



INNOVATIVE: Journal Of Social Science Research

Volume 4 Nomor 4 Tahun 2024 Page 3014-3024

E-ISSN 2807-4238 and P-ISSN 2807-4246

Website: <https://j-innovative.org/index.php/Innovative>

## Analysis And Simulation Of Computer Networks On Campus Tuban Institute Technology And Business Uses Cisco Package Tracking

Ali Amran<sup>1✉</sup>, Moch. Rizqi Aji P<sup>2</sup>

Institut Teknologi dan Bisnis Tuban

Email: [rizqipangestu200101@gmail.com](mailto:rizqipangestu200101@gmail.com)<sup>1✉</sup>

### Abstract

In an educational institution that has computer-based courses, it is mandatory to have a computer laboratory. As is the case with research carried out at the Tuban Institute of Technology and Business which has several study programs so it is mandatory to have a computer laboratory for continuity of learning. which was used as a reference for the author's research in planning how to implement the ITB Tuban online security optimization online system. The author will use the Access Control List (ACL) method for network access control. Organizing data access traffic by system administrators, so that administrators can determine everything that can be accessed or not accessed by users. Simulation and implementation of computer networks at the Tuban Institute of Technology and Business using Cisco Packet Tracker still needs further development. From the Cisco Packet Tracker network configuration that the author created, it is concluded that the Cisco Packet Tracing network can function well and successfully. The function of the Cisco Packet Tracer that researchers understand here is that it can be used to assemble a network or topology that is applied in the real world, such as at the Tuban Institute of Technology and Business. Apart from that, the author can analyze a well-connected network, by looking at latency, if the network has low latency then the results are positive.

*Keywords: Network Simulation, Cisco Packet Tracer.*

## Abstrak

Pada suatu lembaga pendidikan yang mempunyai mata kuliah berbasis komputer, wajib memiliki laboratorium komputer. Seperti halnya penelitian yang dilakukan di Institut Teknologi dan Bisnis Tuban yang mempunyai beberapa program studi sehingga wajib memiliki laboratorium komputer untuk kelangsungan pembelajaran. yang dijadikan acuan penelitian penulis dalam merencanakan bagaimana implementasi sistem online optimasi keamanan online ITB Tuban. Penulis akan menggunakan metode Access Control List (ACL) untuk kontrol akses jaringan. Mengatur lalu lintas akses data oleh administrator sistem, sehingga administrator dapat menentukan segala sesuatu yang dapat diakses atau tidak diakses oleh pengguna. Simulasi dan implementasi jaringan komputer di Institut Teknologi dan Bisnis Tuban dengan menggunakan Cisco Packet Tracker masih perlu pengembangan lebih lanjut. Dari konfigurasi jaringan Cisco Packet Tracker yang penulis buat, disimpulkan bahwa jaringan Cisco Packet Tracing dapat berfungsi dengan baik dan sukses. Fungsi Cisco Packet Tracer yang peneliti pahami disini adalah dapat digunakan untuk merakit suatu jaringan atau topologi yang diterapkan di dunia nyata seperti di Institut Teknologi dan Bisnis Tuban. Selain itu penulis dapat menganalisa jaringan yang terhubung dengan baik, dengan melihat latency, jika jaringan mempunyai latency yang rendah maka hasilnya positif.

Kata Kunci: *Simulasi Jaringan, Cisco Packet Tracer.*

## INTRODUCTION

The use of computers today is not a rare thing, but computers can be used as a tool to help carry out daily tasks. The use of computer networks is not only widespread in the business world but also in the world of education.

In an educational institution that has computer-based courses, it is mandatory to have a computer laboratory. As is the case in this research which was conducted at the Tuban Institute of Technology and Business campus which has several study programs so it is required to have a computer laboratory for continuity of learning. Therefore, to support digitalization activities on campus, a functional computer network is needed. Where the currently available network is only *(LAN) Local area network*.

To support the implementation of a digital campus by facilitating network services in computer laboratories where students and lecturers can exchange information using the sameresources, better network development is needed. One computer network simulation application that can be used is *Cisco Packet Tracing*. *Cisco Packet Tracing* is a simulation *software* introduced by Cisco, a system that functions as a tool for upgrading, training and also researching mock PC networks (Dian Ariawal and Onno W Purbo, (2016: 3) ).

