

## I. INTRODUCTION

Development in this era of globalization is growing rapidly, this is because buildings such as houses and apartments are one of the tertiary basics in life. Humans need a place to live to survive. In addition, buildings such as malls have evolved beyond just shopping destinations, now functioning as entertainment and social interaction centers for everyone. Although these changes provide benefits, such as increased economic opportunities and employment, it is important to realize that these changes in land use have major consequences for the environment.

Rapid and unregulated land use changes in urban areas have resulted in the conversion of green areas into residential, commercial, and industrial areas which can result in natural disasters [1]. Floods are one of the natural disasters that can damage buildings in the area. In addition, natural disasters that can damage the condition of building structures are earthquakes, tsunamis, and liquefaction. In 2018, Palu City experienced a natural disaster that resulted in victims losing their homes. The factor that led to the failure of building structures in Palu after a major disaster was the inability of the main structure to withstand the force during the earthquake [2].

The very rapid development of construction in this era must also be balanced with the maintenance of the condition of the building. Routine monitoring of building conditions must be carried out over time to maintain the building structure to remain sturdy and suitable for human habitation. In addition, routinely monitoring the condition of building structures can also reduce property losses when unexpected disasters occur. To assist in monitoring the condition of buildings in this country so that damage is detected, a wireless sensor network can be utilized. This technology uses sensing that will capture data in real time using parameters such as vibration intensity in buildings [4][15]. Then, TCP Vegas is a network protocol that creates faster retransmissions than some other TCPs [5].

This study aims to evaluate the performance of TCP Vegas in wireless sensor networks (WSN). This analysis includes throughput, delay, and packet loss ratio, which are important metrics in evaluating the performance of a network. In addition, to identify the effect of TCP Vegas implementation on the efficiency of WSN in the application. The study will use NS2 to analyze TCP Vegas against the topology of building condition monitoring. NS2 provides network scenario simulation, so NS2 is suitable for studying TCP Vegas in wireless sensor networks for the purpose of monitoring the structural integrity of buildings by comparing network configurations and assessing the efficiency of TCP Vegas based on metrics such as the number of active nodes, communication coverage area, and nodes that can be reached from the sink [18][19].

Thus, monitoring the condition of building structures can be done in a more efficient way by utilizing wireless sensor network technology by analyzing TCP Vegas. This research is expected to support the development of wireless sensor networks in monitoring the condition of building structures.