

Preface

Rapid growth of wireless communication services in recent decades has created a huge demand of radio spectrum. Spectrum scarcity and utilization inefficiency limit the development of wireless networks. Cognitive radio is a promising technology that allows secondary users to reuse the underutilized licensed spectrum of primary users. The major challenge for spectrum sharing is to achieve high spectrum efficiency while making non-intrusive access to the licensed bands. This requires information of availability and quality of channel resources at secondary transmitters, however, is difficult to be obtained perfectly in practice. Limited channel feedback, a few bits of channel state information sent from receiver to transmitter, provides a practical approach to detect spectrum opportunities and discover channel quality. This Springer Brief investigates spectrum sharing with limited channel feedback in various cognitive radio systems, i.e., point-to-point, broadcast scheduling and ad-hoc networks. The design aim is to optimally allocate the secondary resources so as to improve the throughput of secondary users while maintaining a certain quality of service of primary users. The analytical results of optimal resource allocation are derived via optimization theory and are verified by the numerical results. The results show that the secondary performance is significantly improved by limited feedback, and is further improved by more feedback bits, more secondary receivers and more primary side information.

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