Spectrum sharing method for cognitive radio in TV white spaces: enhancing spectrum sensing and geolocation database

Abstract:

This paper proposes a system called Wireless Link based on Global Communication Channel (WLGCC) to enhance the spectrum sharing between digital broadcasting (DB) services and the cognitive radio (CR) system in the licensed band of 470-790 MHz. The WLGCC aims to enhance the spectrum sensing and geolocation database (GLD) spectrum sharing methods in the CR system. Spectrum sensing can be enhanced by receiving the status of the used frequencies from the WLGCC, thereby eliminating the need for a low detection threshold (i.e., avoiding the hidden node problem). In addition, the GLD can be enhanced by providing a reliable communication link between the database and the CR device in the form of an unused TV white space that is reserved as the proposed Global Communication Channel (GCC). This paper analyzes the coexistence of the new WLGCC system and the DB service in terms of avoiding additional interference. Specifically, we mathematically determine the WLGCC parameters, such as the in-band and out-of-band power levels, and operation coverage, and verify them using Monte Carlo simulation. The results show that WLGCC does not degrade the existing DB service and reliably transmits information of the vacant (or used) frequency bands to the CR.