COMP327
Mobile Computing
Session: 2014-2015

Lecture Set 10 - mCommerce

In this Lecture Set

- M-Commerce

  - E-Commerce on a mobile device

  - Challenges and Opportunities

- Payment Systems

  - Payment mechanisms

E-Commerce

- Traditionally concerned with allowing users to buy goods over the web

  - Emerged in the late 90ies, with significant market uptake in the earlier noughties

  - Saw significant market growth year on year (aprox 20-25%) compared to traditional retail (~5% growth)

- Emerging as a convenient means of managing services and discovering alternate providers

  - Price comparison sites allow users to evaluate the market, rather than having to "collect fliers from the high street"

  - Has allowed niche retailers to emerge and gain exposure

  - Augments traditional services with new capabilities

    - E-Government services (paying bills, filing tax returns)

    - Banking and Utilities management

M-Commerce Scenarios

- Augmenting brick-and-mortar commerce
  - Use of RFID or NFC to detect goods
    - Can acquire additional information about the good
      - E.g. product information, price, reviews
      - Additional services such as preview (e.g. for music)

  - Using QR codes to identify, obtain or provide information
    - Quick Response Code
      - Quicker than URLs; can be captured from billboards or printed media
      - Can encode numeric, alpha-numeric or kanji characters
    - Can display, as well as acquire visual codes
      - Airlines are increasingly using e-ticketing for boarding cards
      - Can use optical scanners to read barcodes from a mobile device
      - Deployments include Spanair, Air France, Lufthansa

- Advantages
  - Informed choice when purchasing goods

M-Commerce Scenarios

- Electronic Banking, Payment and e-ticketing

  - WAP Solo

    - Provides a means of payment to services via WAP for identified ticketing sites
    - Payments either from your bank account or via credit cards - including 3rd parties

  - iMode Felicia

    - Wireless payment scheme

      - Similar to use of Oyster card
      - Used for shopping, transportation, ticketing, membership card, etc

  - SMS payment and alerts

    - Warnings when bank limits are approached or new payments are instructed

- Advantages

  - Shorter queues with lower operating costs
  - Relax need for on-the-spot revenue collection technologies

    - e.g. coin-operated parking meters
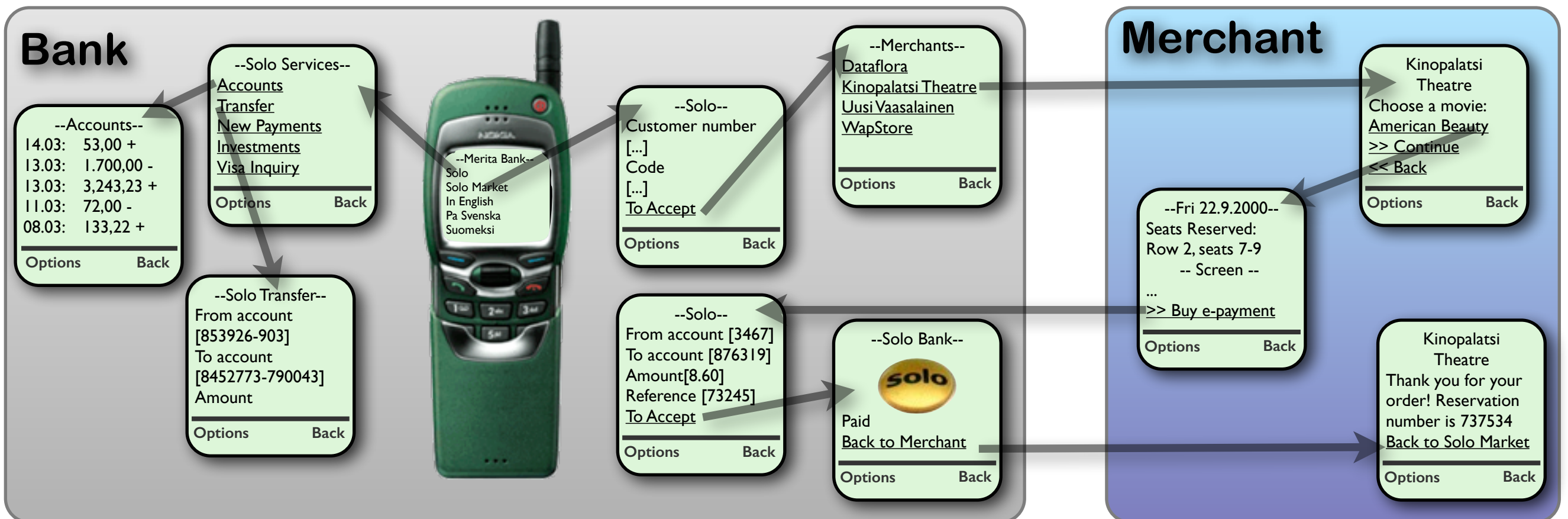
M-Commerce Scenarios

