INTRODUCTION CHAPTER

1.1. Background

The need for information and the advancement of information technology is increasing. Every individual needs information quickly, concisely, and accurately. To meet these needs, facilities are needed that can support it. The use of information networks is also mandatory for now. Internet use in the agency environment must be balanced by implementing a reliable security system. Nowadays, the Internet can connect the head office intranet network with one or two intranet networks in branch offices. The network technology that makes this possible is private.

A private network of ten, referred to as *a Virtual Private Network* (VPN), is a network created by an organization to connect various devices and resources, such as computers, servers, and applications, between offices or geographically separated branches of a company. This network uses high encryption and authentication technology to provide better security than public networks. The main advantages of private networks are more significant control over access to corporate resources and the ability to manage network traffic more effectively. Companies can ensure that only authorized users can access company resources with a private network. In addition, private networks also provide the ability to monitor and limit network usage by employees[1].

With the rapid development of technology, the implementation of private networks is increasingly being utilized by various parties. However, its usage often exceeds the boundaries that should be applied, where private networks, which are intended solely for internal use, are now accessible by external parties, as seen in the case of the ATM Bersama service. This improper use is also accompanied by commercialization, where private network providers generate revenue through such practices. Therefore, this commercialization practice should be balanced with the obligation to pay taxes by private network providers, in accordance with the tax principle applied to income-generating activities. With the growing and increasingly widespread use of private networks, which often deviates from their original purpose, there is a need for regulatory improvements related to private

network operations. These regulations must be aligned with actual practices, including managing access for external parties, as seen in the case of ATM Bersama. Furthermore, the commercialization aspect of private networks requires attention, where revenue generation by providers should be accompanied by clear tax obligations. These regulatory enhancements are expected to create a more transparent governance framework, aligned with technological advancements and market demands. Advances in network infrastructure in a location will impact the development of topology or network infrastructure. Along with these changes, optimal network performance is needed to support activities and comfort network users. Good planning is necessary for transforming a computer network from simple to larger, including selecting the proper routing protocol to recover data traffic. Network managers are responsible for providing convenience to users by using appropriate routing methods[2].

One method that works well in large networks is multiprotocol label switching (MPLS). MPLS transmits information that ensures the quality, scalability, reliability, and security of the packages sent[3]. MPLS can be combined with a private network or VPN, benefiting existing agencies.

In Indonesia, there is no regulation regulating this private network itself. Since private networks are only used in internal cases, there is no obligation to pay PNBP, BNP, and USO[4]. This study proposes the implementation of the MPLS L3VPN private network, which will be used commercially and according to the regulations that the operation of the private network is not subject to tax. According to Law No. 20 of 1997 concerning Non-Tax State Revenue, PNBP is all Central Government revenue that does not come from tax revenue. According to the regulation of the Minister of Communication and Information Technology number 5 of 2021, the Telecommunication Operation Rights Fee, in the future, referred to as BHP Telecommunications is an obligation that must be paid by every Telecommunication Operator and is a Non-Tax State Revenue. According to the regulation of the Minister of Communication and Information Technology number 17 of 2016, KPU/USO is an obligation that must be paid by every telecommunication operator and is a Non-Tax State Revenue. Therefore, this research will help the government develop a regulation regarding *the private*

network. Improving regulations on private networks is a must because many agencies that use public networks are used for commercial needs, such as private networks used in shared ATM technology. Ultimately, the private network is not only intended for internal company use because it is enjoyed by other than bank customers. In this case, there is a discrepancy between implementation and regulations, and the process of implementing the private network itself, which was intended only for internal purposes, can be commercialized. Because of regulations in Indonesia, private networks are still treated like Telsus, so the operators of these private networks are still not obligated to pay PNBP, BNP, and USO.

The study [5] produced research that showed that the L3VPN network model can help improve the quality of VPN services and the efficiency of its use. Therefore, the journal was used as a reference for the authors to conduct this research. In addition, there is research on economic calculations in implementing a technology used to determine the feasibility of an implementation in the study[6]. By referring to the two journals, this research will analyze the technical requirements, the regulations that apply in Indonesia, and the feasibility of economic implementation of the MPLS L3VPN private network. The commercialized implementation of MPLS L3VPN will focus on implementing shared ATMs. From a technical point of view, the topography of the MPLS L3VPN private network will be prepared; the economic feasibility analysis will be calculated using the Capex, Opex, NPV, IRR, PI, and PP methods. In terms of regulations, Law Number 36 of 1999 concerning telecommunications will be analyzed. The difference between the two journals is that this study will combine three aspects. Hence, the research aims to analyze the implementation of MPLS L3VPN from three perspectives, namely in terms of engineering, economics, and regulation.

