

Software Agents and Electronic Commerce

CS486-22

Payment and Exchange

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22-0: Introduction

- Payment and exchange is the third aspect of an e-commerce transaction
- You've found what you want (discovery)
- and agreed to prices and terms (negotiation)
- Now how to transfer everything?

22-1: Challenges

- There are lots of challenges for online payment, including
 - Security
 - Atomicity
 - Speed
 - Ease of Use
 - Cost
 - and many more

22-2: Brick-and-mortar payment methods

- Cash
 - Universal, easy, difficult to trace, not secure
 - Can be easily converted into other forms
 - Easily divided, anonymous
 - Works best for small transactions
 - No recourse for fraud

22-3: Brick-and-mortar payment methods

- Checks
 - Less universal, relatively easy and secure
 - Some float - can take several days for a check to clear
 - Require a third party
 - Money orders, cashiers checks, travelers' checks reduce risk
 - Upfront payment guaranteed by check issuer
 - Work like cash, without anonymity

22-4: Brick-and-mortar payment methods

- Credit Cards
 - Third party guarantees payment to seller
 - Very secure, authorization needed, hard to use in P2P
 - Merchants must pay a fee
 - Consumers can refute transactions

22-5: Brick-and-mortar payment methods

- Debit Cards
 - a form of *stored value* system
 - Unlike credit cards, deducts from a bank account
 - Can be tied into a credit card
 - Similar issues to credit cards, less universal
 - Fewer fraud protections

22-6: Desirable Characteristics for Payment Systems

- Easily exchanged
 - Can be converted into some other payment mechanism
 - e.g. Money orders, but not BART tickets
- Portable
 - Can be used from any location
- Secure (theft, eavesdropping, tampering)
 - Can prevent unauthorized use

22-7: Desirable Characteristics for Payment Systems

- Easy to Use
- Tamper-resistant
 - Hard to forge, double-spend, tamper
- Divisible
 - One large denomination can be exchanged for several smaller demoninations.
 - e.g. cash, but not coupons or vouchers

22-8: Desirable Characteristics for Payment Systems

- Hardware independent
 - No special-purpose equipment needed for buyer or seller
- Storable
 - Can be retrieved remotely, accrue interest, add stability
- Accounts needed?
 - Can limit universal access
- Network effects
 - Widely available and adopted
 - Chicken-and-egg problem here

22-9: Other potential characteristics of Payment Systems

- Anonymity
- Efficiency
 - Fast transaction processing
 - Low-cost processing
 - Transparent to user
- Interest (float) - who gets it?

22-10: Current Systems: Credit cards

- Currently very popular: \$1.7 trillion per year
- 95% of online transactions (\$47 billion) in US
- Less popular elsewhere (50% outside of US)
- Merchant pays a transaction fee.
 - This is a percentage of the sale
 - Split between merchant's bank, cardholder association (Visa) and transaction processing agencies.
 - Typically between 1.5% and 3.5%
 - Rate depends on volume, risk, number of chargebacks

22-11: Current Systems: Credit cards

- Advantages
 - Ease of use, widespread acceptance
 - Buyer is insured against theft
 - Relatively portable
- Disadvantages
 - Low-cost items receive a higher rate. (Bank's processing cost is same for large and small transactions.)
 - In online transactions, the merchant never sees the card. This makes disputed charges more of a problem.
 - Can cost merchant up to \$5 for a transaction
 - Purchases easily tracked

22-12: Current Systems: Credit cards

- Steps of a credit card transaction
 1. Customer sends info to merchant, typically via SSL.
 2. Merchant contacts a clearinghouse, who acts as an intermediary.
 3. Clearinghouse contacts bank to verify account info
 4. Bank credits merchant's account (a few days later)
 5. bank bills customer at the end of the month

22-13: Current Systems: Credit cards

- Are they a good payment mechanism for e-commerce?
 - Sometimes.
 - Work fine for relatively large B2C purchases.
 - Merchant expected to assume risk, both for payment and fraud.
 - Issues with setup time, anonymity, fungibility
 - Not everyone has a credit card (especially juveniles)

22-14: Current Systems: Smart cards

- User has a card that either encodes an amount on it or identifies them to a larger system.
- Card is tied to a store of currency
- Example: Dons dollars, American Express
- Cards can be contact or contactless
 - Contact: Requires physical contact with a card reader. Smart cards, gift cards.
 - Contactless: A remote reader can process the card. EZPass.

22-15: Current Systems: Smart cards

- Advantages: easy, (mostly) secure, fast
- Can be integrated into credit card systems (AmEx Blue)
- Disadvantages: Specialized equipment needed, typically cannot be reconverted into cash or other payment systems.

22-16: Current Systems: PayPal

- Users create an account with PayPal and place funds in that account.
- These funds can then be freely transferred to other accounts to handle payment.
- Works for payments between individuals or businesses
- Can also accept credit card transactions (for a fee)
- Over 9 million users in 2001.
- Recently acquired by eBay.

22-17: Current Systems: PayPal

- Advantages
 - Easy to use, can transfer funds between individuals and businesses
 - Can deal with small amounts
 - Allows individuals to accept credit cards
- Disadvantages
 - Account required, must put in cash in advance
 - Relatively high levels of credit card fraud - requires authorization for purchases over \$200
- Issue: What is PayPal's revenue model?

22-18: Current Systems: RocketCash

- Like PayPal, Rocketcash allows you to store value in an account.
- This can then be used for online purchases.
- Aimed at teens without credit cards
- A subsidiary of Coca-cola
- Rocketcash given away with Coke, Sprite, Nestle, etc. Can be used to buy items from online vendors.

22-19: Current Systems: Yahoo! PayDirect

- Users can route money from their personal checking account, or from a PayDirect account.
- Professional users can accept credit cards, for a fee.
- Users can have funds transferred into their account by other parties.
- Similar to PayPal.

22-20: Concepts: Digital Wallets

- The idea of a *digital wallet* is a hot e-commerce topic
- Provides a wrapper for your credit card and other personal information.
- You register your information with a single provider.
- This provider then handles:
 - Authentication and privacy
 - Payment processing
 - Bill management
 - Loyalty programs
 - Micropayment aggregation

22-21: Concepts: Digital Wallets

- Example: Microsoft .NET Passport
- Uses Web Services
- Single email/password for registration with all participating merchants
- Transfer of sensitive information handled by Microsoft
- Users don't need to worry about proliferation of sensitive information
- User information also collected.
- Kids Wallet allows parents to specify where children can purchase

22-22: Escrow services

- For high-value items, buyer and seller might want guarantees of payment, quality, authenticity, etc.
- An *escrow service* manages this risk.
- Buyer sends payment to the escrow service, who notifies seller that payment has been received.
- Seller sends goods to buyer
- Buyer accepts goods
- Payment transferred to seller (minus a fee)

22-23: Escrow services

- What if the buyer isn't happy?
- Buyer returns merchandise
- Buyer's money returned
- Escrow service may also help negotiate disputes, for example over shipping charges

22-24: State of the Art in Payment

- Many systems have been proposed, but few adopted.
- What are some of the challenges?
 - Network effects
 - Viable business models
 - Assignment/assumption of risk
 - Transaction costs and speed
 - Technological issues