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Full-Duplex Relaying Cognitive Radio Network With Cooperative Non-Orthogonal Multiple Access

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Abstract

The rapid growth of mobile data traffic and connectivity has become one of the most significant concerns for the development of wireless networks. Limited but scarce spectrum resources must be utilized as efficiently as possible to cope with the increasing service demands. In order to reuse both idle and underutilized spectrum bands, we propose a cooperative non-orthogonal multiple access (CNOMA) scheme in a full-duplex (FD) relaying cognitive radio network (CRN). When the primary user (PU) does not exist, the secondary user (SU) identifies and then utilizes spectrum holes by spectrum sensing to avoid the waste of spectrum resource. When the PU exists, it shares its licensed spectrum band with the SU by NOMA to utilize the band more sufficiently. With a FD communication mode, the proposed FD CNOMA scheme has the potential to provide better system performance compared with half-duplex. Moreover, the SU under FD mode detects and transmits signals simultaneously, avoiding inherent issues of conventional CRN such as interference on the PU during transmission slots and resource waste during sensing slots. To characterize the performance of FD CNOMA, expressions of ergodic rates, outage probabilities and system throughput are derived. Simulation results are presented to validate the correctness of the derived results. They also show that FD CNOMA outperforms two other cooperative benchmarks in real-world scenarios.

About the Speaker

Xinyu Wang, received the BEng and MS degrees in information and communication engineering from Harbin Institute of Technology, Harbin, China, in 2014 and 2016, respectively. She is currently working toward the Ph.D. degrees with the School of Electronics and Information Engineering, Harbin Institute of Technology, Harbin, China, and with the Department of Electronic and Information Engineering, The Hong Kong Polytechnic University, Hong Kong SAR. Her research interests include cognitive radio, non-