

Business Models for Mobile Commerce Services: Requirements, Design, and the Future

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Mobile commerce (m-commerce) is generating considerable interest and has led to the design and development of new services, but it lacks a suitable business model. This article presents business model requirements, existing models, and ways to design effective business models for emerging m-commerce services.

Mobile commerce (m-commerce) is an emerging area that involves hand-held mobile devices and wireless networks, made possible by innovative applications such as secure and atomic transactions and mobile middleware. Other applications include location-based services, mobile financial services, and mobile interactive games.¹ M-commerce can transform business processes in terms of efficiency and service quality as well as create new consumer markets that involve highly targeted services because of its unique characteristics, such as location and context awareness, personalization, and transaction orientation.

The work in m-commerce has focused primarily on designing applications and technological sup-

port,¹ location management,² and mobile transactions.³ The lack of suitable business models still causes major challenges in driving m-commerce further, although there is some preliminary work in deriving business models for one or more specific services.^{4,5} The term *business model* has led to multiple interpretations,⁶ but in this article, it refers to m-commerce services and technologies, core expertise and strategies of multiple players, and revenue generation and sharing.

M-Commerce: A Versatile Service

M-commerce services require location management, real-time delivery or service quality, transactions support, security, and wireless network reliability (see Figure 1). With some en-

hancements, cellular networks, wireless LANs (WLANs), and satellite-based networks can support one or more m-commerce services (see Table 1). Personal area networks (PANs), such as Bluetooth, and fixed wireless networks play limited roles because of range limitations and mobility restrictions, respectively. Cellular networks use connections to support mobile auctions that require real-time responses, whereas interactive games require transactional enhancements.

Table 1 shows several m-commerce services, of which certain networks can support. In the table, “yes” means the network can support the given service, and “no” means it might not be able to support the service in its current form.

According to the International Telecommunication Union (www.itu.int/newsroom/press_releases/2008/29.html), the number of handheld wireless devices will exceed 4 billion by the end of 2008, and the number of third-generation (3G) wireless users will have reached 600 million (www.itu.int/ITU-D/ict/newslog/Global+3G+Subscribers+Passed+600+Million+Mark+In+2007.aspx). Increased adoption of sophisticated

mobile devices and networks will influence m-commerce—ditto the fact that the global number of mobile video subscribers will reach an estimated 65 million by 2009. In Japan, wireless carrier DoCoMo supports mobile payments by scanning cell phones and handheld devices. With these developments and an increased

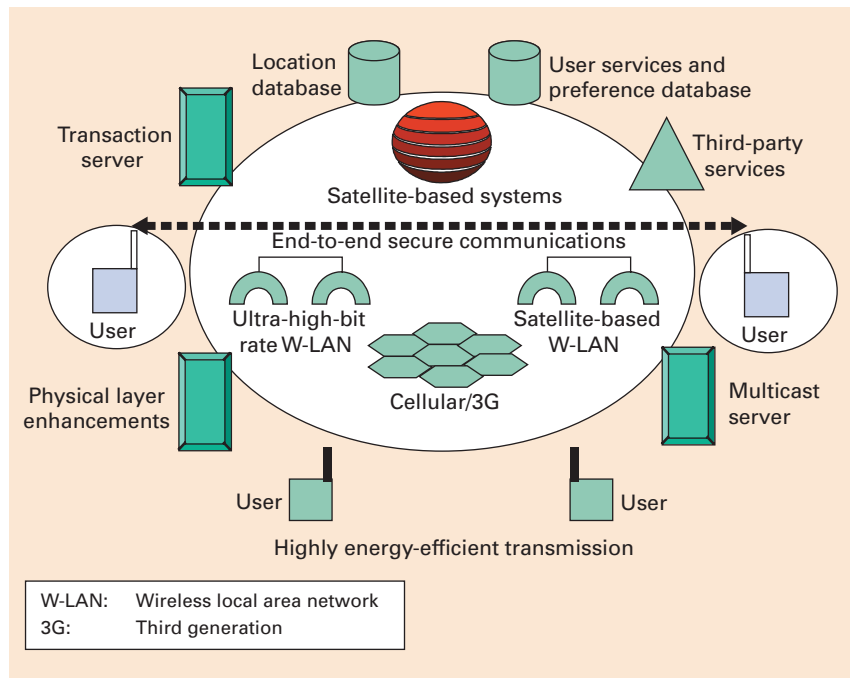


Figure 1. The vision for mobile commerce. In this service and network-oriented vision, various components will enable sophisticated mobile commerce services in the future.

