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Mobile Commerce

Chapter 1 Introduction



Outline

- M-Commerce Overview
- Infrastructure
- M-Commerce Applications
- Limitations
- Security in M-Commerce



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Mobile Commerce: Overview

- Mobile commerce (m-commerce, m-business)—any e-commerce done in a wireless environment, especially via the Internet
 - Can be done via the Internet, private communication lines, smart cards, etc.
 - Creates opportunity to deliver new services to existing customers and to attract new ones



Mobile commerce from the Customer's point of view

- The customer wants to access information, goods and services any time and in any place on his mobile device.
- He can use his mobile device to purchase tickets for events or public transport, pay for parking, download content and even order books and CDs.
- He should be offered appropriate payment methods. They can range from secure mobile micropayment to service subscriptions.



Mobile commerce from the Provider's point of view

- The future development of the mobile telecommunication sector is heading more and more towards value-added services. Analysts forecast that soon half of mobile operators' revenue will be earned through mobile commerce.
- Consequently operators as well as third party providers will focus on value-added-services. To enable mobile services, providers with expertise on different sectors will have to cooperate.
- Innovative service scenarios will be needed that meet the customer's expectations and business models that satisfy all partners involved.



M-Commerce Terminology

- Generations
 - 1G: 1979-1992 wireless technology
 - 2G: current wireless technology; mainly accommodates text
 - 2.5G: interim technology accommodates graphics
 - 3G: 3rd generation technology (2001-2005) supports rich media (video clips)
 - 4G: will provide faster multimedia display (2006-2010)



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Terminology and Standards

- GPS: Satellite-based Global Positioning System
- PDA: Personal Digital Assistant—handheld wireless computer
- SMS: Short Message Service
- EMS: Enhanced Messaging Service
- MMS: Multimedia Messaging Service
- WAP: Wireless Application Protocol
- Smartphones—Internet-enabled cell phones with attached applications

Attributes of M-Commerce and Its Economic Advantages



- Mobility—users carry cell phones or other mobile devices
- Broad reach—people can be reached at any time
- Ubiquity—easier information access in real-time
- Convenience—devices that store data and have Internet, intranet, extranet connections
- Instant connectivity—easy and quick connection to Internet, intranets, other mobile devices, databases
- Personalization—preparation of information for individual consumers
- Localization of products and services—knowing where the user is located at any given time and match service to them



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➡ Hardware

- Cellular (mobile) phones
- Attachable keyboard
- PDAs
- Interactive pagers
- Other devices
 - Notebooks
 - Handhelds
 - Smartpads

Mobile Computing Infrastructure



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(cont.)

- Unseen infrastructure requirements
 - Suitably configured wireline or wireless WAN modem
 - Web server with wireless support
 - Application or database server
 - Large enterprise application server
 - GPS locator used to determine the location of mobile computing device carrier



Mobile Computing Infrastructure (*cont.*)

- Software
 - Microbrowser
 - Mobile client operating system (OS)
 - Bluetooth—a chip technology and WPAN standard that enables voice and data communications between wireless devices over short-range radio frequency (RF)
 - Mobile application user interface
 - Back-end legacy application software
 - Application middleware
 - Wireless middleware



- Networks and access
 - Wireless transmission media
 - Microwave
 - Satellites
 - Radio
 - Infrared
 - Cellular radio technology
 - Wireless systems



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Mobile Service Scenarios

- Financial Services.
- Entertainment.
- Shopping.
- Information Services.
- Payment.
- Advertising.
- And more ...



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Early content and applications have all been geared around information delivery but as time moves on the accent will be on revenue generation.

Entertainment

- . Music
- . Games
- . Graphics
- . Video
- . Pornography

Communications

- . Short Messaging
- . Multimedia Messaging
- . Unified Messaging
- . e-mail
- . Chatrooms
- . Video - conferencing

M- commerce

Transactions

- . Banking
- . Broking
- . Shopping
- . Auctions
- . Betting
- . Booking & reservations
- . Mobile wallet
- . Mobile purse

Information

- . News
- . City guides
- . Directory Services
- . Maps
- . Traffic and weather
- . Corporate information
- . Market data



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Classes of M-Commerce Applications

