Development of Cost-Effective Wi-Fi 6 SISO/MIMO Vector Signal Generator and Analyzer

Jeng-Kuang Hwang, Chien-Min Chen

Department of Electrical Engineering, Yuan Ze University, Taiwan

eejhwang@saturn.yzu.edu.tw, s1078601@mail.yzu.edu.tw

Abstract—**In order to reduce the R&D and testing costs of wireless communication products, this paper proposes a low-cost cross-platform Wi-Fi 6 SISO/MIMO vector signal generator and analyzer, by dismantling the traditional instrument architecture into core software, cross-platform control interface, and radio platforms. We develop the vector signal generation (VSG) software according to the specifications, and design the receiving end analysis algorithm to complete the development of the vector signal analysis (VSA) software. On the other hand, we also develop a cross-platform control interface, so that the core software can be integrated across platforms through this interface. The platforms we have completed integration include low-cost NI universal software radio peripheral (USRP) B/N/X series SDR platform and high-end NI vector signal transceiver (VST). Through this architecture, the radio platform can be flexibly selected according to the user's budget and needs, thereby greatly reducing the R&D and testing budget.**

Keywords—*VSG/VSA, Wi-Fi 6, Software Defined Radio, MIMO, Cost-effective*

Jeng-Kuang Hwang (S'87–M'91–SM'18) was born in Taipei, Taiwan, in 1962. He received the graduation degree (Highest Hons.) in electrical engineering from the National Taipei Institute of Technology, Taipei, in 1982, and the Ph.D. degree in electrical engineering from National Tsing Hua University, Hsinchu, Taiwan, in 1991. Since 1991, he has been with the Department of Electrical Engineering and the Department of Communication Engineering, Yuan-Ze University (YZU), Zhongli, Taiwan. In 1997, he had been a Visiting Professor with AT&T Labs/Research, Florham Park, NJ, USA. From 2008 to 2011, he served as the Chairman of the Communication Engineering Department, YZU, where he is currently the Director of the Communication Research Center. He has conducted many research projects in both academia and industry, authored or co-authored over 150 papers and 2 books, and holds 20 patents. His current research interests include communication signal processing, software defined radios, signal measurement and instrumentation, MIMO channel sounding and modeling, and radar systems.
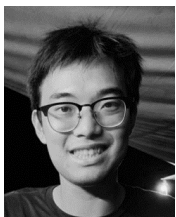
Chien-Min Chen received the B.S. and M.S. degrees in communication engineering from Yuan-Ze University (YZU), Zhongli, Taiwan, in 2012 and 2014, respectively. He joined the YZU Communication Research Center in 2014 and has been involved in 4G LTE SISO/MIMO signal generation/analysis and building cross-platform test/measurement/verification platform. Now, he is working on his Ph.D. degree in Electrical Engineering at YZU. His main research interests include communication signal processing, MIMO systems, IEEE 802.11 family, MIMO channel, and software defined radios.