- Killing "dead-time"
  - Provide access to media on-demand
    - Video access such as TV subscription
      - Available in Japan and Korea since 2005
      - More than 20m TV phones in Japan and 8m in Korea
    - News Media Access
      - Increasing number of Publishers are charging for access to online variants of print news

- In App Purchasing
  - Music Stores such as iTunes allow access to new content
  - "Free" applications can provide basic functionality, with extended functionality for additional cost
    - E.g. new levels for games, or upgrading to the "Pro" version

Case Study: Noreda's WAP Solo

- WAP based payment and banking system from Noreda Bank

  - Launched in Scandinavia in October, 1999; >2M users within first 24 months
  - Payments either from users bank account or via credit cards - including 3rd parties

- Services:

  - Traditional banking services
  - Check balance, pay bills, news, check credit card activity, stock trading
  - But also shopping mall (>600 merchants) , e-salary, loans, insurance, etc.

Bank

--Accounts--
14.03: 53,00 +
13.03: 1.700,00 -
13.03: 3,243,23 +
11.03: 72,00 -
08.03: 133,22 +

Options   Back

--Solo Services--
Accounts
Transfer
New Payments
Investments
Visa Inquiry

Options   Back

--Solo Transfer--
From account
[853926-903]
To account
[8452773-790043]
Amount

Options   Back

--Merita Bank--
Solo
Solo Market
In English
Pa Svenska
Suomeksi

--Solo--
Customer number
[...]
Code
[...]
To Accept

Options   Back

--Solo--
From account [3467]
To account [876319]
Amount[8.60]
Reference [73245]
To Accept

Options   Back

--Merchants--
Dataflora
Kinopalatsi Theatre
Uusi Vaasalainen
WapStore

Options   Back

--Solo Bank--
solo

Paid
Back to Merchant

Options   Back

Merchant

Kinopalatsi Theatre
Choose a movie:
American Beauty
>> Continue
<< Back

Options   Back

--Fri 22.9.2000--
Seats Reserved:
Row 2, seats 7-9
   -- Screen --
...
>> Buy e-payment

Options   Back

Kinopalatsi Theatre
Thank you for your order! Reservation number is 737534
Back to Solo Market

Options   Back

Mobile Payment: General Considerations

- User Interface Constraints:

  - Tiny keypads make credit card details much more difficult to enter

    - Less of an issue with more modern smart phones, though still time consuming

  - Secure end-to-end TLS connection is not always available

    - Problematic in early WAP scenarios

- Opportunities:

  - Mobile phone can be used as a *Personal Trusted Device* that replaces your wallet

  - Can also pay non-physical services, e.g. charitable donations via SMS

Mobile Payment Mechanisms

- Four primary models for mobile payment:

  - Premium SMS based transactional payments

  - Mobile Web Payments

  - Contact-less Payment (Near Field Communication)

- Variants of these also exist

  - TextPayMe, mPark, stored value systems

- Increasing adoption

  - Mainly in Europe and Asia

  - Estimated market of $60B by 2013

Premium SMS based transactional payments

- Payment via an SMS message to a short code
  - Premium charge applied to mobile phone bill
  - Phone-based goods are often delivered through MMS
    - e.g. Music, Ringtones, Wallpapers, but also 2D Barcodes for e-ticketing
  - Challenges:
    - Poor Reliability - messages may get lost (no delivery guarantee)
    - Slow Speed - SMS delivery can be slow, making the consumer wait
    - High Setup and Running Costs - includes delivery of goods via MMS
    - Low Payout Rates - After running costs, payout to merchant as low as 30%
    - Low Follow-on Sales - limited mechanism, with little user support

A Big Thank You!
A big thank you to the UK mobile phone operators, who have made it possible for us to receive the full £5 you have donated: 3, O2, Orange, T-Mobile, Virgin and Vodafone.

Mobile Web Payments

- Payment made via a web site or via embedded code within the app
  - Uses WAP to support communications
  - A variety of implemented payment systems exist to simplify transactions, though require setting up accounts
    - PayPal, obopay, TextPayMe, Google Checkout etc

Mobile Web Payments

- Several Advantages to using Mobile Web Payments

  - Follow-on sales

    - Web or App can return user to the store, other services or related goods.

    - Access to re-usable URLs encourages repeated visits

  - High Customer Satisfaction

    - Confidence in using a widely adopted and brand-familiar approach

  - Ease Of Use

    - Familiarity with a previously used mechanism

    - Requires information known a-priori, or accounts are set up that require little further input

Direct Operator Billing: Advantages

- **Simplicity**
  - the operators already have a billing relationship with the consumers

- **Instantaneous payments**
  - giving the highest customer satisfaction

- **Accurate responses**
  - showing success and reasons for failure (no money for example)

- **Security**
  - to protect payment details and consumer identity

- **Best conversion rates**
  - from a single click-to-buy and no need to enter any further payment details.