Exhibit 8.2 Classes of M-Commerce Applications

Class of Applications	Examples
Mobile financial applications (B2C, B2B)	Banking, brokerage, and payments for mobile users
Mobile advertising (B2C)	Sending user-specific and location-sensitive advertisements to users
Mobile inventory management (B2C, B2B)	Location tracking of goods, boxes, troops, and people
Proactive service management (B2C, B2B)	Transmission of information related to distributing components to vendors
Product locating and shopping (B2C, B2B)	Locating/ordering certain items from a mobile device
Wireless reengineering (B2C, B2B)	Improvement of business services
Mobile auction or reverse auction (B2C)	Services for customers to buy or sell certain items
Mobile entertainment services (B2C)	Video-on-demand and other services to a mobile user
Mobile office (B2C)	Working from traffic jams, airport, and conferences
Mobile distance education (B2C)	Taking a class using streaming audio and video
Wireless data center (B2C, B2B)	Information can be downloaded by mobile users/vendors
Mobile music/music-on-demand (B2C)	Downloading and playing music using a mobile device

Source: U. Varshney and R. Vetter, "Recent Advances in Wireless Networking," *IEEE Computer*, June 2000.
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Mobile Application: Financial Tool

- As mobile devices become more secure
 - Mobile banking
 - Bill payment services
 - M-brokerage services
 - Mobile money transfers
 - Mobile micropayments
- Replace ATM's and credit cards??



- “transform mobile phones into secure, self-contained purchasing tools capable of instantly authorizing payments...”
- Types:
 - Micropayments
 - Wireless wallets (m-wallet)
 - Bill payments



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- Shopping from Wireless Devices
 - Have access to services similar to those of wireline shoppers
 - Shopping carts
 - Price comparisons
 - Order status
 - Future
 - Will be able to view and purchase products using handheld mobile devices



- Targeted Advertising
 - Using demographic information can personalize wireless services (barnesandnoble.com)
 - Knowing users' preferences and surfing habits marketers can send:
 - User-specific advertising messages
 - Location-specific advertising messages



- CRM applications
 - MobileCRM
 - Comparison shopping using Internet capable phones
 - Voice Portals
 - Enhanced customer service improved access to data for employees



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Mobile Portals

- “A customer interaction channel that aggregates content and services for mobile users.”
 - Charge per time for service or subscription based
 - Example: 3G iSmart TruemoveH
 - Mobile corporate portal
 - Serves corporations customers and suppliers



- Support of Mobile Employees
 - by 2015 35% of all workers could be mobile employees (1.3 billion)
 - sales people in the field, traveling executives, telecommuters, consultants working on-site, repair or installation employees
 - » need same corporate data as those working inside company's offices
 - solution: wireless devices
 - » wearable devices: cameras, screen, keyboard, touch-panel display



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Mobile B2B and Supply Chain Applications

- “mobile computing solutions enable organizations to respond faster to supply chain disruptions by proactively adjusting plans or shifting resources related to critical supply chain events as they occur.”
 - accurate and timely information
 - opportunity to collaborate along supply chain
 - must integrate mobile devices into information exchanges
 - example: “telemetry” integration of wireless communications, vehicle monitoring systems, and vehicle location devices
 - leads to reduced overhead and faster service responsiveness (vending machines)



Applications of Mobile Devices for Consumers/Industries

- Personal Service Applications
 - example airport
- Mobile Gaming and Gambling
- Mobile Entertainment
 - music and video
- Hotels
- Intelligent Homes and Appliances
- Wireless Telemedicine
- Other Services for Consumers



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Limitations of M-Commerce

- Usability Problem
 - small size of mobile devices (screens, keyboards, etc)
 - limited storage capacity of devices
 - hard to browse sites
- Technical Limitations
 - lack of a standardized security protocol
 - insufficient bandwidth
 - 3G licenses



Limitations of M-Commerce

- Technical Limitations...
 - transmission and power consumption limitations
 - poor reception in tunnels and certain buildings
 - multipath interference, weather, and terrain problems and distance-limited connections
- WAP Limitations
 - Speed
 - Cost
 - Accessibility

