Study and Analysis of Cognitive Radio Network (CRN) as a Future Communication Network

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A Report is submitted to the Department of Electrical Engineering,
Bahria University, Islamabad.
In partial fulfillment of requirement for the degree of BS(EE).

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Abstract

Cognitive Radio Network (CRN) helps in effective and efficient utilization of the frequency spectrum of licensed user by allocating the spectrum to cognitive users (CUs) when primary or licensed user (PU) is not using the spectrum. In a CRN there are number of CUs, each CU senses the spectrum of the PU and report the sensing result to the Fusion Center (FC) of the CRN which makes the final global decision about spectrum availability. This project aims to analyze a proposed technique Reporting Channel Based Contribution (RCBC) for performance optimization on spectrum sensing schemes in CRN. There are two important performance matrices for any CRN; detection probability and constraint on probability of false alarm. By increasing number of (CUs) in a CRN for sensing PU and reporting to the FC, performance of both performance matrices increase ideally. With Practical increase in number of users, there is reporting loss in the performance matrices and both of these matrices are highly degraded when large number of user is being reported at a time. RCBC count the effects of channel and signal quality to set optimize threshold for performance matrices, probability of Detection and probability False Alarm. The proposed technique RCBC limits the number of CU's contribution for the final global decision of Probability of False Alaram and Probability of Detaction. When RCBC is applied, number of collected samples changes along with the change in global performance matrices. Required numerical results achieved by mathematical expressions show change in the global probability of detection and false alarm with K out of N fusion rules on local performance matrices at FC. Proposed RCBC technique improved the highly degraded performance matrices results to make the decisions for spectrum usage by PU. These results also justify that for large number of CUs; reporting majority fusion rule with RCBC technique is the best approach to be used in future CRN.

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