



Chapter VI

Secure Online Metering for a Liberalized Energy Market

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ABSTRACT

The liberalisation of the energy market requires frequent online access to metering devices. That is not only necessary for exchanging meter data, but also for management reasons. The integration of strong security mechanisms is an essential requirement for the introduction of online meter device access. The project Secure Electronic Exchange of Metering Data (SELMA) supported the development of a concept, the implementation, and a field trial test of prototypes of such metering devices. This chapter focuses on the security aspects. It describes the security analysis, the required security services, and the security concept. The security concept includes the security mechanisms and cryptographic techniques applied to the metering data as well as the security management.

INTRODUCTION

The introduction of the liberalized energy market in Germany has led to important changes in the energy economy. The role of the customer has altered from a simple energy subscriber to an energy customer. Now a customer is not only consuming energy but also influencing the actual market situation. The basic idea behind this new point of view is that it should be possible for every person or organisation not only to buy but also to sell energy. The liberalised energy market provides the concept that there has to be a separation between generation, selling, and trading as well as transportation and distribution of energy. Since the energy market is not a complete new contrivance, the existing distribution network is a fixed object.

The customer may subscribe to different energy providers. It is possible to receive the energy during the day from one provider and during the night from a different provider, or to get the basic energy level from one provider and the energy during the peak hours from another one. Therefore, it will be necessary to frequently read the information about the delivered energy from the energy meter device. That should be performed online via any communication network (wired or wireless, public or private, etc.). A high security level has to be applied to the system to protect the interests of all parties (customers, providers, energy plants, etc.).

The project Secure Electronic Data Exchange of Metering Devices (SELMA) is a project, which is funded by the German Federal Ministry of Economics and Labour (BmWA). The communication between the participants of the energy market and the provision of energy data are independent on the transport medium. SELMA project partners are energy providers, manufacturers of metering devices (Electricity, Gas) and meter management systems, the verification administration, the national metrology institute, organisations for the protection of consumer rights, the national security agency, the University of Muenster for legal aspects and the University of Siegen. The University of Siegen is responsible for the achievement of the security analysis and the development of the security concept.

This chapter focuses on the security aspects of SELMA. It describes the results of the security analysis and deduces the needed security services. The requirements by different laws will be mentioned before the security and cryptographic concepts are explained. Management aspects will be described followed by a conclusion.

SECURITY ANALYSIS

Figure 1 shows the information flow of a transaction. The metering device performs the measurement and provides the raw data (primary or secondary data depending on the type of energy and mode of measurement). The data acquisition entity accesses the metering device online via any network and reads the measurement information, which is assigned to the customer. This information is stored

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