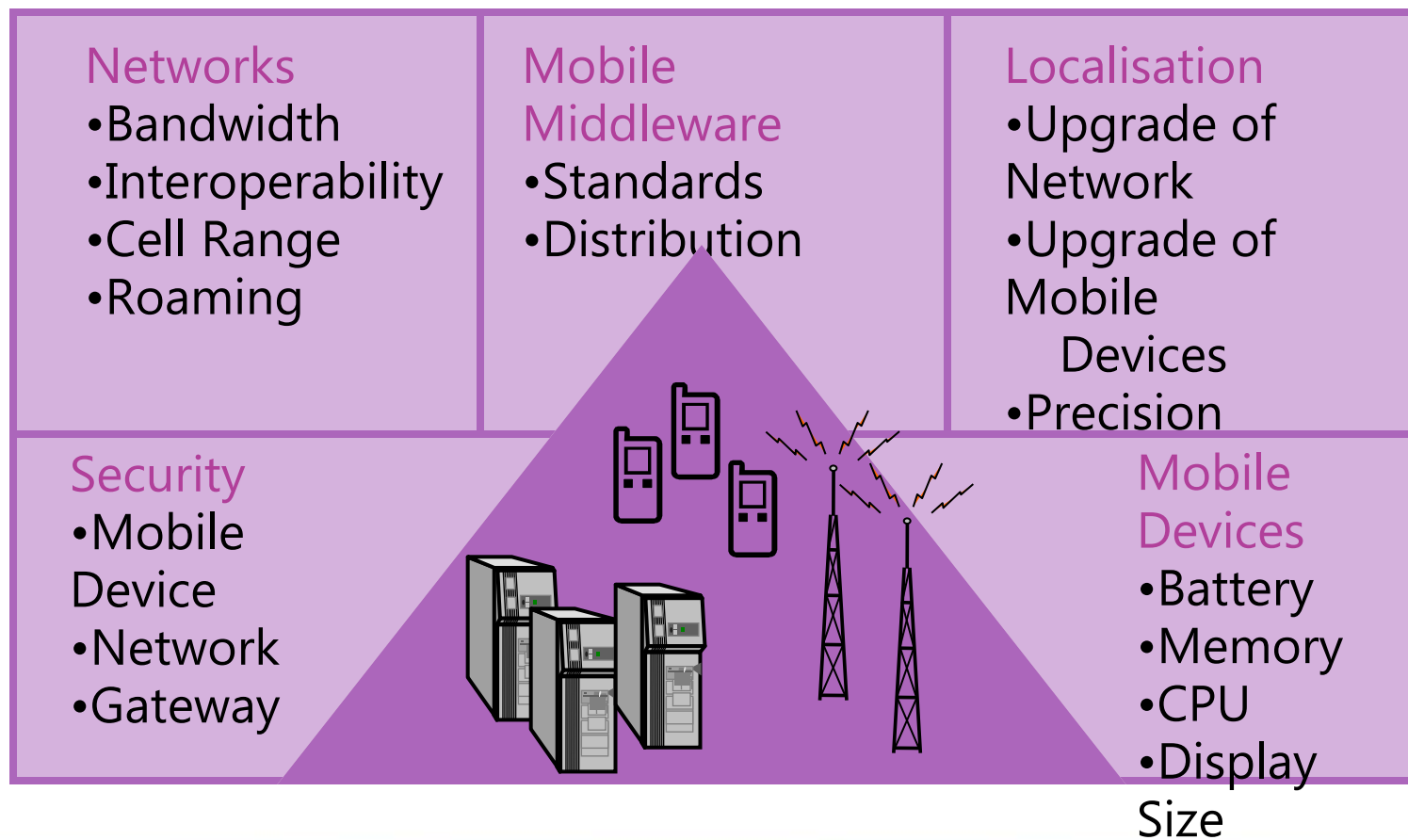


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Limiting technological factors





Potential Health Hazards

- Cellular radio frequencies = cancer?
 - No conclusive evidence yet
 - could allow for myriad of lawsuits
 - mobile devices may interfere with sensitive medical devices such as pacemakers



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New Security Risks in M-Commerce



- Abuse of cooperative nature of ad-hoc networks
 - An adversary that compromises one node can disseminate false routing information.
- Malicious domains
 - A single malicious domain can compromise devices by downloading malicious code
- Roaming (are you going to the bad guys ?)
 - Users roam among non-trustworthy domains



New Security Risks (cont.)

- **Launching attacks from mobile devices**
 - With mobility, it is difficult to identify attackers
- **Loss or theft of device**
 - More private information than desktop computers
 - Security keys might have been saved on the device
 - Access to corporate systems
 - **Bluetooth** provides security at the lower layers only: a stolen device can still be trusted



New Security Risks (cont.)

- **Problems with Wireless Transport Layer Security (WTLS) protocol**
 - Security Classes:
 - No certificates
 - Server only certificate (**Most Common**)
 - Server and client Certificates
 - Re-establishing connection without re-authentication
 - Requests can be redirected to malicious sites



New Privacy Risks

- **Monitoring user's private information**
- **Offline telemarketing**
- **Who is going to read the "legal jargon"**
- **Value added services based on location awareness (Location-Based Services)**



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Questions?

