

Chapter 129

RFID Enabled B2B E-Commerce Technologies and Applications

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ABSTRACT

This article focuses on the emerging phenomenon of Radio Frequency Identification (RFID) technologies & the EPC Network by examining how it enables innovative B2B E-Commerce supply chain applications. A business process approach is used to facilitate the understanding on HOW to design RFID enabled B2B E-Commerce scenarios. Results indicate that RFID with other ubiquitous computing technologies constitute another step in the evolution from E-Commerce to “U-commerce”.

INTRODUCTION

In recent years RFID emerged as powerful and disrupting technologies (Krotov and Junglas, 2008), which can have a major impact on enterprise business practices, changing the way business processes are designed (Lefebvre et al., 2005). It is perhaps the biggest thing to hit the IT world since the Internet (Heinrich, 2005). In fact, it has been coined as “the next big thing for management” (Wyld, 2006), the “key to automate everything” (Want, 2004) enabling “the next wave of the IT revolution” (Srivastava, 2004), and fostering a higher level of electronic

integration between supply chain members (Bendavid et al., 2009).

RFID represents far more than a technological hype and has deep implications for organizations B2B E-Commerce practices. It is still an emerging phenomenon with a relatively rapid speed of adoption and its diffusion global, spanning over industries in different continents. In 2008 the value of the entire RFID market was estimated to \$5.29 billion, up from \$4.93 billion in 2007 (IDTechEx, 2008). Although the current slow-down in the economic environment is impacting the worldwide RFID market for RFID hardware, software and services, according to VDC Research Group (2008), compared to earlier estimates, the market forecasts have to be lowered

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but the demand will remain relatively strong. The revised annual growth rate (CAGR) between 2008 and 2012 are of 23.2 percent with a RFID market size for 2008 of \$3.7 billion, \$4.04 billion for 2009, and \$4.7 billion in 2010. Finally, by 2012, it expects the worldwide market to be valued at about \$8.42 billion.

This paper explores one aspect of the RFID technologies by analysing its potential in term of emerging B2B E-Commerce supply chain applications. More specifically, it focuses on the business process potential of RFID technologies by examining how intra & inter-organizational processes can be redesigned. In terms of practical implications, it is in line with recent questions raised by (Ngai et al., 2008) and (Curtin et al., 2007) about RFID while these authors are asking for models, theories, concepts, frameworks, methods, techniques, and tools to support the needs of professionals developing and implementing such technologies, raising the importance on RFID research to meet the needs of practitioners and managers.

The paper is organized as follows. The first section will define RFID technologies & EPC Global Network, though we will attempt to position RFID in a continuum of E-Commerce technologies adoption. The second section present RFID enabled applications in various industries. In section three, using a business process modeling approach (Davis, 2001), a specific application is selected in order to analyze “how” RFID enabled processes can be redesigned. Furthermore, in section 4, future research direction is proposed.

RFID TECHNOLOGIES & THE EPC GLOBAL NETWORK

Basically, RFID technology is a wireless Automatic Identification and Data Capture (AIDC) technology. As presented in **Figure 1** (adapted from Lefebvre et al., 2008), RFID belong to a

broader portfolio of AIDC technologies including among others barcode readers, Infra-Red (IR), Ultra Sound, 802.1x access points for wireless Local Area Networks (LANs), etc. (**left hand side of Figure 1**). An RFID solution can be represented as a multi layer system composed by tags, readers and middleware integrated with Enterprise Information Systems (EIS) and connected to Inter Organizational Information Systems (IOS).

RFID System: A Multi Layer Architecture

Layer 1 consists of RFID tags also named transponders which can be passive (powered by the reader RF with a read range from couple mm up to 4 m), semi-passive (with embedded sensors powered by a battery) or active (powered by a battery and equipped with a transmitter allowing a read range up to 100 m). These tags, embedded in or attached to any physical objects are used to record information and communicate with the readers using RF signals. **Layer 2** represents the RFID devices that enable the bulk communication with the tags without requiring the line of sight, namely readers and antennas and other ancillary devices (i.e. printers-encoders and feed back devices). These devices also transfer the data from the tags to the RFID middleware (layer 3). **Layer 3** is the software platform or middleware which acts as a bridge between hardware components (i.e. layers 1 and 2) and host applications (e.g. EIS) by enabling backend system integration. In fact, the RFID middleware not only monitors RFID equipment but also ensures the essential data management functions such as collection, storage, smoothing, filtering and aggregation. Moreover, it is critical for the events and workflow management functions based on preconfigured business rules and for other more advanced features such as analytics, business intelligence, reports and notifications.

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