Chapter 4: E-commerce Security and payment systems

The e-commerce security environment

- **Reporting issues:** the most is Malware infection
- **2011 CSI survey:** 46 percent of respondents firms detected breach in last year
- **Underground (black market) economy marketplace:** stolen credit card information and creation a new account. (illegal operation)

Good E-commerce security

- **To achieve highest degree of security needs 3 things**

Multi-layered

1. **New technology (to prevent any attack)**
2. **Organizational policies and procedures**
3. **Industry standards and government laws**

Security is NOT absolute!

- **Other factors**
  1. **Time value of money:** protect a message of a few hours/days/years
  2. **Cost of security vs. potential loss:** trade-off
  3. **Security often breaks at weakest link**: prevent by providing very hard to predict the password

The tension between security and other values

- **Ease of use:** (more security, harder to use, slower outcome)
- **Public safety and criminal uses of the internet:** use of technology by criminals to plan crimes or threaten nation-state

Security Threats in the E-commerce Environment (3 key points of vulnerability in e-commerce environment)

- **Clients = customers**
- **Server**
- **Communication pipeline (internet communication channel)**

Most common security threats in the e-commerce environment

1. **Malicious code (Malware) = comes with a downloaded file that user requests.**
   - **Viruses:** spread from a file to another file
   - **Worms:** spread from a computer to another computer
   - **Trojan horses:** act like a helpful program but actually granting hacker to access the computer
   - **Bots:** Malware that can be installed on your computer when attached to the internet
   - **Botnets:** collection of captures computers used for Spam and DDOS
2. **Unwanted programs**
   - **Browser parasites:** can monitor and change the setting of browser

- **Adware:** Free software program. When installed, it will sent advertising to your computer such as advertising of game on mobile phone.
- **Spyware:** a program used to obtain information secretly (keep information of downloader, benefits for marketer because we can observe customers' behaviors)

3. **Social engineering:** exploitation of human fallibility and gullibility to distribute malware (human greed to trick to take actions)
4. **Phishing = fake e-mail or websites**
    - **E-mail scams**
    - **Spoofing legitimate websites**
    - **Uses information to commit fraudulent acts (access checking accounts), steal identity**
5. **Hacking**

   Hackers vs. Crackers (crackers = a hacker with criminal intent)
    - **Types of hacker**
        - **White hats =** good hackers
        - **Black hats =** intention of causing harm
        - **Gray hats =** pursuing some greater good by breaking in and reveal system laws
6. **Cybervandalism :** intentionally disrupting, defacing, destroying website such as some employees feel angry to the boss. They will delete the company webpage.
7. **Data breach:** When organization loss control over corporate information to outsiders. Ex. Outsider wants to control your website. They change password as a result you cannot log in to the website.
8. **Credit card fraud/theft**
   Hackers target merchant servers; use data to establish credit under false identity
9. **Spoofing =** fake email/website
10. **Pharming =** spoofing website by redirecting website to the fake website
11. **Spam/junk website**
12. **Denial of service (DoS) attack =** hacker make website goes down with useless traffic
13. **Distributed denial of service (DDoS) attack =** control the website such as stop the webpage
14. **Sniffing =** can see the user briefly (monitor information travelling over a network) (benefit for marketer: can track e-mail flow)
15. **Insider jobs =** single largest financial threat (people inside company do something mistake)
16. **Poorly designed server and client software:** six of top ten attacks are from internet browser
17. **Social network security:** provide rich environment for hackers as it is opened for everyone
18. **Mobile platform threats:** same risk as any internet devices (malware, botnets, vishing/smishing =via SMS to download)

Technology Solution

1. Protecting internet communications (Encryption)
2. Securing channels of communication (SSL, VPNs)
3. Protecting networks (Firewalls)
4. Protecting servers and clients (Anti-virus in your computer)

1. **Encryption**
    - Transforms data into cipher text readable only by sender and receiver
    - Secures stored information and information transmission
    - Provides 4 of 6 key dimensions of e-commerce security
      (Message integrity, no repudiation, authentication, confidentiality)

      Symmetric key encryption = use same digital key (same password) to encrypt and decrypt message
        - Requires different set of key for each transaction (different message, different key)
        - **Strength of encryption =** length of binary key (0 or 1.A = 01000001)
        - **Advanced encryption standard (AES)** = most widely used (128-,192- and 256-bit)
        - Other standard use keys with up to 2,048 bits

