IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 2, May 2025
Impact Factor: 7.67

A Machine Learning-Based Link Quality Anomaly Detection Architecture for SD-WMN: A Comparative Perspective

Divya Rani[1], Aparna Singh[2], Farzana Anjum G[3], Nirmala S[4]
Students, Department of Computer Science[1,2,3]
Professor, Department of Computer Science[4]
AMC Engineering College, Bengaluru, Karnataka, India

Abstract: *Software-Defined Wireless Mesh Networks (SD-WMNs) combine the flexibility of Software-Defined Networking (SDN) with the resilience of wireless mesh architectures, enabling them to operate effectively in dynamic and infrastructure-sparse environments such as smart cities and rural deployments. However, such networks are highly prone to threats to link quality degradation caused by interference, mobility, and configuration anomalies. This paper presents a comparative analysis of anomaly detection frameworks with a focus on link quality monitoring in SD-WMNs. Leveraging insights from recent works on SDN security, configuration testing, and DDoS mitigation using data-driven approaches like machine learning and deep learning models, we propose a hybrid unsupervised-learning-based approach combining clustering and change point detection to identify link anomalies in real-time. The study critically evaluates methods based on accuracy, computational overhead, and real-time adaptability using both synthetic and real network traces. Our findings highlight the necessity of lightweight, scalable anomaly detectors in dynamic wireless environments and outline future directions for robust SD-WMN architectures.*

Keywords: Software-Defined Networking (SDN), Wireless Mesh Networks (WMN), Anomaly Detection, Link Quality, Change Point Detection, Machine Learning, Security, Unsupervised Machine Learning

DOI: 10.48175/568