Propuesta de Tesis en Ingenería Matemática

Director de Tesis:

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Proposal:

Project title : **Multi-homing in a competitive wireless telecommunication environment**

Thematic area: Game Theory

Abstract:
In the wireless world, users have the possibility to use different technologies to reach the Internet, such as CDMA (UMTS), WiFi, Wimax… While each technology required a different device, a mobile has now multiple interfaces and the possibility to choose the most appropriate one. It additionally has the possibility of using several technologies at the same time (called multi-homing) or using each interface alternately depending on the network environment. Indeed, this procedure is helpful to improve the mobile's payoff, when user performance in each base station (BS) is determined by the number of the users as well as physical rate being used. Novel techniques in game theory allow solving multi-homing problems in which mobiles divide their traffic among the different base stations in order to maximize some objective. While it has been traditionally used for improving network availability, there is on the other hand an economic issue brought with multi-homing. Indeed, access to the network is in general not for free. In that situation, how to choose or combine between the different access point from the user perspective? Additionally how should those access points settle their prices and offered services in a competitive environment with concurrent providers? Indeed, sometimes some of the technologies are owned by the same operator, but it is not always the case, and operators are then in competition for customers. This has to be considered from a modelling point of view and the natural framework is again that of game theory: is there an equilibrium (a so-called Nash equilibrium) for the game where each player (user or provider) tries to maximize his own payoff? What is the loss of efficiency due to that competition (also called the price of anarchy)?

This work will be carried out in the framework of an ANR project called Winem (for WiMAX Network Engineering and Multihoming) and a PhD is expected to follow in the ANR project

CAPTURES (Competition Among Providers for Telecommunication Users: Rivalry and Earning Stakes).

Industrial and social applications: Improving the efficiency of operation of telecommunications networks, from user and from operators viewpoints.

Methodology: optimisation, game theory.

Bibliography

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[4] R. Wakikawa E. K. Paik C. W. Ng T. Ernst, N. Montavont and T. Noel. Goal and benefits of multihoming. IETF Internet Draft, July 2005.

[5] D. K. Goldenberg, L. Qiu, H. Xie, Y.R.Yangand Y. Zhang. Optimizing cost and performance for multihoming**.** ACM SIGCOMM Computer Communication Review Volume 34 , Issue 4 (October 2004)

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Desired student background: no special comments.

Date and place : Rennes, September 2008