

Master-IT: Project work WS 2011/2012

Area: Cognitive Radios

Title: Predictive Modeling for Coexistence Optimization using Markov Models

Description

Typically, cognitive radio systems either sense the channel just before transmission or perform this task periodically in order to remain aware about the operational environment. The former method is typically known as reactive sensing, while the latter one as proactive sensing. Apart from when to sense, both methods are similar in nature, because both methods decide about the availability of the sensed channel on the basis of information obtained during the sensing process. However, a channel sensed as 'free' can become busy during the transmission of the cognitive system resulting in harmful collision and unnecessary interruption of the data transmission.

As a solution, a predictive modeling based approach has been proposed and has shown promising results in simulated environments. This project work will investigate the use of Markov Models for predictive modeling of primary user traffic as they are already being used successfully in other wireless application.

Tasks:

1. State-of-the-art survey on predictive modeling strategies for CR systems.
2. Theoretical analysis of Markov models to model the spectral usage. IEEE 802.11 based WLAN should be selected as primary user.
3. Investigate the influence of different traffic types of selected primary users to use Markov models.
4. Theoretical analysis of computation of different probabilistic parameters of Markov models.
5. Use MATLAB/Simulink or USRP2 based platform to demonstrate the performance of Markov models.

- [1] Geirhofer, S.; Lang Tong; Sadler, B.M.; , "COGNITIVE RADIOS FOR DYNAMIC SPECTRUM ACCESS - Dynamic Spectrum Access in the Time Domain: Modeling and Exploiting White Space," *Communications Magazine, IEEE* , vol.45, no.5, pp.66-72, May 2007
- [2] Hyoil Kim; Shin, K.G.; , "Efficient Discovery of Spectrum Opportunities with MAC-Layer Sensing in Cognitive Radio Networks," *Mobile Computing, IEEE Transactions on* , vol.7, no.5, pp.533-545, May 2008