In this talk, inkjet-printed flexible antennas fabricated on paper substrates are introduced as a system-level solution for ultra-low-cost mass production of UHF Radio Frequency Identification (RFID) Tags and Wireless Sensor Nodes (WSN) in an approach that could be easily extended to other microwave and wireless applications. A compact inkjet-printed UHF “passive-RFID” antenna using the classic T-match approach and designed to match IC's complex impedance, is presented as a demonstrating prototype for this technology. In addition, we briefly touch up the state-of-the-art area of fully-integrated wireless sensor modules on paper and show the first ever 2D sensor integration with an RFID tag module on paper, as well as the possibility of a 3D multilayer paper-based RF/microwave module, that could potentially set the foundation for the truly convergent wireless sensor ad-hoc networks of the future.

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We witness today the advent of a digital era where the IT and broadband communications create a new economy and shape the behavior of a new society. In this context, fixed and mobile multimedia networks take an unprecedented importance with the convergence of heterogeneous access technologies and the virtualization of services. The control and design of such systems require large scale integrated approaches, spanning from the detailed modeling of stochastic processes, up to resource management and dynamic engineering of networks:

modeling of subscribers behavior, applications and traffic sources, estimation of traffic matrices, optimization of network topologies, capacity planning, management of the quality of service, design of, static or dynamic, resilient routing policies.

In this talk, we present a synthesis of some works carried out at LAAS-CNRS on these issues, and in particular, selected contributions related to the techniques of differential and hybrid modeling, queuing networks, mixed non-linear optimization and Metaheuristics.

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