Devising a Design Framework for Next-Generation Wireless Technology

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Advancing wireless communication technology to a new generation of application and service is one of today's prime research disciplines. Demands for higher capacity drive the need to create novel signal transmission techniques and advanced receiver signal processing methods. Challenging design requirements are compounded by the complexity of the nature of the transmitter and receiver: a complicated system consisting of radio frequency, analog and mixed-signal components. Plus, heated competition in the development arena forces tight time-to-market deliverables.

To develop effective next-generation wireless technology under the constraint of thousands of variables, it is important to use mathematical modeling and analysis, computer simulations, fast calculations, and data summaries to thoroughly account for manufacturing process variations before build-out. Using these tools to analyze production provides a comprehensive transistor-level statistical design and verification framework. With it, designers can troubleshoot and devise design enhancements to solve the issues of fading, impulsive noise, and co-channel interference in the concept phase.

Xiaodong Wang is a leading researcher in signal processing, computing, and communications. His broader research interests include information theory, algebraic coding theory, wireless communications, optical communications, communication networks, statistical signal processing, and genomic signal processing. Results of his research have included extensive publication in these areas, most recently in the areas of chip-level asynchronism on a Code Division Multiple Access (CDMA)-based overlay system for optical network management; modulation classification via Kolmogorov-Smirnov test; Generalized Likelihood Ratio Test (GLRT)-based spectrum sensing for cognitive radio with prior information; and blind frequency-dependent I/Q imbalance compensation for direct-conversion receivers.

Wang also has become active in the emerging field of genomic signal processing (GSP). The aim of GSP is to integrate the theory and methods of signal processing with the global understanding of functional genomics, with special emphasis on genomic regulation. He took part in a National Science Foundation-funded multidisciplinary collaborative project to develop a structural health monitoring (SHM) system using a wireless piezoelectric sensor network.

Wang is a fellow of the Institute of Electrical and Electronics Engineers (IEEE). He received the 1999 NSF CAREER Award and the 2001 IEEE Communications Society and Information Theory Society Joint Paper Award. He has served as an associate editor for the *IEEE Transactions on Signal Processing*, the *IEEE Transactions on Communications*, the *IEEE Transactions on Wireless Communications*, and *IEEE Transactions on Information Theory*. He is listed as an ISI-Highly-Cited researcher.

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