

Firefly Algorithm based Power Control in Wireless TV White Space Network

Abstract

TV white spaces (TVWS) can be used by secondary users as long as they do not cause harmful interference to primary users (PUs). Regulatory authorities worldwide have mandated the use of geo-location database (GLDB) for protection of incumbent users. In a wireless TVWS network, interference could be due to either co-channel interference or adjacent channel interference. Recent studies have shown that aggregate adjacent channel interference from a high density of mobile users using low power in multiple adjacent channels is as harmful as co-channel interference even if each single adjacent channel interference level stays below the GLDB D/U (desired to undesired) ratio constraint. When there is a high density secondary users (SUs) in a TVWS network, there will high interference among SUs and a possibility of harmful interference to primary users (PUs). Power control is therefore necessary to protect PUs against harmful interference and to reduce the level of interference among SUs. In this paper we propose a firefly algorithm based power control algorithm for a GLDB based wireless TVWS network that take into consideration interference constraints at the primary user (PU) and SU. The algorithm also takes into consideration both co-channel and adjacent channel interference. Simulation results show that the proposed algorithm protects TV receivers against harmful interference and results in an improvement of signal to interference and noise ratio (SINR) for SUs.