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Interference Detection Among Secondary Users Deployed in Television Whitespace

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Abstract

Interference is one of the significant issues in television white space (TVWS) that limits the scalability of secondary user networks, lowers the quality of service, and causes harmful destruction to primary users. Interference among secondary users is one of the severe problems in TVWS because there is no legal rule that governs the coexistence of secondary nodes in the available white space channels. Many studies have been conducted to recognize the presence of primary signals in order to identify spectrum gaps and avoid interference between primary and secondary users, but the majority of them failed to detect interference among secondary users. Furthermore, the few works that mitigate interference among secondary users, rather than detecting it, assume interference. Therefore, in this paper, we develop an interference detection algorithm using an energy detector. To enhance the energy detector's functionality, we consider dynamic thresholds rather than static ones. We also modify the binary hypothesis to account for interference between two non-cooperative users coexisting in TVWS. We simulate the energy detector technique in MATLAB R2020a environment and utilised various signal-to-noise ratios (SNR) values. With an SNR of −8 dB, the proposed algorithm attains a maximum performance of 95.35% as the probability of detection and meets the standard set by IEEE 802.22 which requires the probability of detection to surpass or equal to 90%.

Keywords

- **Television White Space**
- **Interference Detection**
- **Secondary Users**
- **SNR**

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