CHAPTER
1. INTRODUCTION

1.1. Background

The increase in the number of devices and the need for faster and more efficient networks drove the development of more sophisticated network technologies. Current popular network technologies use 128-bit IPv6 and 32-bit IPv4, which have been widely implemented. The difference is in the number of IP addresses available; IPv6 is calculated to be much greater than the capacity of IPv4. For comparison, it is 2^128 (IPv6) and 2^32 (IPv4). Layer 3: The routing process is also carried out. Some well-known strategies are Routing Information Protocol (RIP), RIPv2, and RIPng. For RIPng, it supports two types of addressing, namely IPv6 and IPv4 [37].

In an enterprise environment, several criteria must be met in building an information network topology and architecture, including aspects of security, scalability, performance, availability, monitoring, and management capabilities for the administrator side as well as network interoperability capabilities. These points are the main investment for the environmental development and maintenance process at the next stage, which is needed by every corporate environment, whether for small, medium, or large companies, including to protect sensitive, public, and confidential information according to the needs and criteria of the subject [19][20].

Manipulating security at the network layer is also a complex choice but can be a good consideration as a strategy to manage boundaries between the internal network and the external network. On the other hand, the implementation of RIPng routing still finds weaknesses called routing loops, which result in the convergence process not being completed if applied to larger networks. However, there is a Split Horizon Strategy technique that has been used in RIP and RIPv2 routing in the IPv4 environment, which is sufficient. On the other hand, not many similar studies have been found in the IPv6 and RIPng environments in this network layer, especially in network topologies that are quite complex and not so large, such as Enterprise Private Network (EPN) and 802.11ax wireless connection types [43].

This research aims to obtain information about the impacts that occur if the split-horizon strategy is implemented in RIPng (IPv6). As for how to determine a good network design, it will be determined in terms of function, security, and performance. In this case, it is a wireless network (802.11ax) Enterprise Private Network (EPN). In terms of performance, we will look further at the changes that occur. It is hoped that there will be an increase in performance following existing network requirements (EPN) [8][14].

1.2. Formulation of the problem

Before moving into the analysis process, it is necessary to identify the following points as our main objectives in this research, such as:

1. How can we determine the type of technology and protocol that can be used according to the parameters required by the EPN network?
2. How does applying the Split Horizon Strategy (RIPng, IPv6) technique affect the 802.11ax wireless network in the EPN network?
3. How does the performance of the design compare between those using the Split Horizon Strategy technique and those not using this technique?

1.3. Research purposes

The aim of the research "Split Horizon Strategy on RIPng (IPv6) Wireless Network 802.11ax EPN Topology" is to determine the topology design according to EPN criteria, then test the effect of applying the Split Horizon Strategy (RIPng; IPv6) technique with the 802.11ax wireless network. Apart from that, we will evaluate the performance of the network and offer it as an option for layer 1, 2, and 3 configuration and security in network interoperability, especially in the EPN topology.

1.4. Hypothesis

The use of the Split Horizon Strategy technique in RIPng and IPv6 for EPN is expected to improve time efficiency in the routing process and optimize the routing convergence time itself. From a security perspective, it can also be a strategy of choice in network interoperability that suits the needs of the EPN network. However, this performance research will only prioritize performance changes in the routing process or convergence time.

1.5. Methodology

This research uses several methodological stages, including:

Study of literature

Conduct complete literature research on Split Horizon Strategy techniques, 802.11ax wireless networks, RIPng protocols, and routing metrics commonly used in networks.

Network Topology Design

Designing network topology using NS-3 network simulation software. This topology will include several nodes arranged in an 802.11ax network with the Split Horizon Strategy technique.

Implementation of routing protocol strategies

Implement the RIPng protocol on each node in the designed network topology. This includes setting important parameters such as update intervals and timeout times for sending routing packets.

Simulation and Data Retrieval

Retrieves relevant network performance data from each node in the network topology. This will include data such as convergence time, throughput, delay, jitter, and packet loss. Data will be obtained from tcpdump on each node (router, device) to see what is happening in it.

Data analysis

Analyze the data collected in tcpdump. The results of this analysis will include graphs and tables to visualize network performance when the simulation is carried out and compare data with and without the Split Horizon Strategy technique.

Evaluation of results

Evaluate the results and conclude the impact of applying the Split Horizon Strategy technique on an 802.11ax wireless network with the RIPng and IPv6 protocols on network performance, whether it meets the needs of the EPN network or not.

1.6. Research Methods

The research method in this study is simulation using NS-3 network simulation software. It uses simulation because it allows researchers to model and simulate specific network conditions and collect performance data more easily and efficiently.

- The first step in this research method is to design a network topology that meets the research criteria. After the network topology is designed, researchers will implement the RIPng routing protocol by configuring each node in the network topology.
- After the routing protocol is implemented, researchers will collect relevant network performance data to study from each node in the topology. The data collected will include network performance metrics such as convergence time, throughput, delay, jitter, and packet loss. This data will be obtained from tcpdump on each node.
- After the data is collected, the researcher will analyse the data. The results of the analysis will be in the form of graphs and tables to help visualize performance more easily, and a comparative analysis of scenario results will be carried out between those with and without the Split Horizon Strategy technique.
- After the data is analysed, researchers will evaluate the results and make conclusions regarding the effectiveness of implementing the Split Horizon Strategy technique on

802.11ax wireless networks with the RIPng protocol which is related to improving network performance and reducing routing overhead.

Throughout the process, researchers will pay attention to data quality and accurate measurements and carry out trials with various parameters and network conditions to ensure the validity of the research results.