Chapter 1.5
RFID Technologies and Applications

Christian Kaspar
Georg-August-Universität Göttingen, Germany

Adam Melski
Georg-August-Universität Göttingen, Germany

Britta Lietke
Georg-August-Universität Göttingen, Germany

Madlen Boslau
Georg-August-Universität Göttingen, Germany

Svenja Hagenhoff
Georg-August-Universität Göttingen, Germany

INTRODUCTION

Radio frequency identification (RFID) is a radio-supported identification technology that typically operates by saving a serial number on a radio transponder that contains a microchip for data storage. Via radio waves, the coded information is communicated to a reading device (Jones et al., 2005). RFID does not represent a new development; it was devised by the American military in the 1940s. Since the technology's clearance for civil use in 1977, RFID has been successfully used for the identification of productive livestock, for electronic immobilizer systems in vehicles, or for the surveillance of building entrances (Srivastava, 2005). Due to decreasing unit costs (especially for passive transponders), RFID technologies now seem increasingly applicable for the labeling of goods and semi-finished products. By this, manual or semi-automatic data entry, for instance through the use of barcodes, can be avoided. This closes the technical gap

between the real world (characterized by the lack of distribution transparency of its objects) and the digital world (characterized by logically and physically unambiguous and therefore distribution-transparent objects). In addition, RFID facilitates fully automated simultaneous recognition of more than one transponder without direct line of sight between reader and transponders.

CONFIGURATION OF RFID SYSTEMS

A typical RFID system consists of three basic components (Jones et al., 2005): (1) a computer, (2) a reader, and (3) a transponder, as depicted in Figure 1.

1. The computer runs an application that requires real world data (for instance enterprise resource planning [ERP], manufacturing execution system [MES], supply chain management [SCM], or e-commerce applications). The processor sends commands to the reader and receives its replies.

2. The reader is connected to the processor through either a serial interface or a network connection. It contains a so-called "coupling unit," which allows the reader to modulate coded commands onto a magnetic or electromagnetic alternating field. The size and form of this coupling unit may vary, and its dimension determines the design of the reader.

3. The transponder has to be attached to the object to be identified. It is the actual information carrier. All transponders in the reader's field receive commands and send back their response data. A transponder usually consists of a microchip and a coupling unit. There are various transponder designs; most common, however, are small spools attached to adhesive film.

Figure 1. Logical RFID system architecture (Bitkom, 2005; Thiesse, 2005)
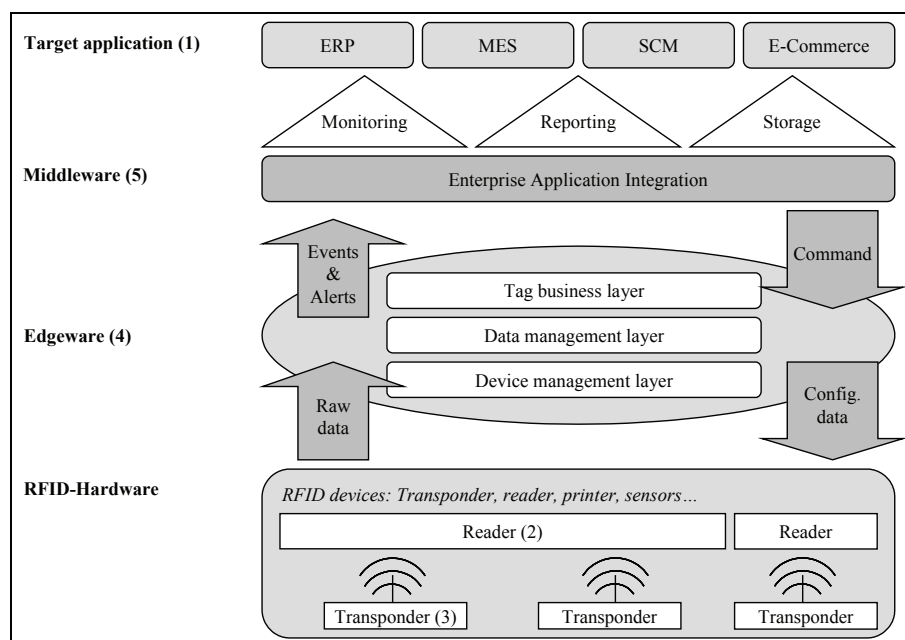
Related Content

Proposed Abelian ACM Method Optimizing The Risk on Real Time Unix Operating System: Risk Assessment on UNIX OS
 (2022). *International Journal of Security and Privacy in Pervasive Computing (pp. 0-0).*
www.irma-international.org/article//304892

The Planning of Distribution Generation (DG) Based on Multi-Objective Quantum Particle Swarms Optimization (QPSO)
Wang Yong-meiand Yao wan-ye (2014). *International Journal of Advanced Pervasive and Ubiquitous Computing (pp. 1-11).*
www.irma-international.org/article/the-planning-of-distribution-generation-dg-based-on-multi-objective-quantum-particle-swarms-optimization-qpso/113815

Dynamic and Secure Business Data Exchange Model for SaaS-based Collaboration Supporting Platform of Industrial Chain
Shuying Wang, Jizi Liand Shihua Ma (2011). *International Journal of Advanced Pervasive and Ubiquitous Computing (pp. 46-59).*
www.irma-international.org/article/dynamic-secure-business-data-exchange/64317

The Future of Personal Area Networks in a Ubiquitous Computing World
Dennis Viehlandand Fei Zhao (2010). *International Journal of Advanced Pervasive and Ubiquitous Computing (pp. 30-44).*
www.irma-international.org/article/future-personal-area-networks-ubiquitous/45134

Wireless Sensor Networks Advances for Ubiquitous Computing
João B. Borges Neto, Rossana M. C. Andradeand Pedro Fernandes Ribeiro Neto (2010). *Designing Solutions-Based Ubiquitous and Pervasive Computing: New Issues and Trends (pp. 175-189).*
www.irma-international.org/chapter/wireless-sensor-networks-advances-ubiquitous/42509