



ABCDE



## Scientific Report

First name / Family name

Chakib BEKARA

Nationality

French/Algerian

Name of the *Host Organisation*

Fraunhofer FOKUS Institute, Berlin

First Name / family name  
of the *Scientific Coordinator*

Thomas LUCKENBACH

Period of the fellowship

04/04/2011 to 03/04/2012



## I – SCIENTIFIC ACTIVITY DURING YOUR FELLOWSHIP

During my stay at Fraunhofer FOKUS, I worked on the area of Smart Grid/Smart Metering Security. I investigated two main research topics:

- **Key management and PKI (Public Key Infrastructure) for the Smart Grid:** I investigated the deployment of a lightweight PKI on the context of the Smart Grid, taking into account issues such as resource-constrained devices (smart meters, smart appliances, sensors, etc.) and the scalability (large scale network involving hundred millions of devices). One of the main aims of the deployed lightweight PKI is the efficient key-establishment in the Smart Grid, such as secure communications could be established between the different actors of the Smart Grid (gateways, smart meters, smart appliances, utilities, energy providers, etc.). This topic was widely investigated during my fellowship, and has lead to three publications (one published and two pending (under review))
- **Privacy issues for the end-user (energy customer) on the Smart Grid:** This topic was investigated by the end-of my fellowship. I tried to investigate the privacy issues for the end-customer due to the introduction/use of smart meters, which could divulge customers-related data (energy consumption profile, periods of presence/absence, etc.), without the prior approval of the end-customer. The main work I try to perform actually (even after the end of my fellowship), is to propose a privacy-preserving architecture for the smart metering system based on the use of aggregation techniques and cryptographic mechanisms.

## II – PUBLICATION(S) DURING YOUR FELLOWSHIP

- **C. Bekara**, T. Luckenbach and K. Bekara. «*A Privacy Preserving and Secure Authentication Protocol for the Advanced Metering Infrastructure with Non-Repudiation Service*». Proc. of the **IARIA 2<sup>nd</sup> International Conference on Smart Grids, Green Communications and IT Energy-aware Technologies** (ENERGY 2012), pp. 60-68, **ISBN: 978-1-61208-189-2**, March 25-2012, 2012, St. Maarten, Netherlands Antilles.
- **C. Bekara**, T. Luckenbach and K. Bekara. «*An ID-based Key Management Protocol for the Smart Grid without the Requirement of a Global Trust Domain*». (pending)
- A. Kamilaris, Y. Tofis, **C. Bekara**, A. Pitsillides and E. Kyriakides. 'The Smart Home Meets the Smart Grid Through the Web'. (pending)

## III – ATTENDED SEMINARS, WORKHOPS, CONFERENCES

During my fellowship, I attended the following scientific events

- **Conference/Workshops: IARIA InfoSys 2012 conferences** (2<sup>nd</sup> International



Conference on Smart Grids, Green Communications and IT Energy-aware Technologies / The Eighth International Conference on Networking and Services / The Eighth International Conference on Autonomic and Autonomous Systems / The Fourth International Conference on Resource Intensive Applications and Services / The Fourth International Conference on Bioinformatics, Biocomputational Systems and Biotechnologies) March 25-2012, 2012, St. Maarten, Netherlands Antilles.

- **Symposium:** Marie Curie Symposium Researchers Symposium, 25-27 September, Warsaw, Poland.
- **Seminar:** ABCDE Seminar, 10-11 November 2011, Berlin, Germany

#### IV – RESEARCH EXCHANGE PROGRAMME (REP)

- **REP 1:** 23/1 to 3/2, NetRL laboratory, University of Cyprus, Cyprus  
Local coordinator: Pr. Andreas Pitsillides ([Andreas.Pitsillides@ucy.ac.cy](mailto:Andreas.Pitsillides@ucy.ac.cy))

During my stay, I meet and work with people in the fields of WSN and Smart Grid/Smart Metering. I also gave a lecture about Smart Grid/Smart Metering Security, and participate on writing a journal paper

- **REP 2:** 21/2 to 3/3, Telematic Department, NTNU, Trondheim, Norway  
Local coordinator: Pr. Edouard Poul Heegaard ([poul.heegaard@item.ntnu.no](mailto:poul.heegaard@item.ntnu.no)).

During my stay, I meet and work with people in the field of Smart Grid and their Security, and I gave a lecture about the security Issues and Challenges in the Smart Grid