      Public key encryption = uses 2 mathematically related digital keys (password)

        - **Public key (**widely disseminated)
        - **Private key (** kept secret by owner)
        - **Both keys used to encrypt and decrypt message**
        - Once key used to encrypt message, same key cannot be used to decrypt message
        - Sender use recipient's public key to encrypt message; recipient uses private key to decrypt it

      Public key encryption using digital signature and hash digests

        - **Hash function: Fixed-length number (same form digit), verify integrity (cannot be changed)**

      Digital Envelopes

        To solve below problems

        - **Public key encryption : computation slowly, decreased transmission speed, increased processing time**
        - **Symmetric key encryption : insecure transmission lines**

Protecting Network

1. **Firewalls (ex. Company block facebook website to prevent employees to access it during work time)**
    - Hardware or software
    - Uses security policy to filter packets
    - 2 main methods: packet filters and application gateways
2. **Proxy servers (proxies)**

- Software servers that handle all communications originating from or being sent to the internet

Protecting servers and clients

1. **Operating system security enhancements (upgrades, patches)**
   ex. Windows updates version itself
2. **Anti-virus software**
   - Easiest and least expensive way to prevent threats to system integrity
   - Requires daily updates

E-commerce payment systems

1. **Credit card :** 45 percent of online payment in 2011 (USA)
2. **Debit card :** 28 percent of online payment in 2011 (USA)
   Limitations of online credit card payment
   - Security, merchant risk (the existing system offers poor security)
   - Cost (about 3.5 percent up, one solution "aggregate")
   - Social equity (Thailand: salary about 15,000 up baht)
   - Security
3. **Digital wallet**
   - Emulates functionality of wallet by authenticating consumer, storing and transferring value and securing payment process from consumer to merchant
   - Early efforts to popularize failed
   - Latest effort : Google checkout
4. **Digital cash**
   - Value storage and exchange using tokens
   - Most early examples have disappeared; protocols and practices too complex
5. **Online store value systems**
   - Based on value stored in a consumers' bank, checking or credit card account
   - PayPal
   - Smart cards 2 types
     - Contact : credit card = physical place on card reader
     - Contactless : transmitting through antenna such as RFID, easypass
6. **Digital accumulated balance payment**
   - Users accumulate a debit card balance for which they are billed at the end of the month
   - PaymentsPuls, BillMeLater
7. **Digital checking**
   - Extends functionality of existing checking accounts for use online
   - PayByCheck, EBillMe

Mobile Payment systems

1. **Use of mobile handsets as payment devices (well established in Europe, Japan, South Korea)**

2. **Japanese mobile payment systems**
    - E-money (stored value)
    - Mobile debit card
    - Mobile credit card
3. **Not as well established yet in USA**
    - Infrastructures still developing
    - Apple, Google, RIM developing separate NFC systems

Electronic billing presentment and payment (EBPP)

- Online payment systems for monthly bills
- 30 percent of households in 2010 used more EBPP; expected to continue to grow
- Two competing EBPP business models: Biller-direct(dominant model) and Consolidator
- Both models are supported by EBPP infrastructure providers

Chapter 6: E-commerce marketing concepts: social, mobile and local

Consumers online: The internet "Audience and Consumer Behavior"

The first principle of marketing

" Know thy customer " → **Understand customers!**

- Around 73 percent USA households have internet access in 2011
- Growth rate has slowed to about 2-3 percent a year
- Intensity and scope of use both increasing
- Some demographic groups have much higher percentages of online usage than others
- Gender, age, ethnicity, community type, income, education

Digital divide: Inequality in access and usage of IT devices

- Broadband (ADSL, cable modem, 3G,4G, Wi-Fi, etc) vs. dial-up audiences, new mobile audience
- Internet purchasing affected by neighborhood
- Lifestyle and sociological impacts (use of internet by children and teens, use of internet as substitute for other social activities)
- Media choices (traditional media competes with internet for attention, TV viewing has increased with internet usage)

Consumer behavior models

- **Study of consumer behavior** : Attempts to explain what consumers purchase and where, when, how much and why they buy
- **Consumer behavior models** : Predict wide range of consumer decisions based on background demographic factors and other intervening, more immediate variables

