Networking mechanisms for new networks

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**, **Akogrimo**, **WIP**, **C-Mobile**, 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:

Rui L Aguiar, ruilaa@ua.pt, Instituto de Telecomunicações, Universidade de Aveiro. Possible cooperation with external elements (depending on period spent abroad) may exist.

Research objective in Networking mechanisms for new networks

The current multi-layered nature of the Internet hides geographic and network topological information of the underlying transmission. This way, e.g., a wavelength in a DWDM optical network connects ports of Ethernet switches that are several optical "hops" away and lets them see each other as neighbors, forming a different topology of the network on the upper layer. Typically 2-3 of such layers are stacked on top of each other (like IP over Ethernet over DWDM). Several of the underlying motivations for this separation are, however, not valid for the kind of networks and traffic that can be seen in today's networks (and that can be expected for tomorrow's networks as well).

The work should address this problem, developing new path abstraction concepts in one of in all of the main aspects: horizontal, vertical, and ends (addresses). A horizontal abstraction will allow a single path to be present on multiple parallel links in the network, allowing for techniques like cooperative coding or network coding. Vertical abstraction means to make visible inside a path the topologies, protocols and coding of the underlying layers in order to do a joint channel/network/source coding and a joint routing of the multiple paths that form an abstract path. Abstracting end points means to not anymore address only one interface of a device, but to allow for host identifiers, semantic or geographical addresses. Mobility will then be inherently supported.

For further detail on previous work, it is advisable to read the paper:

Dipankar Raychaudhuri, Mario Gerla (Eds), "Report of NSF Workshop on New Architectures and Disruptive Technologies for the Future Internet: The Wireless, Mobile and Sensor Network Perspective," GENI Design Document 05-04, August 2005. (GDD-05-04)

Financial Sources:

The financial sources will be mainly EU-funded FP7 projects. In particular, the main source of funding will be associated to the 4FWD project (a clean slate design project), supplemented by other internal funding.