

# A Framework for the Emerging Mobile Commerce Applications

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## Abstract

*We envision many new e-commerce applications will be possible and significantly benefit from emerging wireless and mobile networks. These applications can collectively be termed "wireless e-commerce" or "mobile commerce". To allow designers, developers, and researchers to strategize and effectively implement mobile commerce applications, we propose a 4-level integrated framework for mobile commerce. Since there are potentially an unlimited number of mobile commerce applications, we only identify a few important classes of applications such as Mobile Financial Applications, Mobile Advertising, Mobile Inventory Management, Proactive Service Management, Product Location and Search, and Wireless Re-engineering. We also address the networking requirements of these applications and discuss how these requirements can be supported by existing and emerging wireless networks. It is our hope that this work will become the framework for further research in mobile commerce.*

## 1. Introduction

Electronic commerce has attracted significant attention in the last few years. This high profile attention has resulted in significant progress towards strategies, requirements, and development of e-commerce applications [1]. We envision many new e-commerce applications will be possible and significantly benefit from emerging wireless and mobile networks. We term these applications "wireless e-commerce" or "mobile commerce". These applications are likely to provide new opportunities for users, developers, providers, and researchers. Wireless and mobile networks have experienced exponential growth in terms of capabilities of mobile devices, middleware development, standards and network implementation, and user acceptance [2]. Currently, more 500 million cell phones and other mobile devices are in use worldwide, and out of those, more than 100 million users are in US alone [3]. These numbers are projected to rise to 1 billion in the next few years [4]

thereby exceeding the combined total of all computing devices several fold. According to estimates by GartnerGroup, in 2004, at least 40% of consumer-to-business e-commerce will be initiated from smart phones supported by WAP (Wireless Application Protocol) [5]. A study from the Wireless Data and Computing Service, a division of Strategy Analytics, reports that the mobile commerce market may rise to \$200 Billion by 2004. The report predicts that transactions via wireless devices will generate about \$14 Billion a year [6].

In this paper, we examine how new e-commerce applications can be designed and supported by wireless and mobile networks and mobile middleware. We strongly believe that with the widespread deployment of wireless technologies, the next phase of electronic business growth will be in the area of wireless and mobile e-commerce. We are aware that consensus within business and industry of such future applications is still in its infancy. However, we are interested in examining those future applications and technologies that will form the next frontier of electronic commerce. The paper is organized as follows. In section II, we present an open framework for mobile commerce. We discuss individual functional layers of the framework in a separate section. In Section III, we discuss mobile commerce applications, followed by user infrastructure in IV, mobile middleware in V, networking infrastructure in VI. Finally, we make some concluding remarks in VII.

## 2. The mobile commerce framework

To help future applications and technologies handle m-commerce, we propose the framework as shown in Figure 1. This framework will allow developers and providers to strategize and effectively implement mobile commerce applications. The framework defines multiple functional layers, simplifying the design and development, so different parties (vendors, providers, and designers, etc.) can focus on individual layers. By using following framework, a single entity is not forced to do everything to build mobile commerce systems, rather, they can build on the functionalities provided by others. This will speed up the development of m-commerce applications as designers