

Research and experimentation facilities for implementing and evaluating wireless networks

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***Abstract.** Theoretical analysis and simulation of research oriented techniques and mechanisms can give important information about the performance of new network paradigms in terms of throughput, delay, power consumption, etc. However, in order to have analytically tractable models, several simplifications of the real world environment have to be done. While the simulations have the ability to incorporate more general models, they limit research results due to the complexity of the simulation software and the limited knowledge of the wireless environment. Therefore, experimentation comes as a promising tool for the study and evaluation of wireless mechanisms since it allows the researcher to observe the behavior of the implemented schemes in a real-life testbed.*

In this talk, an experimentation inspired research framework will be presented, based on a heterogeneous wireless testbed called NITOS, which stands for Network Implementation Testbed using Open Source platforms. NITOS has been developed through joint efforts of CERTH and University of Thessaly in Volos, Greece. In the first part of the presentation, the innovative components of NITOS will be discussed including its hardware characteristics (wireless nodes, cameras, sensors, power meters, etc), as well as its software management and control framework. NITOS is based on heterogeneous hardware, focusing on allowing the experimenter to evaluate mechanisms in several research fields, from the physical layer, up to the application layer, including MAC layer mechanisms, routing, scheduling and network coding schemes, video over wireless, sensor protocols, power consumption frameworks, green issues, etc. Complementary to this large variety of research evaluation components, NITOS provides an innovative control and management framework that allows for remote, open access to its experimental facilities by users all over the world. Featuring a slicing scheduler as well as several measurement and control tools, the NITOS management framework gives to researchers the ability to access the physical infrastructure, to develop topologies, scenarios and use cases, to run their experiments and finally to collect their results, taking advantage of an integrated system that is easy to access and use. In this concept, several research activities will be presented based on implementation and experimentation efforts that take place on NITOS.

In the second part of the presentation, the wireless experimentation facilities of Polytechnic Institute of NYU developed under the GENI initiative will be

described. The GENI mesoscale wireless testbed deployment takes place in 7 US Universities. Polytechnic is one of the first two (together with Rutgers) that are already up and running. The details and the challenges of the deployment as well as initial research experiments will be presented.