



Pre-emptive Priority Queueing Based Multipath Routing (PPQM) to Enhance the QoS for Video Transmission in H-MANETs

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Abstract

Addressing latency concerns and ensuring high-quality video services in Heterogeneous Mobile Adhoc Networks (H-MANETs) are paramount challenges. This paper presents a pioneering solution: the Pre-emptive Priority Queueing based Multipath Routing algorithm (PPQM). Our approach prioritizes video traffic within OpenFlow switches, directing it across multiple paths in H-MANETs. Integrating the PPQ module within Cluster Heads operating in the software-defined networking (SDN) architecture is central to our design. We rigorously evaluate delay for each path by employing an M/M/1 queueing policy based on a Poisson arrival process and an exponential service time distribution. Utilizing Burke's theorem, our calculation spans the entire route from the cluster head to a sink node. By meticulously assessing the delay characteristics of individual paths, our model facilitates the selection of the most optimal path to minimize overall delay and enhance network performance. Our proposed model amalgamates clustering, FIFO with M/M/1 queueing, and SDN techniques. In a comprehensive evaluation against existing technologies, the implementation of PPQM demonstrates superior performance in crucial Quality of Service (QoS) metrics, including end-to-end delay, queue size, waiting time, throughput, and response time. Furthermore, our research achieves a significant 4.2% improvement in QoS metrics compared to contemporary approaches, highlighting the effectiveness of the PPQM algorithm in enhancing network performance. This research contributes a robust solution for advancing QoS in H-MANETs, demonstrating the efficacy of the PPQM algorithm compared to contemporary approaches.

Keywords Heterogeneous Mobile Adhoc Network (H-MANET) · Queueing model · Video transmission · Quality of service (QoS) · Software-defined networking (SDN) · Routing protocol

1 Introduction

In recent years, the proliferation of wireless communication has been driven by the escalating demand among modern users to access dynamic services such as web browsing, video conferencing, and gaming. This surge in demand is largely attributed to advancements in

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