

## Abstract

In today's world of wireless communication, Cognitive Radio Networks(CRN) have paved a road for unlicensed users to opportunistically access vacant portions of the licensed spectrum without causing harmful interference to primary users. However, routing has been introduced as a challenging issue in CRN because of unpredictable channel availability. In this report, we study routing related issues in CR network and propose a virtual backbone based routing solution for CRN. The idea of virtual backbone has gained enough popularity in mobile ad hoc networks(MANET) as because it provides an ease for routing and data transport. The proposed strategy looks for constructing virtual backbone in CRN by considering coverage of nodes and relying on local non-dedicated common control channels for each coverage of nodes. This approach first introduces the concept of Distributed Database Coverage Heuristic(DDCH) for the construction of virtual backbone which only requires the exchange of local information among the nodes. The concept of DDCH is also used in ad hoc networks for similar purpose. The approach focuses on how this DDCH can be employed to generate and maintain the virtual backbone structure in CRN network topology. Next, inter-connectivity is maintained among the backbone nodes which get created while constructing the virtual backbone. And finally, the virtual backbone gets utilized for performing end-to-end data transmission by interchanging control messages. The basic intention behind this strategy is to allow every node within a coverage of nodes to have information about the spectrum opportunity of every other node in the coverage. This provides an ease to construct a route for the secondary users. Furthermore, it is preferred to use asynchronous implementation for the proposed approach since secondary users in CR network communicate among themselves in an ad hoc setup. Ultimately, the proposed work is evaluated through simulations by employing an open source modular software, OMNeT++ and efforts are made to provide a performance based comparison between a non CRN based routing approach, such as, Adhoc On Demand Distance Vector Routing Protocol(AODV) and the proposed scheme for CRN routing. Simulation results are presented to show the effectiveness of the proposed approach.

**Keywords :** Cognitive radio Network(CRN), virtual backbone, Common Control Channel(CCC), asynchronous implementation, routing, spectrum mobility, secondary users(SUs), primary users(PUs).