

Preface

The limitations of current static spectrum management policy drive the idea of a more dynamic access policy to improve the efficiency of radio spectrum usage and accommodate the increasing demand for wireless communication applications. Known as the opportunistic spectrum access (OSA), the new paradigm allows cognitive secondary users (SUs) to access the licensed spectrum, provided that the licensed primary users (PUs) are sufficiently protected. To enable OSA by SUs, cognitive medium access control designs are required to track instantaneous spectrum resources, decide on the optimal transmission strategy, and facilitate the distributed spectrum sharing among SUs. This Springer Brief aims to report recent advances in the cognitive MAC designs for OSA networks. First, an overview of the basic MAC functionalities and also MAC enhancements of IEEE 802.11 is presented as an enabler for comprising and realizing full cognitive features. Next, existing MAC protocols for OSA are discussed in detail and classified based on their characteristic features. Finally, new results are presented with regards to adaptive learning-based MAC designs tailored for OSA, which optimize spectrum utilization and ensure a peaceful coexistence of licensed and unlicensed systems. Analytically devised via optimization and game-theoretic approaches, these adaptive MAC designs are shown to effectively reduce collisions between PUs and SUs, and also contention among SUs.

The target audience of this informative and practical Springer Brief is researchers and professionals working on current and next-generation wireless access networks. The content is also valuable for advanced students interested in wireless communications and signal processing for communications.

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