Table 1. Mobile commerce services and wireless networks

Services	Public switched cellular networks	Wireless LANs	Satellite-based networks
Mobile auctions	With added support for transactions	No	Indoor coverage might be a problem
Interactive games	With added support for transactions	No	No
Mobile financial services	With added support for transactions	With added security	Indoor coverage might be a problem
Mobile and locational advertising	Yes	With added support for location management	Indoor coverage might be a problem
Mobile entertainment services	Yes	With added service-quality support	Yes
Proactive service management	Yes	Yes	No
Mobile inventory management	Yes	With added support for location management	Indoor coverage might be a problem

deployment and use of diverse wireless networks, the global market for m-commerce should reach US\$88 billion by 2009 (www.gsmworld.com/services/mcommerce.shtml). In many European countries, mobile tickets, parking, advertising, and shopping already generate billions of dollars in revenue.

Enterprise primarily uses m-commerce for location and tracking services, mobile financial services, shopping and advertisements, content, and telecommuting, but simple versions of m-commerce applications such as mobile games, payment systems, entertainment, and location-sensitive content are gaining popularity throughout Europe, Asia, and the US. Major US wireless companies are beginning to work with content and service providers to attract and retain mobile customers as well.

M-commerce business models must consider service-revenue generation and sharing because of the larger role third-party providers play.

Requirements for M-Commerce Business Models

M-commerce business models must consider service-revenue generation and sharing because of the larger role third-party providers play, the various ways of charging for services in wireless networks, the diversity of emerging m-commerce services, and regulatory diversity.

Because users give their immediate, undivided, and constant attention to mobile devices, an opportunity to create personalized services exists for attracting and retaining new customers. But certain requirements must be supported in designing business models, such as device characteristics, customer mobility, and locational constraints, which affect how m-commerce content and services are designed, developed, shared, and delivered.

In the existing regulatory framework, wireless carriers control access to network infrastructure. Wireless channels must be managed to maximize bandwidth and usability and create overall value for customers in terms of instant access, emergency use, enhanced anytime access to new services, and

increased productivity. Yet wireless carriers' lack of experience in developing service content combined with the cost of building m-commerce infrastructure will require collaboration among multiple players, each using its own financial, technical, and developmental capabilities. ("Players" in this context means wireless service providers, content providers, access providers, content developers, and aggregators.)

With the diversity of m-commerce services, a suitable revenue model is a major requirement, with service price based on flat rate, connection time, traffic, group, transaction, or some combination. A carrier could offer the customers different charges based on transaction, context, time, or location (such as higher fees for a location-based service outside the service area). This isn't all bad—customers who conduct mobile financial transactions might be willing to pay more than those searching for nearby restaurants.

M-commerce services can span multiple wireless carriers with diverse access protocols and performance. The interworking of heterogeneous wireless networks remains a challenge, although a few carriers with similar protocols have interconnected their networks for nationwide roaming. The rapid changes in wireless technologies such as 3G and the emerging fourth generation (4G) as well as free access via WLANs will significantly influence revenue generation and sharing in an m-commerce business models. Also, the cultural differences that influence a user's fascination with state-of-the-art gadgets, multifunctional and feature-rich mobile devices, and diverse peer and social pressures will affect the model's design.

Existing Business Models for Wireless Carriers

For wireless service providers (WSPs), most business models fit into the category of either WSP-centric, in which WSPs control both network access and content, or WSP-managed, in which WSPs control access but not content.

