Mobile Commerce

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INTRODUCTION

The rapid development and deployment in wireless networks and mobile telecommunication systems are leading to a phenomenal growth of innovative and intelligent mobile applications generally referred to as mobile commerce (m-commerce). Mobile devices like the mobile phone become a necessity for everyone. M-commerce makes networks more productive by seamlessly bringing together voice, data communication, and multimedia services. There is an increasing demand in mobile applications or m-commerce. The objective of this short article is to discuss the reasons for the growth of m-commerce. First, variety of wireless and mobile telecommunication technologies will be reviewed. Second, the evolution of m-commerce application architecture will be studied. Third, we will examine the landscape of m-commerce. Finally, we conclude the article.

BACKGROUND

The recent phenomenal convergence of the Internet and mobile telecommunication has accelerated the demand for "Internet in the pocket" on light, low-cost terminals, as well as for radio technologies that boost data throughput and reduce the cost per bit. This trend to higher data rates over wireless networks will culminate in the introduction of 3G IMT-2000 (International Mobile Telecommunications-2000) systems. This revolution continues to 3.5G, which is HSDPA (High-Speed Downlink Packet Access) spreading in Europe and Japan currently, and further will get to 3.75G-HSUPA for solving uplink problems. In addition to these wide area cellular networks, a variety of wireless transmission technologies are being deployed, including DAB (Digital Audio Broadcast), DVB (Digital Video Broadcast), and DMB (Digital Multimedia Broadband) for wide area broadcasting; LMDS (Local Multipoint Distribution System) and MMDS (microwave multipoint distribution system) for fixed wireless access; and IEEE 802.11b, a, g, h, and the new standard i for WLAN (Wireless Local Area Networking), as well as WiMAX (Worldwide Interoperability for Microwave Access) extending from the enterprise world into the public and residential domains.

M-commerce, which refers to access to the Internet via a handheld device such as a cell phone or a PDA, is becoming a leading driver for the successful rollout of the current cellular systems, and will influence the relations between existing and emerging players (Paavilainen, 2001). It is expected to be one of the most important applications for nearly all social classes, as the UMTS Forum predicted the significant potential of the mobile Internet for m-commerce in 3G with the expectation about 50% of mobile subscribers (UMTS Forum, 2003), with a further 1.5 billion mobile users worldwide. The target m-commerce applications imaginable today are ranging from telemetry and credit card applications to electronic postcards, Web browsing, audio or video on demand, and even videoconferences. This will result in an estimated m-commerce global revenue of US$88 billion, and the ticket purchased and phone-based retail POS sales will result US$39 billion and US$299 million respectively in 2009 (Juniper Research, 2004).

This rapid development of m-commerce technologies has opened up hitherto unseen business opportunities. It has increased an organization's ability to reach its customers regardless of location and distance, and has also been successful to a certain extent in creating a consumer demand for more advanced mobile devices with interactive features. While the distinctive e-commerce is characterized by e-marketplaces, an explosion in m-commerce innovative applications has presented the business world with a fresh set of strategy based on personalized and location-based services (Buvat, 2005).

THE EVOLUTION OF M-COMMERCE ARCHITECTURE

M-commerce is enabled by a combination of technologies such as networking, embedded systems, databases, and security. Mobile hardware, software, and wireless networks enable m-commerce systems to transmit data more quickly, locate a user's position more accurately, and conduct business with better security and reliability. In this section, three areas of technologies that are fundamental for m-commerce will be examined which are wireless networks, wireless protocol(s), and mobile devices.

Wireless Networks

Wireless networks provide the backbone of m-commerce activities. The evolution of wireless networks continued with the implementation of 2G (Second-Generation) systems such as TDMA (Time Division Multiple Access), CDMA (Code Division Multiple Access), and GSM (Global System Of Mobile Communication), which were also used primarily for voice applications, with the exception of the SMS (Short Message Service) capability offered by the GSM network. An upgrade of the 2G networks is referred to as 2.5G wireless networks such as high-speed circuit-switched data, GPRS (General Packet Radio Service), and EDGE (Enhanced Data Rates For Global Evolution). Being either circuit-switched or packet-switched, these networks are primarily intended to allow for increases in data transmission rates and, in the case of packet-switched networks, an "always-on" connection.

3G networks are commonly referred as IMT-2000 on a global scale. Along with voice functionality, 3G networks support higher-speed transmission for high-quality audio and video enabled through high-bandwidth data transfers, as well as provide a global "always on" roaming capability. Better modulation methods and smart antenna technology are two of the main research areas that enable fourth-generation wireless systems to outperform third-generation wireless network (PriceWaterhouseCoopers, 2001).

Wireless Protocol(s)

Wireless networks are evolving, similar to the communication protocols; WAP and iMode are the two main wireless protocols that are implemented in m-commerce. The following "information exchange technology" for these two protocols is described:

- Hyper-Text Markup Language (HTML) is not a suitable format for information exchange in the wireless domain, while the compact version of HTML, known as cHTML, has been used in the NTT DoCoMo's iMode services.
- eXtensible Markup Language (XML) is a meta-language, designed to communicate the meaning of the data through a self-describing mechanism. It tags data and puts content into context, therefore enabling content providers to encode semantics into their documents. For XML-compliant information systems, data can be exchanged directly, even between organizations with different operation systems and data models, as long as the organizations agree on the meaning of the data they exchange.
- Wireless Markup Language (WML), which has been derived from XML, has been developed especially for WAP (Wireless Application Protocol). It allows information to be represented as cards suitable for display on mobile devices. So WML is basically to WAP what HTML is to the Internet.

Of course, iMode is a serious competitor of WAP 2.0 (NTTCoCoMo, 2005). It has been suggested that WAP may push ahead of iMode in popularity because WAP has a large community of developers, whereas the tightly NTT-controlled iMode may be stifled by lack of development blood (Frank, 2001). As iMode evolves towards support of XHTML and TCP (Transmission Control Protocol), with the current WAP evolution, these two technologies will probably converge. It has been rumored that the iMode supporters are evolving their platforms to support WAP users by enabling WAP phones to access iMode content. This is being done in Japan, and it is one way for iMode manufacturers and service providers to sell more equipment and services. By enabling a WAP user to get iMode content, an iMode service provider could use the product as a way of convincing the WAP user to buy his or her primary service from the iMode carrier. More than likely, a gateway function will be used to act as a mediation and conversion access point.

CHTML will likely become the common markup language for both iMode and WAP. XHTML is a combination of HTML and XML, and the combined format will define the data and the presentation of the data. This convergence for the technologies will create more opportunities to content providers and the Internet industry between the wireless Internet and the wired Internet, which in turn can offer more applications to m-commerce users and further expand the subscriber base in order to grow the revenue stream.

SMS enables sending and receiving text messages to and from mobile phones. Up to 160 alphanumeric characters can be exchanged in each SMS message. Widely used in Europe, SMS messages are mainly voicemail notification and simple person-to-person messaging. It also provides mobile information services, such as news, stock quotes, sports, weather, SMS chat, and downloading of ringing tones.

In mobile communication, knowledge of the physical location of a user at any particular moment is central to offering relevant service. Location identification technologies are important to certain types of mobile commerce applications, particularly those whose content is varied depending on location. GPS (Global Positioning System), a useful location technology, uses a system of satellites orbiting the earth.

Mobile Terminal(s)

The development of mobile terminals is partly dependent on the evolution of the networks. Bandwidth is an advanced feature, while it is not the only feature that narrows down potential applications. Network-based location services are also dependent on the equipment installed by the mobile