

From sensing to predictions and database technique: a review of TV white space information acquisition in cognitive radio networks

ABSTRACT

Strategies to acquire white space information is the single most significant functionality in cognitive radio networks (CRNs) and as such, it has gone some evolution to enhance information accuracy. The evolution trends are spectrum sensing, prediction algorithm and recently, geo-location database technique. Previously, spectrum sensing was the main technique for detecting the presence/absence of a primary user (PU) signal in a given radio frequency (RF) spectrum. However, this expectation could not materialized as a result of numerous technical challenges ranging from hardware imperfections to RF signal impairments. To convey the evolutionary trends in the development of white space information, we present a survey of the contemporary advancements in PU detection with emphasis on the practical deployment of CRNs i.e. Television white space (TVWS) networks. It is found that geo-location database is the most reliable technique to acquire TVWS information although, it is financially driven. Finally, using financially driven database model, this study compared the data-rate and spectral efficiency of FCC and Ofcom TV channelization. It was discovered that Ofcom TV channelization outperforms FCC TV channelization as a result of having higher spectrum bandwidth. We proposed the adoption of an all-inclusive TVWS information acquisition model as the future research direction for TVWS information acquisition techniques.

Keyword: Cognitive radio; Prediction algorithm; Spectrum sensing; TVWS white space; Geo-location database