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SUJET DE THESE 2012-2013

Groupe de Recherche : MRS

Pôles :

*MINAS (*Micro et Nanosystèmes)	☐
*MOCOSY (*Modélisation, Optimisation et Conduite des Systèmes)	☑
*SINC (*Systèmes Informatiques Critiques)	☐
*RIA (*Robotique et Intelligence Artificielle)	☐

Mot(s)-clé(s) : IP/MPLS networks ; QoS ; online simulation ; queueing theory

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Titre : **Online simulation of IP/MPLS networks**

Nowadays, the management of an IP/MPLS network requires the use of multiple specialized tools. The teams that are in charge of operating the network use different tools for the management of equipment configurations, traffic monitoring and network supervision. These tools provide a certain « view » of the state of the network at a point in time, but require the expertise of network specialists to decide potential network adaptations.

The project NEC (*Network Engineering & Control*) aims at designing and developing a complete environment for the operational management of IP/MPLS networks. Beyond the simple supervision, what is targeted is the « intelligent » control of computer networks. It amounts to conceiving and developing a Supervision/Control center that gives a global and accurate view of the network state, with consistent and high-level data, and that is a true engineering and decision-support tool based on end-to-end stochastic simulation models and on optimization algorithms allowing to take the optimal decisions. In addition to gathering all the information at a centralized point, this tool will enable the proactive analysis of all possible scenarios and the anticipation of the optimal decisions in case of adverse events (QoS degradations, attacks, failures, etc.).

The research of the PhD student will target analytic performance models for an accurate online estimation of the quality of service of network flows. One of the goals is to reduce the current gap between packet-level models (that describes how TCP shares the bandwidth of a network between persistent flows) and flow-level models (that describe the dynamic at the session level), but also to integrate the streaming traffics in the models. The proposed approaches will be based on queueing theory, and in particular on GPS (*Generalized Processor Sharing*) queueing networks.