WSP-Centric Business Model

Japan's DoCoMo uses a business model that dominates the entire supply chain by creating and enforcing an exclusive set of service providers. Roughly 48 million customers access thousands of DoCoMo-approved service pro-

viders using its iMode service; approximately 40 percent of iMode use relates to entertainment, including music, games, cartoons, and betting, and the remaining 60 percent involves dictionaries, guides, travel and business information, stocks, and sports. Customers pay a variety of service charges based on download size and service type, and service providers pay a fraction of their revenue back to DoCoMo (see Figure 2). In essence, DoCoMo enjoys a high customer retention rate combined with an economy of scale.

WSP-Managed Model

Vodafone (www.vodafone.com)—one of the largest global wireless carriers with 150 million customers in Europe, North America, and Asia—uses the WSP-managed model. Unlike DoCoMo, Vodafone doesn't control an exclusive set of third-party providers that its wireless customers can access. Rather, content and news services are included in Vodafone's subscription charge for second-generation (2G) to 3G services, and the company charges news-type services as short-message service (SMS) messages. Vodafone now offers flat rates for data services and event-based or per-minute charges for concerts, games, and live TV. Other carriers use similar models, including Sonera in Scandinavia.

Existing Business Models' Limitations

Although existing business models have been useful for simple wireless services, they'll experience considerable difficulty for the emerging m-commerce services. One challenge is that no effective revenue model exists for these services. Yet, DoCoMo-type models are unsuitable in countries with a strong wireline presence for Internet access, a smaller dependence on public transportation, and a greater sensitivity for monopoly concerns. The WSP-centric model's problems grow more visible as DoCoMo's services in collaboration with local wireless carriers in many countries outside Japan are experiencing difficulty. Moreover, the use of several price schemes in WSP-centric models will become more complex for customers with an increased number of m-commerce services—WSP-managed models force wireless carriers into becoming bandwidth providers, causing such models to become less attractive for m-commerce. In addition, WSP models will be difficult to use in

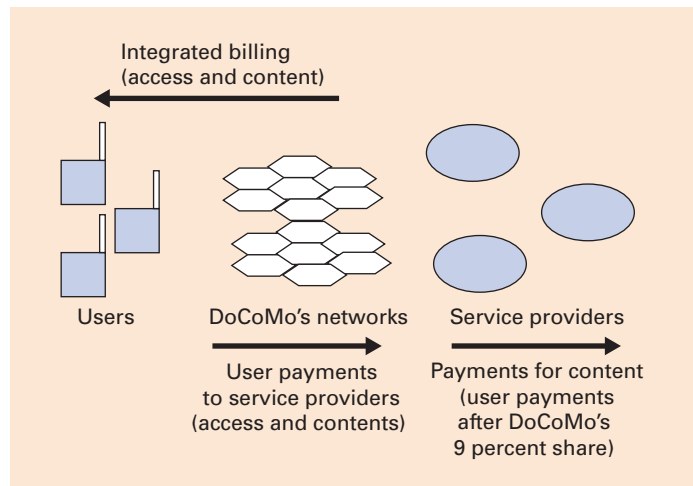


Figure 2. In this model, users pay DoCoMo directly for both network access and content. DoCoMo then withholds 9 percent of the total before paying the service providers for their content.

the US because of wireless network heterogeneity and the diversity in carriers' interests.

Effective M-Commerce Business Model Design

We can design an effective business model for m-commerce services by considering its

- suitability for wireless carriers, content and service providers, and WLAN access providers (WLAPs) without one provider controlling network access or service content;
- diversity of pricing to allow a full range of services and collaboration among providers to provide services for various users who have diverse strategic interests;
- modifiability to accommodate competition among wireless carriers, changing services and content, a range of economic and cultural factors, and user demographics; and
- adaptability to technical enhancements and the maturity of emerging wireless technologies.

Furthermore, the effectiveness of a business model for m-commerce will be enhanced by cooperation or collaboration among various stakeholders.

