

# Challenges of LTE High-Speed Railway Network to Coexist with LTE Public Safety Network

Jin-Kyu Choi\*, Hanbyeog Cho\*, Hyun-Seo Oh\*, Kyong-Ho Kim\*,  
Mun-Jin Bhang\*\*, Hak-Sun Yoon\*\*, Heung-Gyoon Ryu\*\*\*

\* Industries IT Convergence Research Department, Electronics and Telecommunications Research Institute (ETRI), Korea

\*\* KR Research Institute, Korea Rail Network Authority (KR), Korea

\*\*\*Department of Electronic Engineering, Chungbuk National University, Korea  
{jkchoi, hbcho, hsoh5, kkh}@etri.re.kr, {bmj, kamayun}@kr.or.kr, ecomm@cnu.ac.kr

**Abstract**— As the speed of train trialled by the French National Rail Corporation has reached more than 500 km/h, the secure and continuous connection to the train control system has only grown more important. In this paper, current status and progress of national disaster safety network project and LTE-based integrated wireless network for railway in Korea, firstly, and the major challenges of LTE-R network to coexist with LTE public safety network are addressed in the aspect of the air interface requirements for the essential railway services. In our view, it is the most important thing at present for designing and planning LTE railway network to eliminate – not to mitigate or reduce – the radio interference, especially from the adjacent LTE public safety network to LTE-based wireless train control because they use the same frequency band.

**Keyword**— LTE-R, LTE Railway Network, Public Safety Network, PS-LTE



**Jin-Kyu Choi** received B.S. and M.S. degrees from the Department of Electronics, Communications and Electromagnetics Engineering at Hanyang University, Korea, in 1999 and 2001 respectively. Since January 2001 he has been an senior researcher in the Smart Mobility Research Department of ETRI, Daejeon, Korea. His research interests include MIMO-OFDM, 3GPP LTE, SDR, e-Navigation, and LTE-R.



**Hanbyeog Cho** received the B.S. degree in industrial engineering from the Ajou University, Suwon, Korea, in 1981, the M.S. degree in 1983, and the Ph.D. degree in industrial engineering from Hanyang University, in 1992, respectively. He is currently a principal researcher in the Smart Mobility Research Department of ETRI, Daejeon, Korea. His research interests include Telematics/ITS Services & Standardization, Vehicle-Vehicle/Vehicle-Infrastructure Communications, Cooperative ITS, and Railway Wireless Communications Technology.



**Hyun-Seo Oh** received the B.S. degree from the Soongsil University, Korea, in 1982, and the M.S. & the Ph.D degree from Yonsei University in 1985 & 1992, respectively. He is currently a principal researcher in the Smart Mobility Research Department of ETRI, Daejeon, Korea. His research interests include Telematics/ITS Services & Standardization, Vehicle-Vehicle/Vehicle-Infrastructure Communications, Cooperative Driving.



**Kyong-Ho Kim** is a principal researcher and director of the Human–Vehicle Interaction Research Center, Electronics and Telecommunications Research Institute, Daejeon, Rep. of Korea. He received his BS and MS degrees in electronic engineering from Kyungpook National University, Daegu, Rep. of Korea, in 1993 and 1995, respectively, and his Ph.D degree in computer science from the Korea Advanced Institute of Science and Technology, Daejeon, Rep. of Korea, in 2010. Since 1994, he has been with ETRI. His current research topics include intelligent vehicles, human–computer interaction, head-up displays, and augmented reality applications in vehicles.



**Mun-Jin Bhang** is a researcher of KR Research Institute, Korea Rail Network Authority (KR), Korea. He received the B.S. degree in Railway Signal Control Engineering from the National Railroad College, Korea, in 1997, the M.S. degree in Project Management from the Hanyang University, Korea, in 2009. His research interests include Railway Communications Technology.



**Hak-Sun Yoon** is R&D manager of the KR Research Institute, Korea Rail Network Authority (KR), and adjunct professor in Woosong University, Korea. He received the B.S. degree in Electrical Engineering from the Seoul National University of Science and Technology, Korea, in 1995, the M.S. degree & Ph.D in Control and Measurement Engineering from the Kwangwoon University, Korea, in 2000 and 2012 respectively. His research interests include RAMS, Train Control System, and Railway Communications Technology.



**Heung-Gyoon Ryu** is professor in Chungbuk National University, Korea. He received the B.S. and M.S. and Ph.D. degrees in electronic engineering from Seoul National University in 1982, 1984 and 1989. Since 1988, he has been with Chungbuk National University, Korea, where he is currently Professor of Department of Electronic Engineering in Chungbuk National University. His main research interests are digital communication systems, communication circuit design, spread spectrum system and communication signal processing.