Additional Bump Slot Allocation Scheme for QoS guarantee of Urgent Messages in TDMA-based Tactical Wireless Networks

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Abstract—In this paper, we propose an additional bump slot allocation scheme for QoS (Quality-of-Service) guarantee of urgent messages in TDMA-based Tactical Wireless networks. MIL-STD-188-220 is the most typical ad-hoc protocol based on military networks. The key focus of this paper is the performance enhancement of DAP-NAD for QoS guarantee of urgent messages which means the highest MP (Message Precedence). In the battlefield, QoS of urgent messages should be guaranteed because these require real-time and reliable transmissions, and QoS guarantee for these messages affects achievement of military operation, significantly. This scheme can prevent the case where the priority messages are transmitted in advance in compared to urgent messages over DAP-NAD. We define this case as “QoS violation”. To solve this problem, we analyze the case in which QoS violation occurs, and modify the mechanism of the conventional DAP-NAD by inserting an additional bump slot. The proposed scheme is thoroughly examined by simulation method. The results show that the variation of QoS violation according to the number of stations and interval of generation ratio of urgent messages. Consequently, the average delay of urgent messages derived from QoS violation in the proposed scheme becomes shorter than that in conventional scheme.

Keywords—MIL-STD-188-220, DAP-NAD, bump slot, QoS

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