Collaboration among Multiple Players

A business model should focus on creating collaboration among multiple providers, in which each provider uses its core competencies, and no single provider controls access or content. In

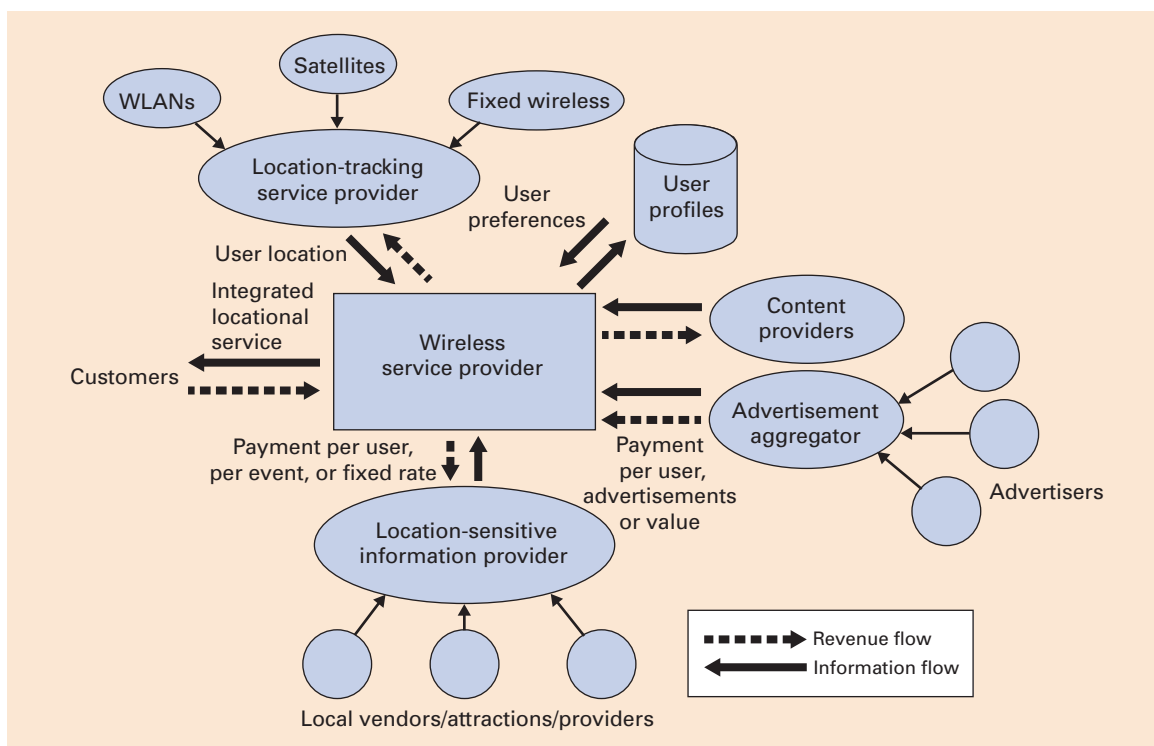


Figure 3. An effective business model for wireless carriers. Information and revenues flow among multiple stakeholders in this model.

Figure 3, for example, this scenario, wireless carriers offer network access, mobile devices, and billing, whereas service providers focus on content acquisition, content adaptation to mobile devices, and necessary software support. Revenue generation includes transaction-based pricing for mobile financial services and subscription charges for news and locational services. Revenue sharing involves cost-component determination and a proportionate division among multiple players.

Specific Components

An effective business model has multiple components, depending on the specific providers involved. We've already seen a business model with 10 suggested components (see Table 1).⁶ We can easily extend this model to include WLAN access providers and content providers.

Wireless carriers offer voice and wireless services in certain locations. These carriers will experience competition with WLANs using unlicensed spectrum, especially for non-real-time services. Thus, the *profit site*—implying a service provider's dominant position, which is its primary source of revenue—will change where multinet devices can access cellular

and WLANs and an increased number of satellite-based networks becomes available. Value is enhanced when carriers improve infrastructure reliability and quality and offer suitable functionalities for m-commerce services. Pricing reflects a large fixed cost associated with acquiring expensive spectrum, equipment and installation, and maintenance; lower variable costs result when a small increase occurs in network processing and storage for billing, user profiles, and location management. The model maintains several pricing schemes that support diversity in emerging m-commerce services. The connected activities include agreements with advertisers, content providers, location service providers, and macropayment providers, which leads to an implementation in which some activities are in-house, some are outsourced, and some are achieved through agreements. The capabilities component includes a flexible use of spectrum and improved coverage and content. The proposed competitive advantages and bundled services for customers with medium- or long-term usage agreements achieve sustainability. Finally, the cost structure includes the network upgrades from current 2G wireless networks to 3G or, in some cases, 4G networks.

