Chapter 3.12
Essential Mobile-Commerce Technology

Wen-Chen Hu
University of North Dakota, USA

INTRODUCTION

Without ways to conduct secure commercial information exchange and safe electronic financial transactions over mobile networks, neither service providers nor potential customers will trust mobile commerce. Various mobile security procedures and payment methods have been proposed and applied to mobile commerce, and this chapter attempts to provide a comprehensive overview of these approaches and the issues involved. A secure mobile commerce system must have the following properties: (i) confidentiality, (ii) authentication, (iii) integrity, (iv) authorization, (v) availability, and (vi) non-repudiation. A discussion of the security issues related to the three network paradigms, wireless local area networks, wireless wide area networks, and WAP, is also included. Among the many themes of mobile commerce security, mobile payment methods are probably the most important. A typical mobile payment process includes: (i) registration, (ii) payment submission, (iii) authentication and authorization by a content provider, and (iv) confirmation. This chapter also describes a set of standards for mobile payments.

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WIRELESS NETWORKS

Network infrastructure provides essential voice and data communication capability for consumers and vendors in cyberspace. As part of the evolution from electronic commerce (EC) to mobile commerce (MC), it is necessary for the existing

wired network infrastructure, i.e. the Internet, to be augmented by a series of wireless networks that support mobility for end users. Wireless networking technologies are advancing at a tremendous pace and each represents a solution for a certain phase, whether 1G, 2G, and 3G, in a particular geographical area such as the United States, Europe, or Japan. In this section, they will be categorized in terms of their radio coverage as wireless local area networks, wireless metropolitan area networks, or wireless wide area networks.

Mobile Middleware

The term middleware refers to the software layer that lies between the operating system and the distributed applications that interact via the networks. The primary mission of a middleware layer is to hide the underlying networked environment's complexity by insulating applications from explicit protocols designed to handle disjoint memories, data replication, network faults, and parallelism (Geihs, 2001). Mobile middleware translates requests from mobile stations to a host computer and adapts content from the host to the mobile station (Saha, Jamtgaard, & Villasenor, 2001).

WAP and i-mode

According to an article "Frequently asked questions about NTT-DoCoMo's i-mode" (Eurotechnology Japan K.K., n.d.), 60 percent of the world's wireless Internet users use i-mode, 39 percent use WAP, and 1 percent use Palm middleware in 2002. Table 1 compares i-mode and WAP, along with details of each.

WAP (Wireless Application Protocol). WAP (2003) is an open, global specification that allows users with mobile stations to easily access and interact with information and services instantly. It is a very flexible standard including most wireless networks, which comprise CDPD, CDMA, GSM, PDC, PHS, TDMA, FLEX, ReFLEX, iDEN, TETRA, DECT, DataTAC, Mobitex, and GRPS. It is supported by most operating systems and was specifically engineered for mobile stations, including PalmOS, EPOC, Windows CE, FLEXOS, OS/9, and JavaOS. The most important technology applied by WAP is probably the WAP Gateway, which translates requests from the WAP protocol stack to the WWW stack so they can be submitted to Web servers. For example, requests from mobile stations are sent as a URL through the network to the WAP Gateway; responses are sent from the Web server to the WAP Gateway in HTML and are then translated to WML and sent to the mobile stations. Although WAP supports HTML and XML, its host language is WML (Wireless Markup Language), which is a markup language based on XML that is intended for use in specifying content and user interfaces for mobile stations. WAP also supports WMLScript, which is similar to JavaScript but makes minimal demands on memory and CPU power because it does not contain many of the unnecessary functions found in other scripting languages.

Table 1. Comparisons of two major kinds of mobile middleware

	WAP	i-mode
Developer	WAP Forum	NTT DoCoMo
Function	A protocol	A complete mobile Internet service
Host Language	WML (Wireless Markup Language)	CHTML (Compact HTML)
Major Technology	WAP Gateway	TCP/IP modifications
Key Features	Widely adopted and flexible	Highest number of users and easy to use