ABSTRACT

Dynamic spectrum access networks (also known as cognitive radio networks and next generation wireless networks) have emerged as a solution to increase spectrum efficiency and adaptability as a result of the power of cognitive radio technology and the motivation of spatially and temporally random use of channels. As long as there are no main- licensed users in the area, secondary users, such as those in a cognitive radio network, are free to utilize the licensed spectrum band and it becomes a question. Due to the approach of limiting the access to the spectrum, secondary users see a wide variety in channel availability. Cognitive radio networks possess a large performance reduction, due to channel availability heterogeneity, which presents a major problem for protocol design.

Methods for spectrum selection and allocation that account for the impact of heterogeneity on the network performance are proposed. This research also proposes channel solutions that may be used to achieve three important goals in the cognitive radio mesh networks.

The primary goal is to maximize the network coverage which is measured by the total number of clients serviced, while also streamlining the communication coordinating function. Weeds (Channels) are selected in the CRN by utilizing a bioinspired approach to achieve this goal. Since then, the markov greedy auction model has been created to distribute channels for forthcoming data transmission protocols. It is demonstrated that the suggested allocation technique outperforms the state-of-the-art alternatives.

The second objective is to improve the detection probability to make up the performance drop, due to the availability of different channels. To minimize the main network interference and to increase channel utilization, a bio-inspired, weed-optimized channel-selection method that makes use of spectrum-hole prediction has been proposed. An auction-based methodology has been presented for allocating channels that account for interference and channel capacity to regulate latency and switch speeds. The accuracy of predictions about channel availability as well as allocation is greatly improved by using this technique. Improving the throughput impact of channel allocation serves as the final objective.

A Particle Swarm Optimization (PSO) and a Genetic Algorithm (GA) approach, both are geared toward spectrum sensing, are presented to tackle this problem. When it comes to allocating channels, we compare and contrast the Generalized Predictive Channel Selection Algorithm (GPCSA) with its extended cousin and the Extended Generalized Predictive Channel Selection Algorithm (EXGPCSA) are compared and contrasted. According to the results obtained, it is clear that the proposed model is superior to all others, and it shows promising evident as a foundation for the sixth generation cognitive communications.