1.2. Objective Research

This study resulted in a feasibility study on implementing a private network with MPLS L3VPN in Indonesia and stands as the agency that organizes the network. The analysis will be divided into three parts: technical, economic, and regulatory. Planning calculations are divided according to the segmentation specified in the technical analysis. Economic feasibility will consider the Capex,

Opex, NPV, IRR, PI, and PP methods of applying this network architecture in economic analysis. Revenue growth from data that will be taken from one of the agencies will be one of the things considered in this study. The regulatory analysis will review existing regulations in Indonesia related to private networks and provide regulatory recommendations that are suitable for current private network practices. The implementation and feasibility of MPLS L3VPN will assist the government in determining, refining, and making regulatory recommendations on private networks.

1.3. Problem Identification

This research will produce an analysis related to implementing a private network with MPLS L3VPN in Indonesia. *The scope* of identification in this research:

1. What is the technological analysis of the implementation of MPLS L3VPN?
2. What is the feasibility of implementing a private network with MPLS L3VPN in Indonesia regarding economic calculations?
3. What are the suitable regulatory recommendations to support the implementation of private networks in Indonesia

1.4. Scope of Problem

The limitations of the problem in this study are as follows:

1. This study will analyze the implementation of MPLS L3VPN in Indonesia using case studies with the city of Jakarta .
2. The application and implementation of this research will stand as a company providing the technology.
3. The case study of commercialized private networks focuses on implementing ATM Bersama.
4. The simulation for implementing this technology will use a One P router as the topology centre, five PE routes representing five regions in Jakarta, and five CE routers in each PE router.
5. The topology represents the topology of the joint ATM in Jakarta.
6. Simulation of the network topology creation will be done in the network emulator.
7. Technical analysis of private networks with MPLS L3VPN

8. The economic analysis will be based on the feasibility of calculating Capex, Opex, NPV, IRR, PI, and PP resulting from implementing a private network with MPLS L3VPN.

9. The analysis of regulations refers to the law in Indonesia that discusses private networks because there are no definite regulations in Indonesia.

1.5. Methodology

This study has a workflow in several stages, as illustrated in Figure 1. The stages are as follows:

1. Literature Studies

    Everything related to the research topic will be searched and studied. Studies can be sourced from books, journals, papers, the results of previous research, and other sources.

2. Data Acquisition

    Later, data will be taken from several sources related to this research in the future. The data related to ATM Bersama in this research was obtained through an interview with an employee of Bank BCA. However, it should be noted that there were limitations in the information due to the company's data confidentiality policy. Nevertheless, the interview provided a sufficient overview of the use of private networks and the commercialization involved, although some specific details could not be disclosed.

3. Techno-Economics Calculations

    It will be carried out from a technical and economic perspective. Determine infrastructure needs and predict the use of private network implementation resources combined with backbone MPLS. Calculate costs and benefits and look at the benefits of the state of Indonesia.

4. Analysis

    This study will analyze technical, economic, and regulatory aspects. At this stage, the results of techno-economic calculations and regulation analyses suitable for regulating private networks in Indonesia will be analyzed. This case study research will be conducted in Jakarta, which has been selected as a representation of Indonesia. As the country's economic and technological hub,

Jakarta is considered capable of reflecting the conditions of private network usage on a national level, including in the context of services like ATM Bersama. The results of this research are expected to provide a relevant overview that can be applied to other regions in Indonesia.

5. Conclusion

At this stage, conclusions will be drawn based on the research, and recommendations will be provided.