Table 2. Effective versus current business models.

Required component	Current status	Model for m-commerce
Profit site	Controls access to content and services; maintains user profiles	Regulatory environment might change its profit site in the value chain; competition from WLANs will reduce non-voice service revenue
Value	Provides access to wireless infrastructure for communications and content	Highly reliable access, location-tracking ability, and improved service quality
Scope	Provides voice and data services (video-based in some places)	Will add several highly sophisticated services (location-based, live-events, entertainment, auctions)
Pricing	Subscription and usage-sensitive pricing	Different pricing for different services (flat rate, transactions-based, or location-based)
Revenue source	Wireless customers and some fraction of vendors who sell to customers via infrastructure	Wireless customers; advertisers (based on number of users and ad traffic); content providers (fixed + usage or per event); location/transaction service providers (usage or value-based)
Connected activities	Coverage for as many users in as great an area as possible; roaming agreements with other wireless carriers	Agreements with advertisers, content providers, location service providers, and macropayment providers
Implementation	Network designers and engineers to build infrastructure	Some services in-house, some outsourced, and some through agreements with other providers
Capabilities	Additional spectrum, better design, and upgrade of wireless infrastructure, billing, and accounting services	Increased and flexible use of spectrum, improved coverage, and bandwidth; more suitable content for mobile users and handheld devices; increased revenue generation and revenue sharing with multiple providers
Sustainability	Carrier owns expensive networking infrastructure and large number of devices	Competitive advantage as other carriers could still try to do all by themselves; collaboration might result in a higher adoption of emerging and sophisticated m-commerce services
Cost structure	High fixed cost due to infrastructure and installation	Upgrade of wireless infrastructure for location-based services; additional cost for m-commerce services and some revenue sharing with other providers

Business Strategies

Given the continued and deeply entrenched differences in wireless standards in the US, some mergers and alliances with compatible wireless service providers and collaboration among content and service providers will be part of a sound business strategy. If the carriers offer user-centric, personalized, sophisticated, and usable m-commerce services, they'll maintain a competitive advantage. Customer retention will improve with easy-to-understand pricing, better service quality (with incentives for frequent users), and highly innovative and targeted services. The carrier's strategy must be both adaptive and forward-looking to changes in wireless technology, individual preferences, societal values, and governmental regulations.

Other m-commerce provider's strategies will differ from those of wireless carriers. Unlike wireless carriers, WLAPs enjoy an excellent interoperability because of LAN protocol compatibility, albeit at a lower bit rate in some cases. Creating a nationwide service that interconnects smaller networks of WLANs can make alliances with other WLAPs profitable. A single type of wireless network that provides nationwide service could offer a significant competitive advantage. Agreements with wireless carriers and content and entertainment service providers are part of the business strategy for WLAPs to avoid becoming network-bandwidth providers. Certainly, more investment in infrastructure, interference management, and m-commerce services should be a high priority for WLAPs to create a

Table 3. Pricing schemes for m-commerce services

M-commerce service and content	Suggested pricing scheme	Comments
Mobile entertainment services	Based on usage or service quality	Live events can also include fixed charges
Mobile auctions	Transaction-based	
Interactive games	Usage-based	Two different rates can exist based on secure and unsecure versions
Mobile financial/payment services	Transaction-based	
Mobile location-based services (advertising, recommendation systems, routing, inventory)	Subscription-based	Can be subsidized using revenue from advertisers
Mobile informational services	Subscription-based	Can be added for free to more sophisticated m-commerce service

strong presence in emerging services. WLAPs should also cooperate with wireless carriers in some locations, especially when dual-network devices become more common, and they should work on creating service agreements in locations of significant user density.

