MAP tele DOCTORAL PROGRAMME IN TELECOMMUNICATIONS

Self In-Network Resource Management

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Abstract

The expected growth, complexity and dynamicity of Future Networks are forcing a change in today's paradigm for network management. Self-management (self-*) vision promises network capable of organise and manage themselves with reduced human intervention. This concept has the potential benefit of scalability, fast reaction time and self-adaptation to changing network conditions. A fundamental pre-condition to self-managed entities is their decision capability. Decision processes must be distributed among intelligent network nodes (agents). These agents will work together in a cooperative self-coordinated way towards common goals, automating many of today's management functions and adapting each node (and therefore the network) to the changing environment.

Our research objectives are to elaborate on such self-adaptation schemes, supported on truly distributed and autonomous agents, targeting an efficient usage of network resources. An efficient resource utilization required both design-time and run-time mechanisms to be identified and specified. Network wide resource efficiency requires stabilization and inter-dependency mechanisms between the multiple co-existent self-adaptation algorithms.

We have designed a resource optimization framework attending the abovementioned self-adaptation and efficiency principles. This framework identified three main components on a distributed, collaborative decision process: knowledge management, cognitive decision and cooperative decision enforcement and dissemination. The first of these processes is fundamental to achieve efficient self-adaptation algorithms.

A set of scenarios were selected to apply and test the concepts developed. This bottom-up approach is necessary to refine the model, considering concrete applications, and to obtain comparative results with a centralized approach and with other self-management techniques (e.g. gossip algorithms).