Cognitive Radio Enabling Opportunistic Spectrum Access in LTE-Advanced Femtocells

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Abstract:

The Cognitive Radio (CR) paradigm provides mechanisms and methodologies for an utmost and efficient use of scarce spectrum resources. Among its implementations, Opportunistic Spectrum Access (OSA) enables the use of otherwise-unutilized licensed spectrum provided no interference is caused to the licensee. This paper focuses on the application of this concept for indoor femtocell deployments where, in addition to own licensed spectrum resources, opportunistic spectrum resources can be aggregated. Provided certain interference among femtocells, coordination mechanisms are required. In this framework, this paper studies the use of Media Independent Handover (MIH) signaling to report interference measurements that allow a central controller to make femtocells share white spaces. Moreover, whenever an excessive femto-to-femto interference would require coordination, the proposed opportunistic spectrum access scheme enhances spectrum efficiency and reduces interferences. Results indicate that the proposed opportunistic system significantly improves capacity without requiring additional intelligence in the femtocell.