

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

Jong-yon Kim*, Jong-kwan Jung*, Eun-ho Kim* and Byeong-hee Roh**

* Mobile Multimedia Communication Network Lab., Ajou University, Suwon, South Korea

** Department of Software Convergence Technology, Ajou University, Suwon, South Korea

{kmakjy, kbs8354, zpstls, bhroh}@ajou.ac.kr

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



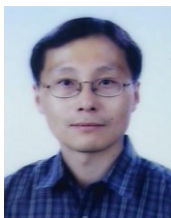
Jong-yon Kim received a B.S degree in mechanical engineering from Korea Military Academy, Seoul, South Korea in 2003 and have studied M.S course in Network Centric Warfare engineering from Ajou University, Suwon, South Korea since 2011. In 2003, he is commissioned second lieutenant in field artillery in Republic of Korea Army. He worked as the field artillery officer for 8 years. He was selected the scholarship, which is supported in the Ministry of Defense, student of M.S course in 2010. His research interests include the MIL-STD-188-220 and Cognitive Radio, MANET, QoS



Jong-kwan Jung received a B.S degree in computer engineering from Korea Military Academy, Seoul, South Korea in 1997, and M.S. degrees in Computer Engineering from Korea Advanced Institute of Science and Technology (KAIST), and Ph.D. degrees in Network Centric Warfare engineering from Ajou University, Suwon, South Korea in 2012. His research interests include the MIL-STD-188-220 and MANET, QoS



Eun-ho Kim received a B.S degree in electronic engineering from Korea Air Force Academy, Chung-Ju, South Korea in 2001 and have studied M.S course in Network Centric Warfare engineering from Ajou University, Suwon, South Korea since 2012. In 2001, he is commissioned second lieutenant in communication command in Republic of Korea Air Force. He worked as the communication command officer for 11 years. His research interests include the MIL-STD-188-220 and Cognitive Radio, MANET, QoS



Byeong-hee Roh received a B.S. degree in Electronics Engineering from Hanyang University, Seoul, Korea, in 1987, and M.S. and Ph.D. degrees in Electrical Engineering from Korea Advanced Institute of Science and Technology (KAIST), Taejeon, Korea, in 1989 and 1998, respectively. From 1989 to 1994, he was with Telecommunication Networks Laboratory, Korea Telecom, as a researcher. From February 1998 to March 2000, he worked with Samsung Electronics Co., Ltd., Korea, as a Senior Engineer. Since March 2000, he has been with the Graduate School of Information and Communication, Ajou University, Suwon, Korea, where he is currently an associate professor. During 2005, he was a visiting associate professor at Dept. of Computer Science, State University of New York, at Stony Brook, New York, USA. His research interests include mobile multimedia networking, network QoS, wireless sensor networks, network security, and military communications.