TCP Westwood Simulation and Analysis on Wireless Sensor Network for Building Structure Condition Monitoring Topology

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***Abstract*---The TCP Westwood congestion control algorithm was designed to improve data transfer efficiency in LTE networks. It can be applied to optimize data transmission in structural health monitoring topologies using Wireless Sensor Networks (WSN). To evaluate data transmission performance in a WSN-based structural monitoring topology, simulations of TCP Westwood were run using Network Simulator 2 (NS2). The results indicate that TCP Westwood optimizes bandwidth usage and reduces congestion, thereby enhancing data transmission performance in WSN. This allows WSNs to transmit data more quickly and efficiently, improving the quality of structural health monitoring. Additionally, by lowering bandwidth usage, TCP Westwood helps reduce WSN operational costs and maximizes network resource utilization. The study applies TCP Westwood in a building structure monitoring topology with various parameters such as the number of nodes, distance between nodes, and congestion levels. Simulation results show that TCP Westwood, particularly in topologies with more nodes and greater distances between them, enhances WSN data transmission by optimizing bandwidth usage and reducing congestion. Overall, the study demonstrates that TCP Westwood improves WSN data transmission performance in structural health monitoring, enabling faster and more efficient data transmission and reducing operational costs.**

Keywords--- TCP Westwood, Wireless Sensor Network, NS2, Bandwith.

I. INTRODUCTION

In Indonesia, one of the serious problems currently being Wireless Sensor Network (WSN) technology has advanced significantly in recent years, with widespread applications across various fields, including structural health monitoring. WSN enables real-time and remote data collection from sensors installed in hard-to-reach locations. However, the use of WSN in structural monitoring also presents several challenges, such as bandwidth limitations, energy constraints, and network limitations. In this context, the use of an effective congestion control algorithm like TCP Westwood can help improve data transmission performance in WSN [1].

TCP Westwood is a congestion control algorithm developed to enhance data transmission performance in LTE networks. It operates by estimating the available bandwidth and adjusting the window size based on this estimation. Consequently, TCP Westwood can reduce congestion and improve data transmission performance in Wireless Sensor Networks (WSN) [2].

In this study, TCP Westwood simulations were carried out using Network Simulator 2 (NS2) to evaluate data transmission performance in a structural health monitoring topology using WSN. The simulations were conducted with various parameter variations, such as the number of nodes, distance between nodes, and congestion levels. The results of the simulations demonstrate that TCP Westwood can improve data