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Proposition de stage 2008/2009
2e Master réseaux informatiques

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Sujet:

Selection and Routing Protocols in Multihop Next Gene ration Cognitive Radio Networks

Durée:

5 Months

Descriptif:

Cognitive radio networking [1] is a new paradigm of communication that attract wirele ss users, operators and service providers. Benefiting from unused licensed spectru m opportunistically can enhance the quality of communication for existing networks or provide new communicat ion services such as low-priced SMS and background media transfer. The concept is based on using dynamically as much frequency bands as needed without impacting ongoing licensed (called also primary) users transmissio ns. Cognitive users can be connected through several prima ry networks using multi-hopping. Thus, in this scenario new ro uting protocols should be designed to take into account the interaction with primary users dynamically. Existing ro uting protocols designed for multi-channel mesh or ad-hoc networks are not adapted especially if the primary user a ctivity is intermittent. Transmission channels should b e chosen in order to avoid classic inter- and intra-interference but also interference with primary users, thus allocat ed powers for every user and for every channel should be carefully compute d. Obviously, it is preferable to allocate jointly pow ers, channels and routes in the network to target higher rates f or every route.

The first task in this internship is to determine adequate metrics for channel selection and routing that aim to optimize the performance of routing while shares adequately the power among cognitive radio users. Then, using these metrics we shall design a routing algorithm and its corres ponding protocol for cognitive radio networks. In order t o evaluate the effectiveness of the routing protocol, we should implement new modules in OMNET++ that introduces th e properties of cognitive environment such as multiple channe ls, parallel transmissions and primary users. Particular ly, the implementation should be able to measure the impact o f wrong primary detection on the performance of primary users as well as cognitive users. The modular and component -based architecture of OMNET++ allows easy porting of C++ source code. Accordingly, the internship calendar is the following:

- State of the art of cognitive radio networks and routin g in multihop multi-channel networks
- Study of OMNET++ simulation environment
- Analysis of cognitive/primary interaction and conceptio n of metrics
- Design and implementation of a simulation environment in OMNET++ for cognitive/primary networks
- Design of the routing algorithm
- Design of the routing protocol and its implementation in O MNET++
- Simulation and Evaluation

Mots clés : Cognitive Radio Networks, Multihop, Frequency band, Parall el transmissions, Primary users, Routing, Power Sharing, Simulation

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Équipe d'accueil: Networks and Performance Analysis (NPA)

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Pré-requis: TCP/IP, Wireless Networks, IEEE 802.11, C/C++.

Matériel et logiciel utilisés: omnetpp, inet, C/C++, LINUX.

Références:

[1] http://www.ece.gatech.edu/research/labs/bwn/CR/