Based on the background above, this research takes the title "Analysis and

Simulation of Computer Networks on the Campus of the Institute of Technology and Technology.

Tuban Business Using *Cisco Packet Tracing*".

## RESEARCH METHOD

The approach used in this research is the Network Development Life Cycle (NDLC) technique. NDLC itself has several stages, including analysis, design, simulation, implementation, monitoring and other management.

- Analysis

At the analysis stage, the author analyzed the network security system at ITB Tuban. The author checks the website by doing IP scanning and port checking tests to find out whether there are weaknesses in the network or not. It turns out that this scan can be carried out so that the author knows if there are gaps in the network that could possibly experience eavesdropping or intrusion. Because together the information from the scan results is good information in the form of searching for IP addresses, active ports and accounts and passwords which can be used to retrieve backup data.

- Planning

After being identified as a research reference, the author plans how to implement an online system to optimize ITB Tuban's online security. The author will use the Access Control List (ACL) method for network access control. Organizing data access traffic by system administrators, so that administrators can determine which pages or features users can access and what users cannot access. If the administrator does not want When the user enters the site, the administrator blocks access to the site. In this case, the author prepares everything necessary when designing the Tuban ITB management and security system.

- Simulation

the author designed the model, the author simulated the results of the design for the ITB Tuban network. The author tested the design to determine the success of the plan. After completing testing, the author evaluated the system design to optimize the results of the plan before it was actually carried out online.

- Application

The author applies his design to an internet cafe access control network that is easier to monitor on the ITB Tuban network.

- Summary

After the design was sent implemented on the ITB Tuban network , it was checked

by the embedded system development administrator. During the monitoring period, the system administrator more understands how to operate and maintain the system better and is more compatible with the network.

- Management

After going through all the stages here, it will be easier for the author to determine what method you want to use to manage the system in the future? When the first administration stage ends and the monitoring results are known, it is easier for the author to control what happens in order to deal with situations that arise later.

## RESULTS AND DISCUSSION

### A. Research Framework

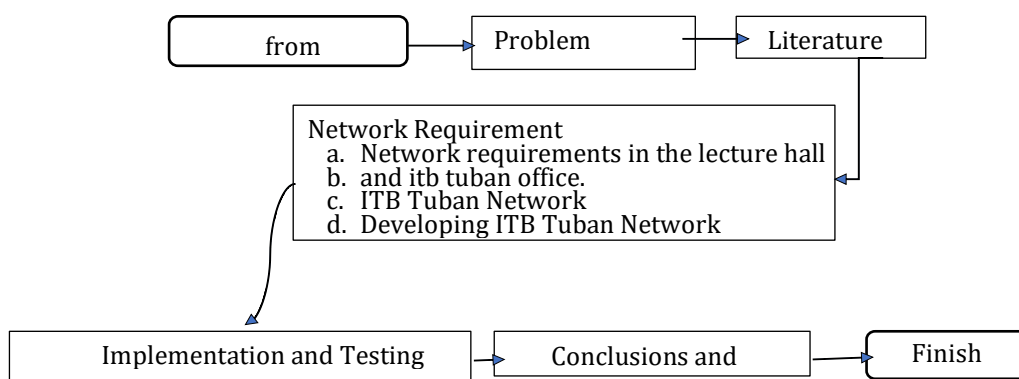


Figure 1.1

### B. Stages and Needs

Implementation of network simulation requires the following:

- Computer system

The software used in network emulation is the *Cisco Packet Tracer* application and Windows 10 64-bit.

The hardware used to carry out network emulation is: Central Processing Unit (CPU) 1.10Ghz, 4 GB memory or RAM, monitor, keyboard and mouse.

