

Chapter 22

Secure RFID–Enablement in Modern Companies: A Case Study of the Pharmaceutical Industry

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ABSTRACT

Current RFID implementations suffer from security threats and privacy issues since the technology was not designed for secured data exchange. In emerging global RFID-aided supply chains, the need for open interfaces between supply chain partners exposes business secrets. A case study focusing on the development of detected counterfeits in the pharmaceutical industries in Europe and in the United States of America motivates the rising importance for RFID security. A formal model for describing RFID-aided supply chains is introduced to analyze flow of messages and data. Countermeasure tasks for all involved supply chain participants are defined to harden the integrity of the global supply chain. Motivated by concerns of exposing data via the air interface, two mutual authentication protocols are presented that aim to keep tag production costs low. Their applicability in context of the pharmaceutical industry is discussed.

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INTRODUCTION

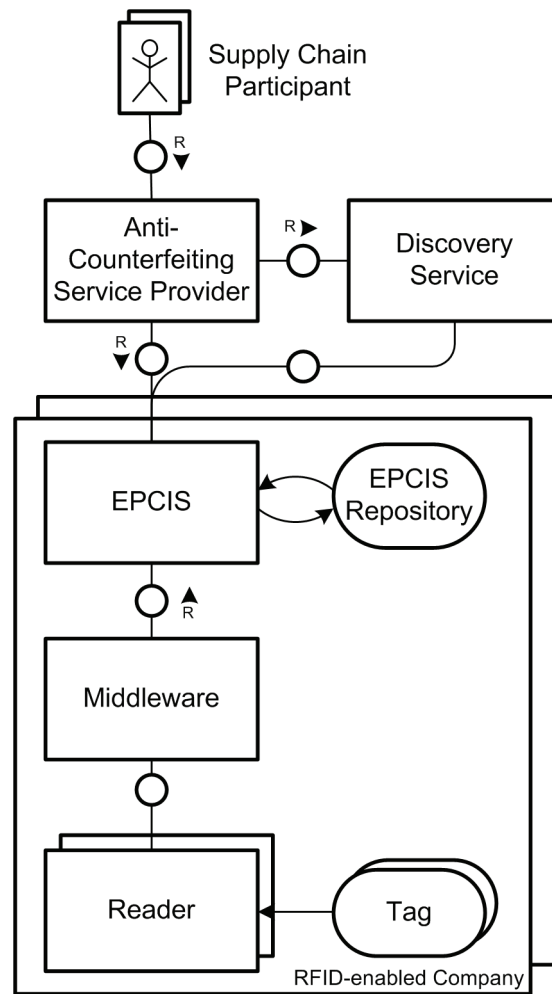
In a two month period, more than 34 million tablets were seized, including fake antibiotics, anti-cancer, anti-malaria and anti-cholesterol medicines, painkillers and erectile dysfunction medication. (Intellectual Property Crime Report 2008 / 2009) (IP Crime Group, 2009)

The quote above reflects the tremendous number of pharmaceutical counterfeits detected at borders of the European Union. With rising efforts toward globalization in the pharmaceutical industry, trust between supply chain participants becomes increasingly fragile. In order to protect human beings from being harmed by improper doses, poisoning or missing ingredients in pharmaceuticals, security threats have to be understood to design RFID innovations for protection of goods. Figure 1 depicts a possible RFID architecture modeled using the Fundamental Modeling Concepts (FMC) (Knöpfel, Groene, & Tabeling, 2006). It enables RFID-aided supply chains by incorporating a discovery service and a dedicated service provider performing authentication checks (Schapranow M.-P., Müller, Zeier, & Plattner, RFID Event Data Processing: An Architecture for Storing and Searching, 2010). We value customer privacy as a primary influencer for the acceptance of RFID technology, e.g. concerns about customer profiles which can be derived by tracking goods and customers (Garfinkel, Juels, & Pappu, 2005).

In this chapter, we want to increase the reader's overall understanding of security threads in RFID-aided supply chains and present possible countermeasures and its costs. To this end, we discuss

- A case study for the global pharmaceutical supply chain,
- Security threats in RFID-aided supply chains,
- Modeling techniques for supply chains to elaborate security tasks for all supply chain participants, and

Figure 1. Interaction of RFID Information Systems



- Authentication protocols based on the use of cost-efficient, passive tags for designing integer supply chain systems.

CASE STUDY: COUNTERFEITS IN THE PHARMACEUTICAL SUPPLY CHAIN

RFID technology is nowadays named to be the successor of existing tracking techniques such as scanning of one-dimensional barcodes (White, Prabhakar, Abdrazak, & Gardiner, 2007). Making use of RFID tags results in various advantages.

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