

BAB I

PENDAHULUAN

1.1 Introduction

Smart systems offer innovative technical solutions that substantially improve specialized products' quality, reliability, and economic efficiency. Several sectors, including the military, are implementing smart systems [1]. The military is the nation's most valuable asset when personnel is considered the most valuable resource. The success of a military operation is contingent upon careful planning, secure and uninterrupted communication, and the conservation of the workforce until the very end. In the military, Tactical Data Link communication is one example of "smart" technology [2].

Tactical Data Link (TDL) is a communication system that uses a particular message format and a common protocol to transmit data via wireless channels immediately, securely, and automatically [3]. In addition, Tactical Data Link communication to exchange tactical data continuously in real time between various entities, including allied, neutral, and enemy unit data [4]. One of the data delivery mechanisms in this communication is multicast data delivery. Multicast allows for data transmission to multiple computers within the same group [5]. Distributed applications and more efficient network bandwidth utilization are among the benefits of this method [6].

PT Len Industri (Persero), the holding company of Defense Industry Indonesia (DEFEND ID), has devised a method for transmitting data over a VPN Multicast network to monitor the Indonesian territory. This network can connect several Command and Control (C2) in multiple Air Operations Command Headquarters to numerous Base Transceiver Stations (BTS) in Indonesia.

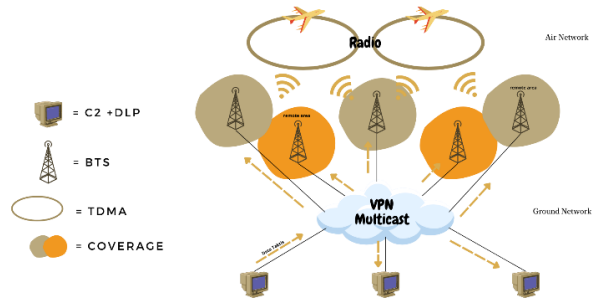


Fig. 1. Illustration of VPN Multicast in Tactical Data Link

However, its implementation is problematic due to the high cost of network procurement and difficulty reaching BTS in remote areas. Using the Multicast Tunnel technique is an option for overcoming these network issues.

Multicast Tunnel is used on local computers that aim to channel multicast traffic easily through parts of the internet that do not support multicast [7]. Although the possibility of bandwidth usage in the application of a Multicast Tunnel is very large, the multicast tunnel can reach remote areas. In this experiment, we tried using RabbitMQ, Hazelcast, and Netty in implementing multicast tunnels.

RabbitMQ is a message broker software that supports message queuing with its asynchronous messaging capabilities. It is based on publisher and subscribers, with consumers subscribing to particular topics and receiving only messages of that type [8]. The message broker is key in sending data from the server to the client, and this paper uses RabbitMQ with MQTT protocol. Hazelcast is an In-Memory Data Grid (IMDG) framework that facilitates highly scalable data aggregation and distribution [9]. In contrast, Netty is a Non-Blocking I/O (NIO) server-client framework that enables the development of network-based applications that simplify and streamline network programs such as TCP and UDP [10]. It currently needs to be determined whether the efficacy of the three can be used in the implementation of a Multicast tunnel. Therefore, Multicast Tunnels utilizing RabbitMQ, Hazelcast, and Netty are subjected to Quality of Services (QoS) testing and analysis to determine their reliability, efficiency, and availability. The Wireshark program will analyze throughput, packet loss, delay, and jitter to obtain test results for these QoS parameters.

. The summary of key contributions of this work is to compare the results of analyzing the QoS parameters of RabbitMQ, Hazelcast, and Netty on multicast tunnels to find out which has more reliability, efficiency, and availability.

The rest of this paper is organized as follows. Related work is given in Section II. Section III will explain the method, network topology, and QoS equation used in this test. In Section IV, the calculation results of the test scenarios that have been made in Section III are explained. These results are the results of the QoS parameters analyzed from the tests carried out. Finally, Section V discusses our conclusions and talks about future work