The strategies for content and location service providers must address the challenges of creating favorable collaborations with wireless carriers and WLAPs. Their strategies must also address acquiring, aggregating, updating, and delivering user-centric content. Forming alliances with content providers and focusing on user-centric content suitable for smaller devices could reduce the cost to acquire, aggregate, and update the content. Pricing, location-sensitive advertisement revenue, and revenue sharing with other providers will also affect revenue generation. To maximize advertising revenue without losing customers, content and location service providers must focus on improving the quality and usefulness of advertisements and additional revenue sources by offering recommendation services for their customers.

Revenue Models for M-Commerce

A revenue model describes the way a company will make money through a variety of revenue flows. For m-commerce, this implies identifying all sources of revenue from customers and other m-commerce providers. The largest wireless carriers in Japan, Europe, Scandinavia, and Korea have varying revenue models.

DoCoMo's revenue model is unique in that it uses both pricing and revenue collection from participating vendors (www.nttdocomo.com/services/imode/business/). It includes

- content control, as DoCoMo approves both content access and the content itself;
- a low monthly fee of US\$2.72 (\$1.36 for packet transmission and a \$1.36 fee for iMode service);
- variable usage charges based on the amount of data downloaded (a packet of 128 bytes costs roughly \$0.003);
- charges for email (\$0.009), downloading still images (\$0.063), checking share prices (\$0.236), transferring funds (\$0.544);
- information charges for iMode as a flat monthly fee of \$0.906 to \$2.72 for each subscribed content provider site; and
- 9 percent from all sites that provide an integrated billing service to customers. The rest of the money goes to content aggregators who then divide it among content owners and developers.

Vodafone's revenue model involves flat rates for data services (€0.59 for 100 Kbytes) and event-based or per-minute charges for concerts, games, and live TV. Some sample rates are £22.00 for 100 anytime minutes, 12 pence per text message, 60 pence per video message, and 0.235 pence per Kbyte of data.

Sonera's revenue model involves a fixed monthly rate for specific free SMS messages combined

with a usage rate for additional messages. A sample plan involves a US\$2 to \$9 fixed rate fee and \$0.10 per minute for a call or per SMS message. Many data-centric services are charged a basic fixed rate and then \$1.70 per Mbyte for additional data. Also, users can subscribe to low-bit-rate data at \$0.18/minute at 9.6 Kbps, while MMS multimedia messaging service (MMS) messages cost \$0.50.

South Korea (SK) Telecom's revenue model is primarily subscription-based for voice, data, and text-messaging services—for example, roughly 1 million current subscribers can download and play songs for a fixed monthly subscription rate of roughly US\$6. Unlike DoCoMo's per-item model, this model is quite appealing to power users in Korea.

Of the four revenue models discussed, it's clear that although DoCoMo's model covers the most varied types of services, it's complex and difficult for users to remember. The Vodafone, Sonera, and SK Telecom models don't support pricing for sophisticated m-commerce services because they treat most services as pure data; SK Telecom's model treats all services with subscription-based charges.

For emerging m-commerce services, in which both service types and usage models are likely to be quite diverse, a revenue model should include a combination of simplified pricing such as a subscription rate, usage-based charges, and a fixed rate (see Table 3). Also, as m-commerce services require different levels of wireless networking resources, content, and provider involvement, the pricing should reflect both fixed and variable costs for all providers. Usage-based charges are suitable for services that require networking resources and real-time delivery, transactions-based pricing suits mobile financial services and mobile auctions because of the transaction orientation, diversity, and financial value. A flat, unlimited rate for high-end and business users also simplifies billing for m-commerce service providers.

Multiple providers can share revenue deriving the cost components for individual players for each service or proportionally dividing revenue among multiple providers. Any provider not collaborating in the business model can receive a combination of a fixed price and a variable price based on the number of customers.

Future m-commerce business models must be suitable for several providers, including wireless carriers, WLAN access providers, and location and content service providers. It must provide support for flexible revenue generation and revenue-sharing models to suit a diverse set of strategic interests, and it must evolve with maturing wireless and mobile technologies. The increased revenue due to both a higher number of customers and support for sophisticated services will lead to higher profitability, and pricing schemes, as well as suggested business strategies, will significantly improve m-commerce service providers' profitability. ■

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