

Network benchmarking

1. Research group and interests:

The Multimedia and Communications Scientific Area inside Institute of Telecommunications in Aveiro contains a sub-area, which is mainly centred on architectures for Heterogeneous Networks (<http://hng.av.it.pt/>). The main interests of this group are in the areas of integration of heterogeneous networks, covering both infrastructure, ad-hoc and mesh networks, and covering technologies such as WLAN, WiMax, DVB and Ethernet. The main areas of research consider issues such as Quality of Service (QoS), mobility, multicast and broadcast, security and privacy, inter-domain, communities, mobile GRIDs and IMS/MBMS integration.

This group participates in national and european projects. In particular, currently is involved in the FP6 Integrated Projects **Daidalos**, **SWIFT**, **WIP**, **C-Mobile**, **Onelab2**, and has several cooperations established with national and international industry. During the next year, three new EU-funded projects will start, on the areas of new security architectures, novel multicast environments, and clean-slate design. The group has thus a well/established research record on the area of new generation networks, with work in some aspects for clean-slate design.

Advisor:

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Research objective in Network benchmarking

Evaluation of new network protocols and architectures are at the core of networking research. This evaluation is usually performed using simulations (e.g., NS2), emulations (e.g., Emulab), or in experimental platforms (e.g., PlanetLab). Simulations allow a fast evaluation process, fully controlled scenarios, and reproducibility. However, they lack realism and the accuracy of the models implemented in the simulators is hard to assess. Emulation allows controlled environment and reproducibility, but it also suffers from a lack of realism. Experimentations allow more realistic environment and implementations, but they lack reproducibility and ease of use. Therefore, each evaluation technique has strengths and weaknesses. However, there is currently no way to combine them in a scientific experimental workflow. Typical evaluation workflows are split into four steps: topology description and construction, traffic pattern description and injection, trace instrumentation description and configuration, and, analysis based on the result of the trace events and the status of the environment during the experimentation.

The work should address this problem, developing a benchmarking methodology and scenarios for networking experiments in specific environments (peer to peer and wireless networks) and to provide an experimental workflow for networking experiments. A major issue in the definition of benchmark scenarios is to identify which metrics can be used as benchmark metrics, i.e., metrics that are used to describe benchmark scenarios. In order to identify the right metrics, one needs to perform statistical analysis. The methodology and tools defined for this analysis should be generic enough to be useful for the description of benchmark scenarios in different contexts.

Financial Sources:

The financial sources will be mainly EU-funded FP7 projects. In particular, the main source of funding will be associated to the Onelab2 project (a network evaluation design project), supplemented by other internal funding.