- **Reliability**
  - that builds confidence

- **Reduced customer support costs**
  - for merchants and operators

- **Higher payout rates**
  - with operators such as Vodafone in the UK delivering up to 86% in some cases

Credit Card

- User can provide credit card details for one-off payments
  - Familiar payment mechanism, used by most e-Commerce stores
  - User enters card details, billing address, and (if different) a delivery address
  - Many banks also require 3rd party authentication
- Can be tedious and error prone from a small device
  - leading to lower success or conversion rates
  - By having the retailer retain card details, payments can be simplified
    - increases conversion (i.e successfully completed transaction) rate
    - experience becomes similar to Direct Operator Billing
- Other "peripheral" based approaches emerging
  - E.g. SquareUp for credit card payments on smartphones

Online Payment Systems

- Online payment systems allow online transactions, and act as a proxy

  - Online account is paired to a 3rd party bank account

    - Credit may be held by the payment system, but can be "topped up" from the bank account

    - Excess credit can be paid back to the bank

  - Authentication performed using an account id and password/pin

- Augments existing banking services

  - New payment systems can be adopted without uptake from high-street banks

    - Flourished with the advent of Auction Marketplaces such as eBay

- Examples:

  - PayPal, Amazon Payments and Google Checkout

MicroPayments

- Financial transactions involving very small sums of money

  - From a few pennies to a small number of pounds

  - Often used for purchasing online content, or making regular payments

    - music, video, toll-payments, etc

- Standard payment systems problematic for small payments

  - Typically every payment incurs a transaction fees

    - Transaction fee for small payments becomes significant

- Require some billing mechanism to support payments over several transactions:

  - Pre-paid accounts

  - Accumulated Balance Payment Systems

MicroPayments

- Pre-paid accounts
  - MicroPayments can be drawn from this pre-paid account
    - NetBill research project at CMU explored this approach in 1997
  - Still used for systems such as Skype, etc

- Accumulated Balance Payment Systems
  - Accumulate small charges, then bill periodically
    - Familiar to utility users (e.g. phone bills)
  - Assumes Direct Operator Billing, as user needs account
  - Example: Apple Store
    - Payments accrue over a fixed period of time, and then are billed as a single transaction
    - Supports the retail of music tracks (e.g. at 79p), apps (from 59p), rentals, etc

Contact-less Payment Systems

- Uses Near Field Communication (NFC) mechanisms such as RFID to communicate with receivers
    - Device is "passed" near to receiver, to perform transaction
        - May require some authentication using a PIN
    - Payment is then made via a pre-paid account, or billed directly
- Main adoption within mass-transit networks
    - Edy/Suica enabled phones used on Japanese Rail Network
    - Oyster Cards used on London Transport Network

Other payment systems

- Other payment forms have been used
  - Pre-paid accounts
    - User sets up an account and deposits credit
    - Payments are drawn from account
    - User notified when account is low, or automatic re-deposit method used
    - Often used with contact-less payment systems
      - Example: M6 Toll charges use from a pre-paid user account. When credit is low, a single transfer is made to bank account to top up user account
  - SMS-supported payment systems
    - Uses SMS to instruct payment
    - May involve "gluing" another payment system to a user

Examples of SMS-supported payment systems

- mPark (mobile Parking)
  - Parking Meter Payment System using SMS
    - Deployed in Edinburgh, Newbury and Glasgow so far
  - User activates the parking meter, which displays a unique code
  - This code is then sent via an SMS message identifying the user
  - User is then billed through a registered account, but can also be notified of reminders, etc

- Other similar systems exist
  - E.g. Liverpool City Council "*Phone and Pay to Park*" scheme

PHONE AND PAY TO PARK — Liverpool City Council

Out of change? No coins needed!
Text reminder available as parking period expires.
Extend parking when you are away from your vehicle!
Simple, easy and quick.

Get Started Here:
- Call 0151 203 0000
- Quote Location Number 7312
- Provide Card Payment Details

Exercises...

- The Desktop and Mobile E-Commerce experience can differ wildly. Describe one limitation and one advantage of using a mobile device for e-commerce.

- Network costs for 2G communications can seriously hamper the use of credit-card payments, especially when using mobile devices with numeric keypads

  - Describe a scenario whereby communication costs can be reduced when paying for goods, and give details of how the payment could be made

- In-App purchasing is a mechanism whereby applications can sell additional services directly from the application.

  - Discuss why micropayments may be desirable in such applications, and by means of an example, give a brief explanation of how micropayments work.

- How does a mobile device augment traditional commerce? Speculate on how RFID sensors could be used to transform a mobile device into a "self-pay" point-of-sales device?

  - How could a store differentiate between legitimate purchases and shoplifted goods?

To Recap...

- In this lecture set, we covered:
    - An introduction to E-Commerce
        - Evolution of the B2C e-commerce site
        - Comparison of the Desktop and Mobile experience
    - M-Commerce Scenarios
        - Case Studies
    - Payment Systems
        - SMS, Credit Card, Pre-payment, Micropayment, and Web-based
        - Contact-less payment systems
    - Apple's In-App Payment Framework

Further Reading

- ***M-Commerce***
  Norman Sadeh (Wiley, 2002)
  - Chapters 1 and 6

- ***Apple's Development Site***