network verbal exchange more advanced, especially in the improvement of computer networks. [6]

LOCAL ARES NETWORK (LAN)

Local Area Network (LAN) is a nearby computer network that connects numerous computer systems and terminals at a distance that isn't too long way. The transmission medium utilized in standard is Cable, each - twine and coaxial cable. however, current tendencies have all started to be developed wireless LAN with implementation expenses that are not too highly priced as is the case with cable. [7]

STAR TOPOLOGY

Infamous person topology a few nodes are paired with an important node, which bureaucracy a bodily network like a celeb, all conversation is treated without delay and controlled through a bunch within the shape of a mainframe pc which includes a transfer/hub. The famous person topology may be visible in Figure 1. [8]
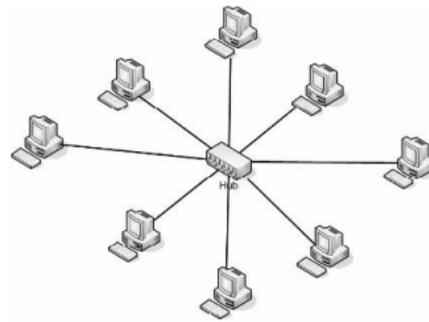

Figure 1. Star Topology

TRANSMISSION MEDIUM

A transmission medium is a means to perform the transmission of statistics from one information supply to a statistics receiver. Transmission Media In this situation the cable is a staple element in a community due to the fact without this media a network cannot operate and can not be referred to as a network. Cable is the most vulnerable bodily issue of the network so its set-up needs to be executed cautiously and thoroughly. If the network has a trouble then the cable is the primary element to be checked, due to the fact maximum probably the trouble that arises is on this component. In nearby networks, 3 varieties of cables are regarded, particularly: [9]
a) UTP cable (Unshielded Twisted Pair)
b) coaxial cable
c) Optical Fiber [10]

HOTSPOT

Hotspot is used to perform authentication, authorization, and accounting of users who access the network through a hotspot gateway. User hotspot before network access needs to authenticate via web browser with both HTTP protocol and HTTPS (secure HTTP). A Hotspot gateway requires additional memory and the CPU is used to calculate and observe the local traffic that is running. [11]

DRAW.IO

Draw.io is a software program used for network simulation. Draw.io is a network simulation software. this software program serves to create a version of a computer network and simulate a network. Draw.io offer simulation, layout and collaboration competencies in addition to facilitating the creation of complicated generation principles.

this software program has supplied numerous additives which might be regularly utilized in network structures, making it clean to create a computer network simulation in a computer, this simulation serves to decide the way to paint every of that equipment and the way to ship records from one computer to some other.[12]

[13] Application is a program that contains commands to perform data processing. Jogiyanto also explained that the notion of application, in general, is a process from a manual method that is transformed into a computer by creating a system or program so that data is processed more efficiently and optimally" [14]

METHODS

PATRIA GADINGREJO VOCATIONAL SCHOOL CHARTS

SMK Patria is an educational institution that has been established since 1984. the village Wonodadi Gadingrejo Pringsewu Lampung Indonesia, college there are numerous rooms, specifically the fundamental's room, workplace area, instructor's room, lecture room and laboratory may be proven in figure 2. Senior high school Patria ground plan.
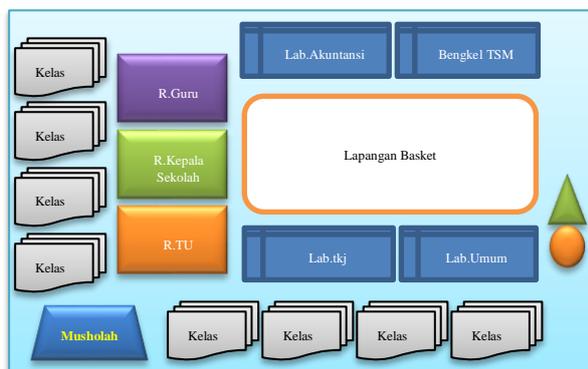

