

Mobile Commerce Technology

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INTRODUCTION

With the introduction of the World Wide Web, electronic commerce has revolutionized traditional commerce and boosted sales and exchanges of merchandise and information. Recently, the emergence of wireless and mobile networks has made possible the admission of electronic commerce to a new application and research subject—mobile commerce, which is defined as the exchange or buying and selling of commodities, services, or information on the Internet through the use of mobile handheld devices. With services provided by mobile commerce, consumers may use the microbrowsers on their cellular phones or PDAs to buy tickets, order meals, locate and book local hotel rooms, even write contracts on the move.

In just a few years, mobile commerce has emerged from nowhere to become the hottest new trend in business transactions. NTT DoCoMo's i-mode (2003) is by far the most successful example of mobile commerce. Introduced in February 1999, i-mode has attracted over 36 million subscribers worldwide. With i-mode, cellular phone users can easily access more than 62,000 Internet sites, as well as specialized services such as e-mail, online shopping and banking, ticket reservations, and personalized ringing melodies that can be downloaded for their phones. The i-mode network structure not only provides access to i-mode and i-mode-compatible contents through the Internet, but also provides access through a dedicated leased-line circuit for added security. i-mode users are charged based on the volume of data transmitted, rather than the amount of time spent connected. In Spring 2001, NTT DoCoMo introduced its next-generation mobile system, based on wideband CDMA (W-CDMA), which can support speeds of 384Kbps or faster, allowing users to download videos and other bandwidth-intensive content with its high-speed packet data communications.

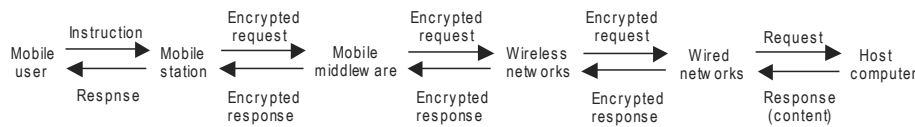
BACKGROUND

A mobile commerce system is very complex because it involves such a wide range of disciplines and technologies. In general, a mobile commerce system can be divided into six components: (1) mobile commerce applications, (2) mobile stations, (3) mobile middleware, (4) wireless networks, (5) wired networks, and (6) host computers.

To explain how these components work together, the following outline gives a brief description of a typical procedure that is initiated by a request submitted by a mobile user:

1. *Mobile commerce applications:* A content provider implements an application by providing two sets of programs: client-side programs, such as a user interface on a microbrowser, and server-side programs, such as database accesses and updating.
2. *Mobile stations:* Mobile stations present user interfaces to the end users, who specify their requests on the interfaces. The mobile stations then relay user requests to the other components and display the processing results later using the interfaces.
3. *Mobile middleware:* The major purpose of mobile middleware is to seamlessly and transparently map Internet contents to mobile stations that support a wide variety of operating systems, markup languages, microbrowsers, and protocols. Most mobile middleware also encrypts the communication in order to provide some level of security for transactions.
4. *Wireless networks:* Mobile commerce is possible mainly because of the availability of wireless networks. User requests are delivered to either the closest wireless access point (in a wireless local area network environment) or a base station (in a cellular network environment).
5. *Wired networks:* This component is optional for a mobile commerce system. However, most computers (servers) usually reside on wired networks such as the Internet, so user requests are routed to these servers

Figure 1. Flowchart of a user request processed in a mobile commerce system



using transport and/or security mechanisms provided by wired networks.

6. *Host computers:* This component is similar to the one used in electronic commerce, which includes three kinds of software. User requests are generally acted upon in this component.

To better illustrate the above procedure, Figure 1 depicts a flowchart showing how a user request is processed by the components in a mobile commerce system (Leavitt, 2000).

MOBILE COMMERCE SYSTEMS

Since each component in a mobile commerce system is large enough to be a research area by itself, only elements in components that are specifically related to mobile commerce are explained in this article. Related research on mobile commerce systems can be found in the article by Varshney, Vetter, and Kalakota (2000).

Mobile Commerce Applications

The applications of electronic commerce are already wide-spread; mobile commerce applications not only cover these

but also include new ones. For example, some tasks that are not feasible for electronic commerce, such as mobile inventory tracking and dispatching, are possible for mobile commerce. Table 1 lists some of the major mobile commerce applications (Gordon & Gebauer, 2001; Sadeh, 2002), along with details of each.

Mobile Stations

A mobile station or a mobile handheld device, such as a personal digital assistant (PDA) or Web-enabled cellular phone, may embrace many of the features of computers, telephone/fax, e-mails, and personal information managers (PIMs), such as calendars and address books, and networking features. A mobile station differs from a PC or notebook due to its limited network bandwidth, limited screen/body size, and mobility features. The limited network bandwidth prevents the display of most multimedia on a microbrowser, while the limited screen/body size restricts the mobile stations of today to either a stylus or keyboard version. Table 2 lists some major mobile station specifications, although several table entries may be incomplete as some of the information is classified as confidential due to business considerations.

Table 1. Major mobile commerce applications

Mobile Category	Major Applications	Clients
Commerce	Mobile transactions and payments	Businesses
Education	Mobile classrooms and labs	Schools and training centers
Enterprise resource planning	Resource management	All
Entertainment	Games/images/music/video downloads and online gaming	Entertainment industry
Health care	Accessing and updating patient records	Hospitals and nursing homes
Inventory tracking and dispatching	Product tracking and dispatching	Delivery services and transportation
Traffic	Global positioning, directions, and traffic advisories	Transportation and auto industries
Travel and ticketing	Travel management	Travel industry and ticket sales

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