- Network Design

To determine the design or topology of a network, there are several simulation adjustments, including: (a) Network topology, (b) Concentrator (hub/switch), (c) Transmission media (wired/wireles) (d) Server IP address (e)Router

## RESULTS AND DISCUSSION

### 1. Use of the Cisco Packet Tracer Application

Cisco Packet Tracer is a network imitation tool developed by Cisco Systems. It is primarily used to study and teach computer networking concepts and skills, as well as for research and development purposes. Here are some of the main uses and features of Cisco Packet Tracer:

Cisco Packet Tracer is often used in networking courses to gain practical experience in a virtual environment. It provides a virtual laboratory environment where users can practice networking, Internet of Things (IoT), and cybersecurity skills without the need for physical hardware. This tool allows users to design, configure, and troubleshoot network topologies, making it an effective learning and teaching aid for computer networking concepts and skills. Cost-effective network design: Cisco Packet Tracer allows users to design network topologies that can be implemented in the real world. Without such tools, creating such a network topology would require expensive hardware and equipment. Therefore, Cisco Packet Tracer is a cost-effective solution for network design and planning.

## 2. Research results

Here the author has created a computer network topology consisting of: (a) 30 computers (b) 3 switches (c) 1 waiter, (d) 3 Wifi routers. Each switch is connected to 10 computers. And each PC has a destination IP with the same level and team. The conclusion is as in Figure 1.2.:

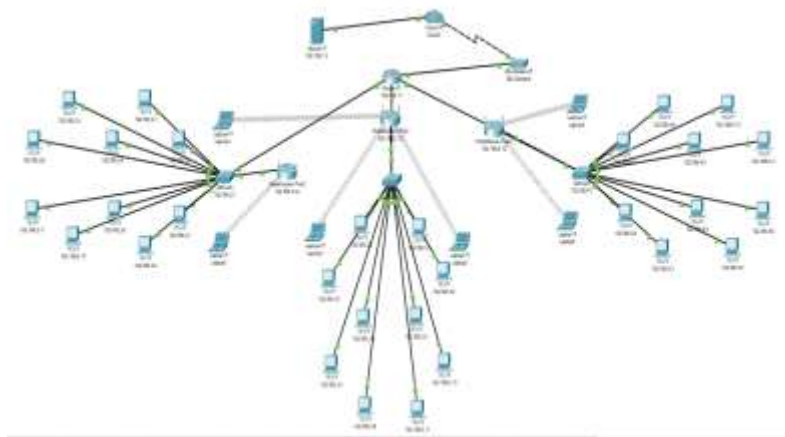


Figure 4.1: Computer Network Simulation

The stages of creating the above network tools are as follows:

- Select the server to use.



Figure 4.2: Cisco Server

- Select the router to use.



Figure 4.3: Select a router

- Select the Switch to use.



Figure 4.4: Select Switch

- Select the Wifi to use



Figure 4.5: Select Wifi

- Select the Cloud & Modem to use.



Figure 4.6: Select Cloud & Modem

- Select the computer & laptop you want to create



Figure 4.7: choosing a computer & laptop

- Neatly Arranged Server, Cloud, Modem, Router, Switch, Wifi



Figure 4.8: stacking servers, cloud, modem, router, switch, and wifi

- After creating, the most important thing is to connect each icon correctly. After all the icons have been created, next connect the area that will be connected with the switch. Use

a straight cable as a transmission medium. Server-Cloud-Modem-Router-Switch-Computer

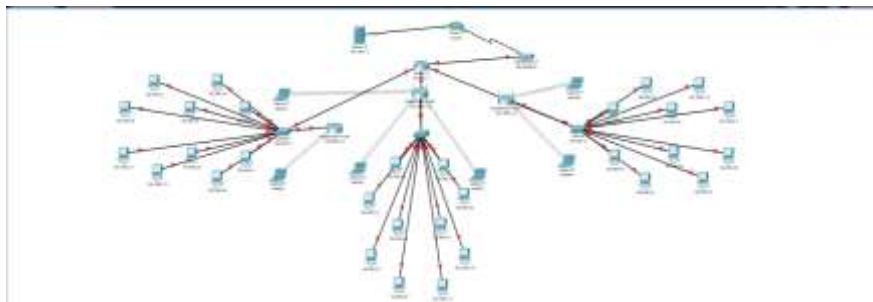


Figure 4.9: Straight Cable each icon

- After connecting to each other, select Router to set the IP configuration for each fast Ethernet in the interface column.



