A Survey on How to Solve a Decentralized Congestion Control Problem for Periodic Beacon Broadcast in Vehicular Safety Communications

Heecheol Song and Hwang Soo Lee

Department of Electrical Engineering, KAIST, Daejeon, South Korea

heecheol.song@mcl.kaist.ac.kr, hwanglee@ee.kaist.ac.kr

***Abstract*—For decades, vehicular industries have made an investment in developing cooperative vehicular systems to satisfy the current and future needs for reducing car accidents and increasing traffic safety and efficiency on the road. To satisfy these requirements, vehicular ad hoc networks (VANETs) based on wireless communications have been emerging as one of the promising solutions in recent years. Several research efforts have been conducted for various applications in VANETs and especially cooperative collision warning (CCW) using vehicular safety communication has been getting the spotlight because this is one of the most important and critical applications in VANETs. To realize CCW, however, the existing technical challenges, such as congestion control of periodic beacon broadcast and reliable dissemination of emergency messages in congested situation, should be solved. In this paper, we present the existing congestion control techniques for CCW in decentralized vehicular environments and point out their limitations and technical challenges. The question about how to solve these problems is also discussed in this paper.**

***Keyword*—Cooperative collision warning (CCW), decentralized congestion control (DCC), vehicular ad hoc network (VANET), vehicular safety communication (VSC)**

Heecheol Song was born in Gunsan, Korea in 1982. He received the B.S. and M.S. degrees in electrical engineering from KAIST, Daejeon, Korea in 2004 and 2006, respectively. Currently he is a Ph.D. candidate in electrical engineering from KAIST, Daejeon, Korea. His research interests include MAC and routing protocols for mobile ad-hoc networks, wireless mesh networks, wireless sensor networks, and vehicular networks.

Hwang Soo Lee Song was born in Seoul, Korea in 1952. He received the B.S. degree in electrical engineering from Seoul National University, Seoul in 1975, and the M.S. and Ph.D. degrees in electrical engineering from KAIST, Seoul in 1978 and 1983, respectively. In 1975, he was with the Hyundai Heavy Industries Co. where he was involved in designing marine instrumentation and automatic navigation systems. In March 1983, he joined KAIST as an Assistant Professor of Electrical Engineering. He is currently a Professor in the Division of Electrical Engineering, School of Electrical Engineering and Computer Science at KAIST. From 1993 to 1996, he served as a Chairman of the Department of Information and Communication Engineering at KAIST. In the academic years of 1984 to 1985 and 1996 to 1997, he worked with the Information Systems Lab. at Stanford University as a Post Doc. Fellow and a Visiting Professor, respectively. From Feb. 1997 to Mar. 2000, he was working with SK Telecom as a Vice President and Head of the Central Research Laboratory in SK Telecom. Since Dec. 2005, he has been Head of the Mobile Media Platform Center (MMPC). His current research interests include mobile communication systems, ad hoc and sensor networks, and wireless data transmission and protocols.