Fair Optimal Resource Allocation in Cognitive Radio Networks With Co-channel Interference Mitigation

ABSTRACT

- In this paper, we study the utility fairness resource allocation in multi-user orthogonalbased cognitive radio network (CRN) with cochannel interference (CCI) mitigation. In our proposed system model, we introduce the correct reception probability (CRP) model as a network utility metric. Furthermore, useful bounds on CRP are derived to analyze the performance of proposed allocation schemes. The optimal resource allocation is formulated as a worst-case user CRP maximum problem with both average CCI and average power budget constraints. However, this problem is non-convex and generally challenging to solve.

CONTINUE

- Therefore, we solve this problem by successively performing subchannel allocation and power allocation. Firstly, a k-means clustering inspired subchannel allocation strategy is proposed to divide secondary users (SUs) into multiple groups by minimizing the average mutual-signal-to-interference-ratio degree between any two SUs. The concept of reference user is employed to guarantee the quality of service of the primary user (PU). In each subchannel, we formulate a max-min utility optimal power allocation problem.

EXISTING SYSTEM

- **R**ECENTLY, the fourth generation (4G) mobile com- munication systems, which can provide a higher rate service for high mobility user, have been deployed in many countries.
- the requirements of these next generation mobile systems face the challenges of a huge number of users, multi-form wireless communication service demands, better quality of service (QoS) and higher energy consumption. All these challenges result in increasing demands of spectrum resource. Obviously, the traditional spectrum allocation policies are no longer appropriate for the advanced mobile communication systems.
- Cognitive radio (CR), which is one of the most promising approaches that can improve the spectrum utilization efficiency and alleviate the spectrum scarcity problem.

PROPOSED SYSTEM

- In this paper, we study the utility fairness resource allocation in multi-user orthogonalbased cognitive radio network (CRN) with cochannel interference (CCI) mitigation. In our proposed system model, we introduce the correct reception probability (CRP) model as a network utility metric.
- We model the resource allocation objective function by the CRP, which can reveal insights into the transmission and interference performance for SUs in underlay CRN.

CONTINUE

- Different from existing works, we propose a k-means inspired subchannel allocation to mitigate CCI among SUs.
- We propose a fairness power allocation strategy for Sus occupying in the same subchannel, which can guarantee the SUs transmit probability fairness with increasing total CRP of CRNs. The nonlinear Perron-Frobenius theory is applied to solve this problem.
- It is proved that this strategy is the optimal solution to our utility optimization problem. Besides, the power allocation algorithm has geometric convergence.

HARDWARE REQUIREMENTS

- Processor - Pentium –III
- Speed - 1.1 Ghz
- RAM - 256 MB(min)
- Hard Disk - 20 GB
- Floppy Drive - 1.44 MB
- Key Board - Standard Windows Keyboard
- Mouse - Two or Three Button Mouse
- Monitor - SVGA

SOFTWARE REQUIREMENTS

- Operating System : Windows 8
- Front End : Java /DOTNET
- Database : Mysql/HEIDISQL

CONCLUSION

- In this paper, we studied the resource allocation optimal problem in multi-user Rayleigh-fading CRN. Our goal is to maximize the CRP of the worst performance SUs and control the CCI among the SUs in each subchannel. We first proposed a k-means clustering based subchannel allocation scheme to improve the spectrum efficiency. Below the interference threshold to PU, the SUs with minimized mutual signal to interference degree can share the same subchannel to improve the spectrum utilization efficiency. After that, we formulated a max-min utility optimal problem for single subchannel power allocation by considering fair transmission probability of SUs.

CONTINUE

- Then, a nonlinear Perron-Frobenius theory based power allocation algorithm was proposed to solve this max-min utility optimal problem. Simulation results show that the CRP of the worst-case SU by the proposed spectrum allocation scheme outperforms the upper bound of worst-case SU by random spectrum allocation scheme. The sum network CRP obtained by the proposed spectrum allocation is greatly improved than that obtained by random spectrum allocation scheme.

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