Figure 4.10: IP configuration setting

- After completing the IP configuration settings on the router, then set the IPv4 address on the server by clicking Server-Desktop-IP Configuration.



Figure 4.11: IPv4 settings on the server

- After setting up the server, immediately set up each computer by selecting PCdesktop configuration-ip-setting IPv4 address. Do it on all available PCs



Figure 4.12: IPv4 settings on a computer

- After you have finished setting IP4V on everything so that the network can be used, set the default gateway for each server and computer so that they can connect to each other. By clicking Server/PC-Desktop-Ip Configuration and entering the ip in the default gateway.



Figure 4.13: Setting the default gateway

- If you have finished setting the IP for everything, the cable will change color to green, with that the network can be used and immediately carry out testing.

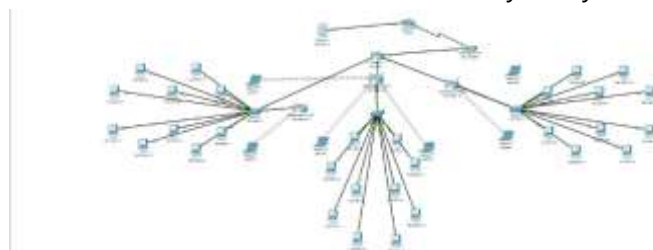


Figure 4.14: network connected with green cable

- Once everything is done, check if it can be connected from one computer to another by sending an email. If successful then the network can be used.



Figure 4.15: Sending email from one computer to another

- If so, success will appear where the network can be used.

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit
	Successful	192.1...	192.168.3.9	ICMP		0.000	N	0	(edit)

Figure 4.16: Successful example

## 2. Network Topology

Madcoms (2015:6) explains network topology as the relationship between network parts which include server PCs, consumer PCs or workstations, hubs or switches, cables and other network parts. Network topology shows the geometric relationship between its constituent components in the formation of networks, namely nodes, links, and stations. Network selection Topology formation is based on network size, capital, objectives and uses. We usually encounter this topology in everyday life without realizing it. So, computer network topology is a term used to connect computer components to each other. Network topology is divided into several types of topology, such as bus topology, ring topology, star topology, tree topology, and mesh topology.

In this research, researchers used a tree topology or what is usually called a tree topology. According to Kustanto and Saputron Effendy (2019), this tree topology combines the features of bus topology and star topology. This tree topology is a mixture of characters from star topology and bus topology, in which there is a collection of bus topologies as the backbone path. Tree topology itself is widely known as a multilevel topology which is usually used to connect centers with different hierarchies which are displayed from a small position and continue up until they have a larger level.

The advantage of a tree topology like this is that it can create the necessary groups at any time. For this reason, the use of a tree topology design is most suitable for analyzing and simulating computer networks on the campus of the Tuban Institute of Technology and Business because this topology can form several terminals that can be adapted to the needs of the campus. For example, relations can be in the form of BAAK terminals, as well as other groups formed as Tendik terminals and other groups can be formed as student terminals which can be connected to each other. The downside is that if higher level nodes fail to be useful, other groups below them become inefficient. This form of generating

network operation is relatively slow. This topology uses many cables and the trunk (sub cable) is the center of this topology.

## CONCLUSION

In conclusion, the simulation and implementation of computer networks at the Tuban Institute of Technology and Business using Cisco Packet Tracer demonstrate promising results but still require further development. The network configuration created using Cisco Packet Tracer has proven to function well and successfully. Despite the drawback that the network goes down during server maintenance, the simulation's advantages, such as cost-effectiveness and stability, make it a valuable tool. This research facilitates the quick, easy, and low-cost detection of computer network issues by providing detailed information about the status of network connections. Cisco Packet Tracer has been effectively used to design realistic network topologies for ITB Tuban and analyze network performance through latency measurements. However, the frequent lagging of the network at ITB Tuban underscores the need for continuous improvement to achieve a stable and buffer-free network. Future researchers are encouraged to build upon this work, possibly using different applications, to ensure minimal maintenance and a consistently stable network at ITB Tuban

