

# Evaluating the Impact of Aggregation and RTS/CTS schemes on IEEE 802.11 Based Linear Wireless Ad-Hoc Networks

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## Abstract

The Linear Wireless Ad-Hoc Network (Linear WANET), as a branch of the Ad-Hoc network, refers to a self-organizing multi-hop wireless network in which nodes are arranged linearly. Frame aggregation and RTS/CTS schemes are introduced in IEEE 802.11 aims to improve network transmission performance. However, the traditional mechanisms may not have good adaptability in linear multi-hop networks. Thus, we defined a Linear WANET simulation model based on the IEEE 802.11 protocol. We established this model on the NS-3 network simulator to perform A-MSDU, A-MPDU, and two-level frame aggregation simulation and analyzed the aggregation performance under different channel environments. Meanwhile, the RTS/CTS and TXOP mechanisms were also simulated in this paper. We analyzed the performance of each mechanism in a Linear WANET under saturated and unsaturated environments. We found that in a Linear WANET, the A-MSDU mechanism can improve system performance to a limited extent, but at the same time, it will increase the packet loss rate and delay. Although the A-MPDU mechanism can reduce the retransmission overhead, the higher A-MPDU Limit cannot further improve the throughput of the Linear WANET. Meanwhile, in the case of single A-MPDU aggregation, there has a lowest data delivery interval that the Linear WANET system can withstand. Besides, we also found that the native TXOP mechanism cannot effectively improve the system efficiency of Linear WANET. And the RTS/CTS mechanism can improve the performance of Linear WANETs, especially in a saturated throughput environment.

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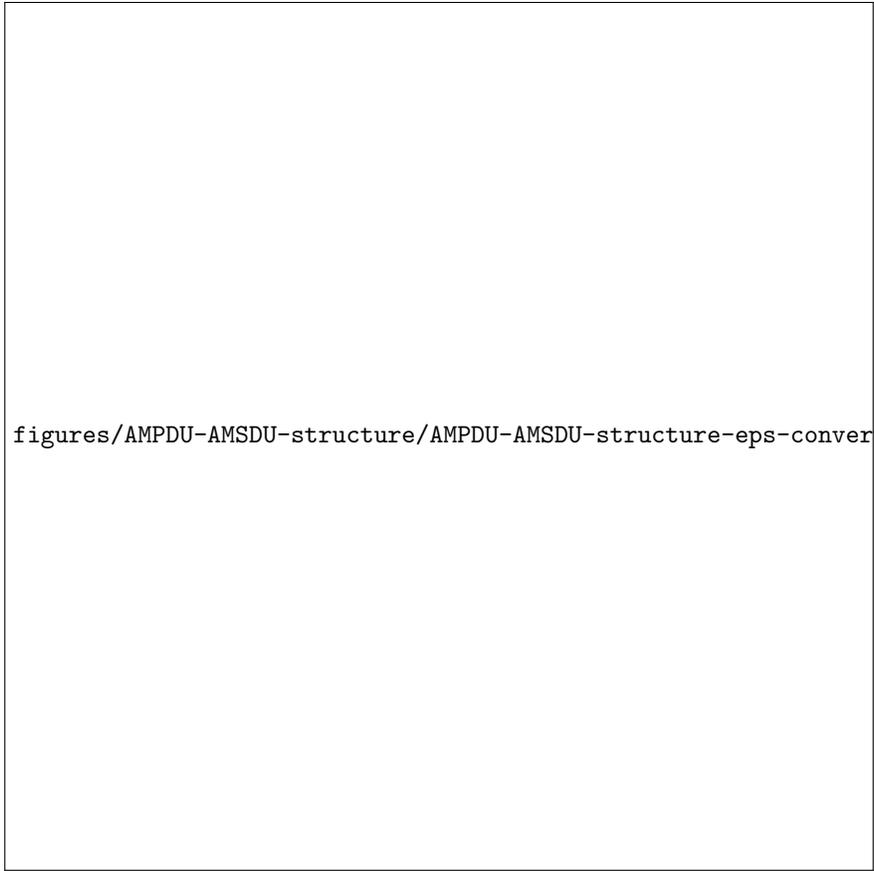
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