Future Internet initiatives

Michael Stanton

Directorate of R&D – Rede Nacional de Ensino e Pesquisa (RNP)
Rua Lauro Muller 116/1103 – Botafogo – 22290-906 – Rio de Janeiro – RJ – Brazil
michael@rnp.br

(on secondment from Computing Institute, Universidade Federal Fluminense – UFF)

Abstract. *Large-scale Future Internet testbeds are beginning to be deployed in North America, the EU, Japan and Korea. In the USA, NSF launched its GENI (Global Environment for Network Innovations) programme in 2005 and, after several years spent on design, began in 2008 to formulate and deploy an experimental facility to support R&D into new network architectures [GENI 2009]. The EU launched its FIRE (Future Internet Research and Experimentation) programme, also in 2008, based initially on a number of existing testbed projects: OneLab, Panlab, FEDERICA and Phosphorus [FIRE 2009]. Meanwhile, in Japan the AKARI project was launched to design a New Internet by 2015 [AKARI 2008].*

There are ostensibly several similarities between these different proposals, especially in the technologies adopted. In principle, all these testbeds seek to support simultaneous use by concurrent projects (architectures). To carry this out, extensive virtualisation is carried out, both of network resources, including switches, and of processing and storage devices available on the network. This latter facility was originally included as a fundamental part of PlanetLab technology [Peterson 2002], and this has now been extended into network virtualization by variants of PlanetLab, such as VINI, which enable the virtualization of a level 3 router based on a PC [Bavier 2006]

The most general model is that of GENI, which supposes the existence of a level 2 transport service linking network nodes containing programmable and virtualisable routers, as well as processing and storage elements. Among the programmable routers, apart from the VINI model, are such designs as OpenFlow and NetFPGA [McKeown 2008]. On the other hand, the FEDERICA project has adopted the use of production IP routers which support router virtualization [FEDERICA 2009].

One thing is quite clear: there is considerable interest in interoperation of these different testbeds, leading to collaboration around the globe. In Brazil, several invitations have been received to participate in testbed projects which were proposed to GENI in 2009. Therefore, in the planning of a Brazilian Future Internet experimental facility, future interoperation with foreign partners is of great importance.

It should be mentioned that a couple of Brazilian Future Internet R&D projects are already underway: Horizon and WebScience

Horizon is a project to study new Internet architectures, which is being jointly carried out by a consortium of French and Brazilian universities, together with industrial partners, and funded by their respective governments [Horizon 2010].

Web Science is a large consortium of more than 100 researchers from several leading universities, which is being funded for 3 to 5 years of research activity by CNPq, under its National Institutes of Science and Technology programme [WebScience 2010]. RNP and a group of researchers from 5 universities have included in this project the establishment of a VINI-style testbed for experimental research into Future Internet architectures.

Lastly, interest has been expressed at government level in coordinating officially funded projects in the Future Internet area between Brazil and the EU, with a first call expected to be published in 2010.

References

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Biography

Michael Stanton is Director of Research and Development at RNP. After a Ph.D. in mathematics at Cambridge University in 1971, he has taught at several universities in Brazil, since 1994 as professor of computer networking at the Universidade Federal Fluminense (UFF) in Niterói, Rio de Janeiro state. Between 1986 and 2003, he helped to kick-start research and education networking in Brazil, including the setting-up and running of both a regional network in Rio de Janeiro state (Rede-Rio) and RNP. He returned to RNP in 2001, with responsibility for R&D and RNP involvement in new networking and large-scale collaboration projects.