

**CHENNAI – PONDICHERRY**

**Centralized Cooperative Directional Spectrum Sensing for Cognitive Radio Networks**

**Abstract:**

Most previous spectrum sensing techniques use omni-directional antennas. Unlike omni-directional antennas, the use of directional antennas for spectrum sensing is a promising technique that can realize fine-grained sensing for the primary user (PU) with a longer sensing range. In this paper, we propose a centralized cooperative directional sensing technique for cognitive radio networks. We assume that one secondary coordinator called the fusion center (FC), gathers sensing results from secondary nodes. Using the reported information, the FC optimizes the sensing period, sensing power, and sensing beams per secondary node. For optimization, we use a modified gradient descent method with numerical methods to solve the nonlinear optimization problem. The simulation results show that our directional spectrum sensing technique is well suited for the existing cognitive radio environment. The optimal scheme shows proposed here better performance in all simulation factors than the non-optimized scheme.

**Existing System:**

Cooperative spectrum sensing techniques have used omni-directional antennas. The SUs that use an omni-directional antenna cannot determine the sensed Pus exact location. If SUs sense the locations of PUs, they can efficiently utilize the geographic information of the spectrum. Some localization schemes such as the direction of arrival, triangulation or other similar methods used in omnidirectional antennas exchange to message of PU detection among SNs. As a result, it causes harmful interference to the PU.

To detect the PUs location more accurately and without harmful interference, a directional antenna can be used for spectrum sensing. Compared with the omni-directional counterpart, the directional technique which needs more radio units has several benefits such as a longer sensing range over the same amount of energy, lower energy consumption with the same sensing range, and fine-grained sensing. In this paper, we propose a directional sensing technique for cognitive radio networks. If we use a directional antenna for spectrum sensing, sensing overhead (sensing time, sensing energy, etc.) can be reduced, and more precise sensing is possible since directional antennas can identify the orientation of the PU.

**Proposed System:**

A distributed sensing algorithm based on evolutionary/coalition games. In their scheme, each secondary node decides whether to participate in sepctrum sensing or do nothing to save its own energy. Each secondary node selects its action based on its utility history and chooses the strategy that yield the highest utility. Further, secondary nodes sense the channel that carries the most amount of information in order to reduce the uncertainty of the channel status. In the authors proposed an adaptive sensing period optimization scheme for cognitive radio networks based on a genetic algorithm. They aimed to maximize spectrum opportunities as well as minimize the sensing overhead for secondary nodes. In their scheme, the genetic algorithm was used to update the sensing period during each sensing operation. In the authors proposed a cooperative sensing technique based on a greedy heuristic algorithm. In order to reduce the energy consumption for sensing, they attempted to optimize the sensing schedule. In their scheme, each secondary node broadcasts its sensing schedule. If another secondary node receives this information, it determines an optimal sensing schedule by using a greedy heuristic algorithm to reduce the time complexity.