Thesis title: *Design of Secure Smart Meter utilizing Process Isolation*

**Background**

Power supply infrastructures are facing radical changes by the introduction of so called Smart Grid technology. Its use is expected to grow exponentially in the coming years. Smart grids modernize electric power delivery systems by using computer-based remote control and automation. The smart meter is a particularly important component in smart grids, and is deployed in individual customers’ homes. A smart meter enables the collection of accurate power metering data and transmission of remote commands that trigger different actions (e.g. starting an appliance when energy prices are low). However ICT (Information and Communication Technologies) systems in general and thus also smart grids are increasingly subject to cyber attacks, which can have a disruptive impact on the whole power grid, and put people’s safety and business interests at risk.

**Objectives**

The main objective of this thesis project is to study design of and develop a model of a smart meter implementation that utilizes virtualization and other techniques for mitigating cyber attacks in addition to providing other improvements compared to existing designs. A typical smart meter must consider different threat vectors such as attacks against the traffic to/from the meter but also attacks against processes running on the meter. As a smart meter interacts both with devices from the energy provider and devices at the customer premise these functionalities must be kept separated.

First the state of the art of smart metering should be researched. A profile should be created detailing the functionality common smart meters provide. This can then be used to perform a gap analysis determining which functionality typical smart meters lack. Another critical point is what functionalities exist but are insecure or can be further improved using the techniques this paper focuses on. The following are areas where this research can lead:

- Virtualization and process isolation
- Secure boot
- Device hardening
- Managing sensor data
- Interaction with other smart grid devices
- Support for 3rd party software modules
- Presentation of gathered statistical data to the end user
- Privacy implications

For this project SICS are cooperating with companies with real world experience in the design and deployment of smart meters at a national level. These companies will be able to provide advice and assistance and share information on what the most relevant improvements needed in smart meter design are. This can provide a basis to evaluate which areas need focus and what current challenges exist.
Competence

We are looking for one MSc student for a position in Stockholm (Kista office) who meets the following requirements:

- Some knowledge of the C programming language
- Knowledge in operating system architectures, preferably on embedded devices
- Experience with the Linux environment
- Good spoken and written English

Applications

Applications should include a brief personal letter, as well as a CV with education, professional experience and specific skills, and recent grades. In your application, make sure to provide examples of previous experience or other projects that you consider relevant for this position. Candidates are encouraged to send in their application as soon as possible, in paper form or via e-mail. Suitable applicants will be interviewed as applications are received.

About SICS

SICS Swedish ICT is a non-profit organization that carries out advanced and focused research in strategic areas of computer science, in close collaboration with Swedish and international industry and academia. The main office is situated in Kista outside Stockholm and there are smaller offices in Uppsala, Lund, and Norrköping. SICS employs approximately 160 researchers, including 96 PhDs, and hosts another 30 researchers from KTH, consultants and students working on their Master Thesis. SICS is part of and leading many Swedish strategic initiatives, including IOT, Big Data and Automation.

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