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An Optimized Link State Routing Protocol with a Blockchain Framework for Efficient Video-Packet Transmission and Security over Mobile Ad-Hoc Networks

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Abstract: A mobile ad-hoc network (MANET) necessitates appropriate routing techniques to enable optimal data transfer. The selection of appropriate routing protocols while utilizing the default settings is required to solve the existing problems. To enable effective video streaming in MANETs, this study proposes a novel optimized link state routing (OLSR) protocol that incorporates a deep-learning model. Initially, the input videos are collected from the Kaggle dataset. Then, the black-hole node is detected using a novel twin-attention-based dense convolutional bidirectional gated network (SA_ DCBiGNet) model. Next, the neighboring nodes are analyzed using trust values, and routing is performed using the extended osprey-aided optimized link state routing protocol (EO_OLSRP) technique. Similarly, the extended osprey optimization algorithm (EOOA) selects the optimal feature based on parameters such as node stability and link stability. Finally, blockchain storage is included to improve the security of MANET data using interplanetary file system (IPFS) technology. Additionally, the proposed blockchain system is validated utilizing a consensus technique based on delegated proof-of-stake (DPoS). The proposed method utilizes Python and it is evaluated using data acquired from various mobile simulator models accompanied by the NS3 simulator. The proposed model performs better with a packet-delivery ratio (PDR) of 91.6%, average end delay (AED) of 23.6 s, and throughput of 2110 bytes when compared with the existing methods which have a PDR of 89.1%, AED of 22 s, and throughput of 1780 bytes, respectively.

Keywords: mobile ad-hoc networks (MANETs); blockchain storage; interplanetary file system (IPFS); deep-learning method; delegated proof-of-stake (DPoS); optimized link state routing protocol (OLSRP)

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1. Introduction

Mobile ad-hoc networks (MANETs) are infrastructure-less networks in which self-configured mobile nodes are interconnected via wireless links [1]. Due to their decentralized process, such nodes confide in each other to store and transmit packets. Video-packet transmission over MANETs is a challenging task because of the sudden changes in topology and minimal central administration [2]. Traditional cellular wireless networks demand a high-priced infrastructure for achieving great mobility. However, MANETs cannot require high-priced or wired infrastructure [3]. Also, conventional wireless networks require a constant network infrastructure with access points or base stations that are eligible to be utilized for situations such as military missions and disaster relief [4]. In these cases, a high-speed deployment and self-organized network can be employed for certain purposes and particular periods. In general, ad-hoc networks are self-configured, decentralized, self-organized networks and can generate a communication network without confiding in any constant infrastructure [5]. Advancements in the Internet have changed our way of