

**COST-STSM-IS0605-6880**  
**Visitor: Peter Reichl (FTW Vienna)**  
**Host: Patrick Maillé (Télécom Bretagne)**  
**22. – 28.08.2010**

**Scientific Report**

The original goal of this STSM was to jointly review recent advances in the area of modelling network security issues with the help of non-cooperative game theory, and to further work on new models for the competition among security providers. The results of this STSM were expected to provide a starting point for a planned contribution as part of the final COST publication activities.

During the STSM, joint work and discussions has taken place in collaboration with the host (Patrick Maillé) as well as during a visit of Bruno Tuffin at the neighbouring INRIA site. The following topics have been addressed during the STSM:

- **Game-theoretic security models**  
This topic has already been addressed during previous STSMs of Bruno Tuffin and Patrick Maillé in Vienna which had already led to drafting a joint paper on the interplay between security providers, consumers and attackers. The model of this paper assumes users which are choosing between several security providers which offer different security levels at different prices. Furthermore, it is assumed that attackers choose their targets according to the total value of protected data in order to maximize expected gain, which introduces an additional negative externality. The initial analysis of this model, especially with respect to the derivation of user equilibria, has been discussed during the STSM, and next steps have been jointly defined. Note that the paper has been finished early November 2010 and has been submitted to ACM SIGMETRICS 2011.
- **Utility theory and Quality-of-Experience**  
In another collaboration with Bruno Tuffin, economic aspects of Quality of Experience (QoE) is investigated. In this context, especially the relationship between logarithmic utility functions as well-known from traditional micro-economics, and recent results from QoE trials is of interest, and has led to the publication of a paper at CTTE 2010, mentioned as Best Paper Award Runner-up, and a subsequent journal paper submission (which in the meantime has been accepted).
- **A Framework for Future Telecommunications Ecosystems**  
In order to provide a joint description of user-centric, business-oriented and technological perspectives on telecommunications, recently the notion of “Telecommunications Ecosystems” has been created. In general, ecosystems may be characterized as communities of organisms together with their environment, viewed as systems of interactions and interdependent relationships. Like their biological models, communication ecosystems are characterized as dynamic (on several time-scales) and complex systems, whose inhabitants include a large variety of users and business entities. Their interaction is based on the use of communication services, whereas they are typically structured according to layers and value chains / value networks. In the course of STSM, first steps towards a systematic foundation of a framework for such ecosystems have been achieved.

Additional activities during the STSM include the preparation (evaluation of reviews) of a special issue of the Telecommunication Systems Journal on “Socio-economic Issues of Next Generation Networks”, e.g. during a joint phone conference with Bruno Tuffin, Burkhard Stiller and Tuan Anh Trinh, as well as the preparation of an invited lecture entitled “Towards Future Telecommunication Ecosystems” which has been held at Télécom Bretagne (Rennes site) on 13.09.2010 and has been transmitted live to the Brest site of Télécom Bretagne.