

# Future Internet Network Management

**José Augusto Suruagy Monteiro**

Núcleo de Pesquisas em Redes e Computação (NUPERC)

Universidade Salvador (UNIFACS)

R. Ponciano de Oliveira, 126 – Rio Vermelho – 41950-275 Salvador - Brazil

suruagy@unifacs.br

**Abstract.** *Even in today's technology, end to end performance may not be what users would expect from high speed backbones. In order to identify possible performance holes, it is desirable to instrument such networks, from the user's lab, through his campus, regional, national and international backbones with tools that can perform tests in order to obtain delay and throughput measurements. One such measurement infrastructure is perfSONAR [Hanemann et al. 2005], a service oriented architecture for multi-domain network monitoring. perfSONAR have been deployed in several National Research and Education Networks (NRENs), including Internet2, ESNNet, Géant, and RNP, through the MonIPÊ service [Sampaio et al. 2007].*

*In testbeds for future Internet experiments such as GENI, OneLab, and Federica, where each experiment runs on a given slice it is even more important to instrument the testbed in order to collect all relevant data for each experiment, including not only network related measurements but also operational data which can help operations personnel on monitoring and troubleshooting the infrastructure itself.*

*GENI (Global Environment for Network Innovations) is a network research and engineering infrastructure which is currently being designed. GENI key concepts are the following: programmability, virtualization, federation, and slice-based experimentation [GENI 2009]. perfSONAR is already being used in the ProtoGENI infrastructure to monitor Internet2 backbone and other parts of it.*

*In this presentation we review the proposed measurement infrastructures for Future Internet testbeds, including the GENI Instrumentation and Measurement System (GIMS) [Barford et al. 2009], and PlanetLab Europe's TopHat measurement service [Borgeau et al. 2010]. This paper features the GIGA testbed network [Scarabucci 2005] and the academic network Ipê [Stanton 2010], two of the most relevant networks in Brazil for the support of experimental research. It describes the characteristics and supported functionality of these networks, discusses their limitations and elaborates on how they can be evolved to support Future Internet research and development at various levels by way of large-scale experimentation.*

## References

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## Biographies

**José Augusto Suruagy Monteiro** received his B.S. in Electrical Engineering from Universidade Federal de Pernambuco (Brazil) in 1979, his M.Sc. in Electrical Engineering, from Universidade de São Paulo (Brazil) in 1982, and his Ph.D. in Computer Science from University of California, Los Angeles, in 1990. He is currently a faculty member at Universidade Salvador (Brazil) where his research interests include Internet measurements, network resources allocation, and traffic engineering.