1.6. Research Method

The techno-economic method aims to find costs to determine the economic feasibility of implementing a private network with MPLS L3VPN in Indonesia, which will later be leased to other institutions. The technical design must be revised again if it is not economically feasible. However, if economic analysis is feasible, it can be implemented. The techno-economic method is closely related to science and is oriented towards disclosing and calculating economic value in a technical activity plan.
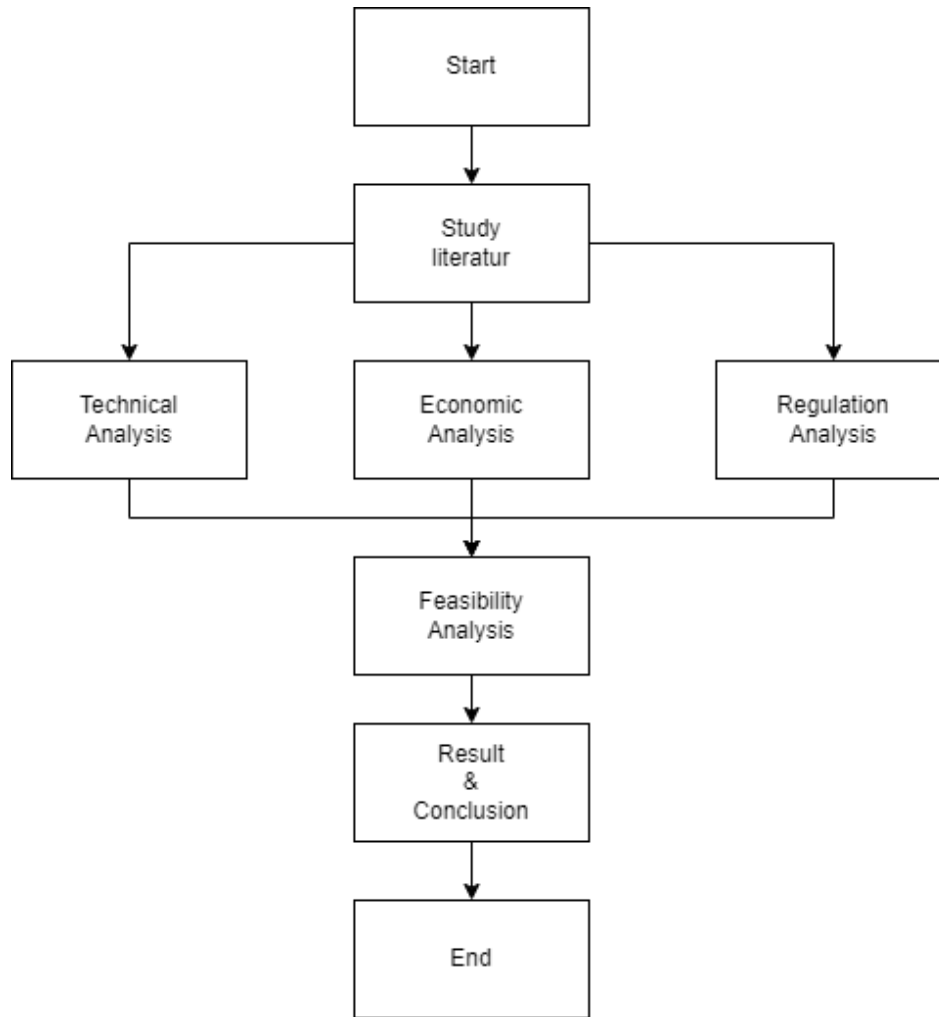
Picture. 1 Block Research Flow Diagram

1.7. Hypothesis

Based on a study entitled "Experimental Validation of L3 VPN Network Model for Improving VPN Service Design and provisioning" is a study that discusses the development of a virtual private network (VPN) network model based on MPLS Layer 3 (L3), which aims to improve the design and provision of VPN services. The results show that using the proposed L3 VPN network model can improve the quality of VPN services, including throughput, delay, and jitter. In addition, the study also shows that the use of efficient routing algorithms can significantly improve VPN network performance. Based on the research, examining the commercial implementation of MPLS L3VPN and analyzing it from a technical, economic, and regulatory perspective will show the feasibility of implementing a private network in Indonesia. Not only that, this research will be one of the considerations for improving recommendations regarding regulations on private networks in Indonesia. The making of regulatory recommendations regarding Indonesia's private networks is because many of the implementations of this private network were previously required for internal purposes but were used for business purposes so that the perpetrators of this implementation can benefit from this private network. At the same time, because the current regulations regarding special telecommunications are not subject to mandatory PNBP BNP and USO countries, they do not benefit from implementing this private network.