## REFERENCES

- Alfian Armawan Sandi, T., Septian Anwar, R., & Fauzi, A. (N.D.). *Analisis Performa Redundancy Link Menggunakan Metode Spanning Tree Protocol Dan Per Vlan Spanning Tree*. <http://ejournal.bsi.ac.id/ejournal/index.php/infotech47>
- Ary Prasasty Marpaung, E., Candro Parulian Sinaga, D., Sianipar, B., Mawaddah, M., Mayang Sari, I., Rekayasa Komputer Jaringan, T., & Pelita Nusantara, S. (2024). Edukasi Teknologi Internet Of Things (Iot) Menggunakan Cisco Packet Tracer Di Sma Swasta Cahaya Medan. In *Communnity Development Journal* (Vol. 5, Issue 1).
- Bangun, R., Vlan, J., Menggunakan, D., Cisco, S., Tracer, P., & Susanto, R. (2020). *Infotekjar: Jurnal Nasional Informatika Dan Teknologi Jaringan Attribution-Noncommercial 4.0 International. Some Rights Reserved. 4(2)*. <https://doi.org/10.30743/infotekjar.v4i2.2297>
- Choirina, P., Huda, M. M., Jannah, U. M., Utama, S., & Pradani, E. R. K. (2021). Pelatihan Topologi Jaringan Menggunakan Cisco Packet Tracer Untuk Meningkatkan Kompetensi Mahasiswa Politeknik Angkatan Darat Malang. *Mitra Mahajana: Jurnal Pengabdian Masyarakat, 2(2)*, 117–123. <https://doi.org/10.37478/mahajana.v2i2.848>
- Gwangwawa, N., & Mubvirwi, T. B. (2021). Design And Simulation Of Iot Systems Using The

- Cisco Packet Tracer. *Advances In Internet Of Things*, 11(02), 59–76.  
<https://doi.org/10.4236/Ait.2021.112005>
- Hardiani, T., Esi Putri Silmina, & Danur Wijayanto. (2023). Pelatihan Jaringan Komputer Menggunakan Cisco Packet Tracer Di Smk Ar Rahmah Bantul. *Dharma Rafflesia: Jurnal Ilmiah Pengembangan Dan Penerapan Ipteks*, 21(1), 90–97.  
<https://doi.org/10.33369/Dr.V21i1.25103>
- Hasim Siregar, M. (2020). Design Of Wireless Computer Network Infrastructure In Implementation Of Kemendikbud Distributed Information Systems In Singingi Kuantan Islamic University. In *Jurnal Mantik* (Vol. 4, Issue 3).  
<https://locscience.org/ejournal/index.php/mantik>
- Irsan, M., & Candy Viditya, V. (2008). *Desain Grafis Menunjang Karya Seni Dalam Komputer Melalui Aplikasi Software Desain Grafis Menunjang Karya Seni* (Vol. 1, Issue 3).  
<http://www.aiga.com/>
- Kumar H, A. B., & D, K. E. (2022). *Study On Network Simulation Using Cisco Packet Tracer*.  
[www.irjet.net](http://www.irjet.net)
- Kuspandi Putra, Y., & Sadali, M. (2020). Penerapan Mikrotik Dalam Mengembangkan Infrastruktur Jaringan Pada Kantor Desa Rumbuk Kecamatan Sakra. *Jurnal Informatika Dan Teknologi*, 3(2), 182–193.
- Mantik, J., Setiono, O., Setijaningsih, R. A., & Ghazi, W. (2022). Redesign And Simulation Of Computer Networks In Iot-Based Medical Records Laboratory. In *Jurnal Mantik* (Vol. 6, Issue 3). Online.
- Naufal Taufiqul Hakim, Hijroh Tamamil Gina, Apriliano Chandra Diva, Gilang Gemilang, & Didik Aribowo. (2023). Simulasi Jaringan Metro Ethernet Dengan Aplikasi Cis-Co Packet Tracer Versi 6.2.0. *Jurnal Sains Dan Teknologi*, 2(1), 22–31.  
<https://doi.org/10.58169/Saintek.V2i1.1>