Proposition de stage 2012/2013
2e Master réseaux informatiques

Sujet :

Traffic Engineering Strategies for QoS in Single and Multihop Cognitive Radio Networks

Durée :

5 or 6 Months

Descriptif :

Cognitive radio networking [1] is a new paradigm of communication that attracts wireless users, operators and service providers. Benefiting from unused licensed spectrum opportunistically can enhance the quality of communication for existing services such as VoIP and web surfing, or provide new communication services such as low-priced SMS and background media transfer [2]. The concept is based on using dynamically as many frequency bands as needed without impacting ongoing licensed (called also primary) users transmissions. Thus, in this scenario new protocols should be designed to dynamically take into account the interaction with primary users. The challenge is to ensure continuous services with the required quality over the dynamic nature of the spectrum. This is one of the objectives of the national ANR LICORNE [3] project that funds the internship.

The first task in this internship after a brief state of the art, is to study and complete our previous work on spectrum handoff and QoS for single hop cognitive radio networks [4]. In this work, we classified applications into several types to better adapt to the different and various properties of available channels for cognitive radio users. For each application, we are developing optimized algorithms for channel selection at admission, channel handoff, and selection post-handoff. Each application requirement is satisfied while maximizing the satisfaction of other applications. Handoffs are reduced to limit medium contents and handoff delays. In order to integrate several services together, we propose new interaction rules so that they can efficiently cohabit together. In order to perform selection and handoff decisions, these algorithms are based on sensing information that is assumed to be provided.

Then, the second step is to propose an extension to the multihop case in a coherent and smooth manner. Compatibility with our previous work on routing is preferable [5]. It will be necessary to implement a cross-layer routing metric onto an ad hoc routing protocol. Based on the link quality metric defined previously, a new routing metric will be defined and tested on a simulation environment.

Finally, some simulations will be then conducted in order to illustrate and validate at least the interaction between two different types of applications including at least VoIP. Technical and engineering support will be provided to the intern in order to perform easily simulations using OMNET++. Accordingly, the internship calendar could be the following:

- Read a cognitive radio tutorial and our previous work (2 weeks)
- Complement the work, especially the algorithms of variable rate applications. (4 weeks)
- Start learning the simulation environment. (1 week)
- Study the extension to the multihop case (routing) in parallel with first simulations of the single hop case. (6 weeks)
- Design routing while trying to keep compatibility with the single hop case and preferably our previous work on routing. (4 weeks)
- Simulations of the multihop case (3 weeks)

Mots clés : Cognitive Radio Networks, Parallel transmissions, Spectrum handoff and selection, Routing, Services, Traffic Engineering

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Matériel et logiciel utilisés : As required.

Rémunération : Rémunération LIP6/NPA en vigueur (437 €).

Poursuite en thèse : Possible (Bourse d’allocation EDITE ou CIFRE)

Références :


[4] Internship report of Xiaonan Fang M2 Réseaux