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A Scheduling Model for Centralized Cognitive Radio Networks

In this thesis, we present a scheduling model for centralized cognitive radio networks. Our model consists of a set of schedulers that focus on the data transmission of the secondary users and determine with which frequency, time slot and data rate each secondary user will transmit to the cognitive base station. Common features of the schedulers are that all of them ensure that the primary users in the service area of the cognitive base station are not disturbed, no collisions occur among the secondary users, and reliable communication of the secondary users with the cognitive base station is maintained. Our schedulers differ from each other mainly in terms of their objectives. We propose schedulers that maximize the overall cognitive radio cell throughput, minimize the average scheduling delay of the secondary users, provide max-min, weighted max-min and proportional throughput fairness, maximize the number of secondary users that are satisfied in terms of throughput, and take the different delay costs of switching to different frequency bands into account. In addition to heuristic algorithms and simulation based studies, we also present a graph theoretic approach and prove several NP-hardness and inapproximability results, propose polynomial time graph algorithms as well as approximation algorithms.

PUBLICATIONS

Journals

1) **Didem Gözüpek**, Başak Eraslan, and Fatih Alagöz: Throughput Satisfaction based Scheduling for Cognitive Radio Networks. IEEE Transactions on Vehicular Technology, accepted, 2012 (SCI)
2) **Didem Gözüpek**, Seyed Buhari, and Fatih Alagöz: A Spectrum Switching Delay Aware Scheduling Algorithm for Centralized Cognitive Radio Networks. IEEE Transactions on Mobile Computing, accepted, 2012 (SCI)
3) Başak Eraslan, **Didem Gözüpek,** and Fatih Alagöz: An Auction Theory Based Algorithm for Throughput Maximizing Scheduling in Centralized Cognitive Radio Networks. IEEE Communications Letters, Vol. 15, No. 7, pp. 734-736, 2011 (SCI)
4) **Didem Gözüpek** and Fatih Alagöz: Genetic Algorithm-Based Scheduling in Cognitive Radio Networks under Interference Temperature Constraints. Wiley's International Journal of Communication Systems, Vol. 24, No. 2, pp. 239-257, 2011 (SCIE)
5) **Didem Gözüpek** and Fatih Alagöz: Throughput and Delay Optimal Scheduling in Cognitive Radio Networks under Interference Temperature Constraints. Journal of Communications and Networks, Vol. 11, No. 2, pp. 147-155, 2009 (SCI)

Conferences

1) **Didem Gözüpek** and Fatih Alagöz: An Interference Aware Throughput Maximizing Scheduler for Centralized Cognitive Radio Networks. IEEE International Symposium on Personal, Indoor, and Mobile Radio Communications (PIMRC), Istanbul, 2010.

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