

Primary users ON/OFF activities over MF-TDMA based Cognitive Radio networks

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Abstract

Spectrum underutilizations are attributed to the primary users (PUs) ON/OFF behavior, thus giving rise to spectrum holes. However, cognitive radio technology (CRT) has being a research paradigm to the identification and exploitation of TV white space (TVWS) across frequency and time. Moreover, several research focus on Orthogonal Frequency Division Multiple Access (OFDMA) as a perfect match for CRT and little or none on Multiple Frequency Time Division Multiple Access (MF-TDMA). This paper focuses on investigating the primary/incumbent users ON/OFF markov activities over MF-TDMA platform in various channel environments (rural, urban and open space) and show the amount of available resources (OFF mini-slots) in these areas which are very useful for cognitive users (CUs). Simulation was carried out in various scenarios (environments) to see the availability of resources (IDLE/OFF mini-slots) which are of utmost importance to the secondary users. The transition from ON to OFF was adopted from a measured data from the Communication Research Centre, Harbin Institute of Technology. The experiment shows the state probability matrix and the state transition matrix which depicts a typical ON/OFF behaviour of primary users in the three environments. The simulation of this behavior shows that there are more available resources found in the open space with 95.66%, closely followed by remote/rural environment with 82.2% and lastly, by urban areas with 23.2%. Thus reason being that, urban areas are jam packed with users of all kind.

Keywords: cognitive radio network (CRNs), wireless channel, MF-TDMA, Primary users, ON/OFF.

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