Figure 2. SMK Patria Gadingrejo

Existing system development model, in this study the authors use the system development method of Network Development Life Cycle (NDLC). [15] Computer network layout at senior high school Patria Gadingrejo the usage of the network, specifically, 48 pc

desktops, 3 laptops, 3 wi-fi routers and 3 switches the usage of 3 areas as follows:
1. The Computer And Network Engineering Laboratory (TKJ)
2. Accounting Laboratory Rooms
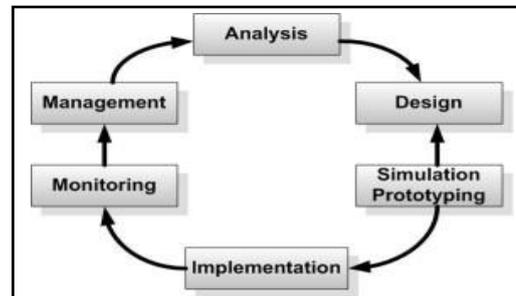3. The General Laboratory

Figure 3. Network Development Life Cycle

Figure 3 illustrates the stages that must be carried out in the NDLC method, the stages can be described as follows:
1. Analysis
   At this stage will be done network needs analysis, problem analysis, user needs analysis, and analysis of the topology/network that already exists today. Methods commonly used at this stage include conducting interviews with authorities in implementing computer networks in schools. In addition to interviews, an analysis of the theoretical basis needed to build an optimal computer system in schools, by the needs and limitations of the institution.
2. Design
   This will make the design of the network topology image that will be made, with the hope that this image will give an idea of the existing needs. The design can be a topological structure drawing, data access design, cable layout design, and others that will give an idea of what will be built.
3. Simulation Prototype
   The next stage is the prototyping of the system to be built, as a simulation of the implementation of the production system, thus researchers can know the general picture of the communication process,

connectivity and working mechanism of the interconnection of all elements of the system to be built. Researchers build a prototype of this system in a virtual environment, using a virtual machine, as a replication of the system to be run, because the virtual machine allows a program that is already dedicated to a system.

4. Implementation

At this stage, it will take longer than at the previous stage. In the implementation, the researcher will apply all that has been planned and designed before. Implementation is a very decisive stage of the success/failure of the project to be built.

5. Monitoring

The implementation of the monitoring stage is an important stage so that computer networks and communications can run following the wishes and initial objectives of the user at the initial stage of analysis, it is necessary to carry out monitoring activities.

6. Management

Stage of management or arrangement, one of particular concern is the issue of Policy/policy needs to be made to make/set up so that the system that has been built and runs well can last a long time and the element of reliability is maintained. The policy will largely depend on the policy-level management and business strategy of the company. IT as much as possible should be able to support or align with the company's business strategy.

Network simulation is designed by applicable in SMK Patria Gadingrejo by using software draw.io has advantages :

1. to create a computer version of the community and simulate the community.
2. Draw.io offers simulation, layout and collaboration competencies in addition to facilitating to get creative with complex generation principles.

3. this software has provided many additives that are often used in community structures, making it easier to create computer community simulations on computers,
4. this simulation serves to determine how to paint on each of these equipment and how to send data from one computer to another.
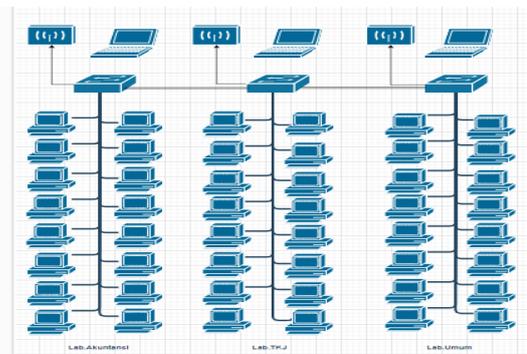

Figure 4. Network Model

DELAY

Postpone is the time it takes to journey the space from the starting place to the vacation spot. postponement may be affected by distance, bodily media or additionally lengthy runtime.

To get the cost of delay can be calculated through the equation below :

$$\text{average delay} = \frac{\text{total delay}}{\text{total packages received}} \qquad (1)$$

The network category by value of the delay can be seen in Table 1.

Table 1. Category Delay (Tiphon version)

Category	Large Delay
Very good	< 150 ms
Good	100-300 ms
Medium	300-450 ms
Ugly	> 450 ms

PACKET LOSS

Packet Loss is a parameter that describes a circumstance that suggests the entire variety of misplaced packets. Packet Loss can arise because of elements, consisting of sign

degradation in network media, exceeding network saturation limits, corrupt packets that refuse to transit, and network hardware mistakes [7]. Numerous classes of package deal loss may be visible in Table 2.

