



Fall 2017 Colloquium Department of Computer and Information Sciences

Recent Progress on Shared Spectrum Metrology Research

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Abstract: Due to the increased bandwidth demand of wireless services and low efficiency of legacy spectrum usage, spectrum sharing is an increasingly important research topic to enhance spectrum efficiency while keeping mutual interferences to be non-harmful. Shared spectrum metrology (SSM) relates to the science of measurement of spectrum activities and quantification of functional performance of coexisting wireless systems. The first part of this presentation covers a brief technical overview and highlight of shared spectrum metrology work at National Institute of Standards and Technology (NIST), USA. The second part focuses on recent theoretical and experimental results on coexistence of LTE-LAA (long term evolution-license assisted access) and WLAN (wireless local area network) systems. We point out several problems of an original listen before talk (LBT) scheme used in LAA, including low efficiency, a significant slot boundary tracking error, and a transmission backoff slot jamming (SJ) effect between systems of heterogeneous slot durations. We design new LBT schemes to improve throughput efficiency, and mitigate slot tracking error and SJ effect. We also develop a novel performance analysis method to evaluate effect of heterogeneous slot durations, and implement software defined radio (SDR) and FPGA programming and automated-test-based experiments. Comparisons among theoretical, Monte Carlo simulation, and hardware-based experimental results are provided.

Bio: Yao Ma received the Ph.D degree in wireless communication area of Electrical Engineering from National University of Singapore in year 2000. He past appointments include Member of Technical Staff at the Centre for Wireless Communications, Singapore, Post-doctorate Fellow at University of Toronto, Assistant Professor at Iowa State University, research faculty member at Wright State University, Electronics Research Engineer at Air Force Research Laboratory, and Senior Computer Scientist at Infoscitex Inc. Since July 2015, he has been with the Communication Technology Lab, National Institute of Standards and Technology (NIST), USA.

His technical expertise covers wireless communication and network area, with recent focus on shared spectrum metrology, software defined radio, and Laboratory experiments and data processing. He is a senior member of IEEE (2008), an associate Editor for the IEEE Transactions on Vehicular Technology (since 2004), and a former editor for IEEE Transactions on Wireless Communications.