ABSTRACT

In an era of ever-evolving infrastructure, the need for proper monitoring and maintenance of public facilities has never been more important. Structural Health Monitoring (SHM) is emerging as a solution that enables early detection and analysis of damage to infrastructure without damaging its materials. In this context, Wireless Sensor Network (WSN) is a promising option to efficiently collect data from various infrastructure locations. This method allows setting up a network topology based on the surrounding environment, but also presents challenges such as power and communication limitations. To address this, this research analyzes topology variations (star, tree, and mesh) to assess QoS performance with delay, throughput, and packet loss parameters. By using routing protocols such as Destination-Sequenced Distance Vector Routing (DSDV), this research aims to achieve more accurate and efficient monitoring objectives in support of sustainable infrastructure. The results of this study show that the mesh topology has the best QoS performance compared to the star and tree topologies with a throughput of 1.35 kbps and a delay of 0.04 s. The results show that the mesh topology has the best QoS performance compared to the star and tree topologies.

Keywords: *Destination-Sequenced Distance Vector Routing* (DSDV), *Network Topology, Structural Health Monitoring (SHM), Wireless Sensor Network (WSN).*