Category	Packet Loss
Very good	0 %
Good	3 %
Medium	15 %
Ugly	25 %

Table 2. Category Packet Loss

To calculate Packet Loss can be seen by using the following equation :

$$packet\ loss = \frac{(A-B)}{A}\ x\ 100\% \qquad (2)$$

Where :
A = data packet sent
B = data packet received

THROUGHPUT
Throughput is the real capacity of a network to transmit records. typically throughput is usually related to bandwidth. due to the fact throughput can certainly be referred to as bandwidth in real situations. Bandwidth is extra restoration, at the same time as its nature is dynamic relying on the site visitors that are happening. [16]
To get the throughput value, the following equation is used :

$$throughput = \frac{jumlah\ data\ yang\ dikirim}{waktu\ transmisi\ data} \qquad (3)$$

RESULTS AND DISCUSSION
From the simulation that has been done, obtained records for each parameter of the overall network performance that has been calculated quantitatively.

DELAY
The delay simulation results are shown in Table 3.

Parameters	simulation room	Simulation results
Delay (ms)	Lab -TKJ	30.4 ms
	Lab – Akuntansi	40.1 ms
	Lab – Umum	36.9 ms
	Akuntansi Akuntansi	50.2 ms
	Akuntansi Umum	46.8 ms
	Umum Umum	43.4 ms
Delay Rata-Rata		**41.3 ms**

Table 3. Delay simulation result From Table 3.

The put-off among the workplace area with the TKJ of 30.4 ms, for workplace area with lab Akuntansi of 40.1 ms, for workplace area with Lab general of 36.9 ms, for Lab area akuntansi with Lab akuntansi of 50.2 ms, for Lab area akuntansi with Lab general of 46.8 ms and the ensuing postpone among Lab area general and general of 43.4 ms.[17] Then the common postpone is received of 41.3 ms, in which the postpone is protected within the excellent class primarily based on Table 1.

PACKET LOSS
The results of packet loss simulation can be seen in Table 4.

Table 4. Packet Loss results

Parameters	Simulation room	Simulation results
Packet Loss (ms)	Kantor - kantor	0 %
	Kantor -Lab MM	0 %
	Kantor -Lab TKJ	0 %
	Lab MM -Lab MM	0 %
	Lab MM -Lab TKJ	0 %
	Lab TKJ - Lab TKJ	0 %

From the check consequences the usage of draw.io at the time of the simulation consequences received packet lack of 0%, may be visible in table 4. in which the value of packet loss is protected inside the superb class based totally on table 2.

THROUGHPUT

The throughput simulation results are shown in Table 5.

Table 5. Throughput simulation results

Parameters	Simulation room	Simulation results
Throughput (kbps)	Lab -TKJ	0.51 kbps
	Lab – Akuntansi	0.44 kbps
	Lab – Umum	0.45 kbps
	Akuntansi Akuntansi	0.37 kbps
	Akuntasi Umum	0.38 kbps
	Lab TKJ - Lab TKJ	0.38 kbps
Throughput Rata-Rata		**0.42 kbps**

From Table 5. the throughput in the TKJ room is 0.51 kbps, for the accounting room is 0.44 kbps, for the overall room is 0.45 kbps, for the accounting room with Lab Akuntansi is 0.37 kbps, for the accounting room with fashionable is 0.38 kbps and the ensuing among the TKJ Lab room and TKJ Lab is 0.38 kbps. Then the common throughput was acquired by 0.42 kbps. in which the more the throughput generated by using the simulation system the higher and vice versa small throughput generated via the simulation system isn't always correct. [18]

CONCLUSION

From the dialogue of the computer community, the overall performance of the use of the software program draw.io received numerous conclusions, amongst others :

1. From the simulation effects, it may be visible that the put-off that takes place within the TKJ lab room is 30.4 ms higher than the accounting Lab and standard Lab Room of 43.4 ms and 50.2 ms. in which the more the

postponement happens, the more the put-off time of the simulation system.
2. For the check outcomes, the complete room did now not reveal packet loss throughout the simulation system.
3. Primarily based on the simulation effects, the throughput price of TKJ Lab room is 0.51 kbps in comparison to the throughput cost of Akuntansi Lab room and widespread Lab.

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