# Abstract

Today's wireless networks are characterized by a fixed spectrum assignment policy. However, a large portion of the assigned spectrum is used sporadically and geographical variations in the utilization of assigned spectrum ranges from 15% to 85% with a high variance in time. The limited available spectrum and the inefficiency in the spectrum usage necessitate a new communication paradigm to exploit the existing wireless spectrum opportunistically. In this respect, Cognitive radio technology is receiving significant attention as an approach to alleviate the FCC (Federal Communications Commission) identified problem of scarcity of available radio spectrum. In order to fully utilize the scarce spectrum resources, with the development of cognitive radio technologies, spectrum access becomes a promising approach to increase the efficiency of spectrum access the licensed bands from primary users(when primary user is not using the spectrum)on a negotiated or an opportunistic basis. To access the available wireless spectrum channel assignment must be done among the CR users in the network in an efficient manner.

Game theory provides a framework for analyzing spectrum access. We have developed a model for channel assignment among cognitive radio users. We are considering single hop network and homogeneous node in our model. Channel assignment is done in three different cases and they are as first fit, best fit, and worst fit. First fit is associated with quick decision making but might lead to less capacity utilization. The best fit provides best capacity utilization possible but the delay in decision making might occur as there is more number of comparisons. In worst case scenario the capacity is wasted unnecessarily and also there is more number of comparisons. The utility of coalition is given by overall data transmitted, where the revenue is in terms of transmitted data and cost is in terms of time spent during decision making among cognitive radio users. The game formulated in this model for channel assignment has transferable utility so that the utility can be arbitrarily distributed among the members of coalition.

Keywords: cognitive radio user (CR user), cognitive Radio Network (CRN), secondary user(SU),primary user(PU), coalitional game theory, cooperative, transferable utility, first fit, best fit, worst fit.