Background demographic factors

- **Culture:** Affects entire nations (different country, different culture)
- **Subculture:** Subsets formed around major social differences (ethnicity, age, lifestyle, geography)
- **Social networks and communities:**
    - **Direct reference groups** (family members)
    - **Indirect reference groups** (feedback/comments)
    - **Opinion leaders** (influencers: singers/actors/actresses/ those inspired you)
    - **Lifestyle groups** (ABAC students lifestyle and other university lifestyle are different)
- **Psychological profile** (set of needs, drives, motivations, perceptions, and learned behaviors) ex. Free seminar – teach how to use product

The online purchasing decision

- **Psychographic research:** combines demographic and psychological data
    - Divides market into various groups based on social class, lifestyle, and/or personality characteristics
- **5 stages in consumer decision process:**
    1. Awareness of need
    2. Search for more information
    3. Evaluation of alternatives
    4. Actual purchase decision
    5. Post-purchase contact with firm

A model of online consumer behavior

- **Decision process "similar" for online and offline behavior**
- **General online behavior model**
    1. **Consumer skills** (knowledge to conduct online transaction)
    2. **Product characteristics** (easily described, packaged, shipped, Eg. Book,CD)
    3. **Attitudes toward online purchasing** (guarantee satisfaction: turn money back guarantee)
    4. **Perceptions about control over Web environment** (trust in the website) Ex. Thai airway website provides good service and good security (depends on each person's perception)
    5. **Website features:** latency, usability, security (easy to navigate, secured to shop)
- **Clickstream behavior** (transaction log that consumers establish as they move about the web) ex. Statcounter: track that who access to website, how many people turn to website again, the access flow of each people (know behavior of customers)

Shoppers: Browsers and buyers

- Shoppers : 87 percent of internet users-to check information only
- (73 percent is buyers, 15 percent is web browsers)
- 1/3 of offline retail purchase influenced by online activities
- Online traffic also influenced by offline brands and shopping
- E-commerce and traditional commerce are coupled: part of a continuum of consuming behavior

What consumers shop for and buy online

1. **Big ticket items = value more than $100**
    - Travel, computer hardware, electronics
    - Consumers now more confident in purchasing costlier items
2. **Small ticket items = value $100 or less**
    - Apparel, books, office supplies, software, etc.
    - Sold by first mover on web (physical small items, high margin items)

How consumer shops

- **How shoppers find online venders**
  - Search engines – 59 percent
  - Marketplaces (Amazon, eBay) – 28 percent
  - Direct to retail sites – 10 percent
  - Other methods – 3 percent
- **Online shoppers are highly intentional –** look for specific products, companies and services
- **StumbleUpon.com:** Unintentional searchers
- **Recommender systems (introduce interesting products to consumers) :** eBay recommend the top 10 best seller items in the first page of the website

2 most important factors shaping decision to purchase online

1. **Utility :** better prices, convenience, speed (you can order fast, the webpage is easy to use and understand)
2. **Trust :**
   - Asymmetry of information can lead to opportunistic behavior by sellers (the seller knows a lot more about the quality of goods)
   - Sellers can develop trust by building strong reputations for honesty, fairness, delivery ex. Amazon book review/feedback from customers

Internet Marketing Technologies

- **3 broad impacts**
  1. Scope of marketing communications broadened
  2. Richness of marketing communications increased
  3. Information intensity of marketplace expanded
- **Internet marketing technologies**
  1. **Web transaction logs – how customers click off**
     - Build into web server software
     - Record user activities at website
     - Webtrends : leading log analysis tool
  2. **Tracking files**

     4 types of tracking files
     1. **Cookies** (small text file placed by website, allow web marketer to collect data)
     2. **Flash cookies** (a website can only receive the data it has stores on a clients computer and cannot look at any other cookie)
     3. **(web) Beacons/bugs** : create cross-site profiles (small graphic file)
     4. **Apps**
  3. **Databases, data warehouses, data mining**
     - **Database:** store record and attributes
       - **Database management system (DBMS) :** software used to create, maintain, and access databases
       - **SQL (structured query language) :** industry-standard database query and manipulation language used in a relational database
       - **Relational database:** two dimensional tables

- **Data warehouse :** collects firm's transactional and customer data in single location for offline analysis by marketers and site managers
- **Data mining :** example : beer and diaper
  - Analytical techniques to find patterns in data, model behavior of customers, develop customer profiles
  - **Query-driven data mining**
  - **Model-driven data mining**
  - **Rule-based data mining**
  - **Collaborative filtering**

4. **Advertising networks**
5. **Customer relationship management systems (CRM) : To keep on a loyal/ repeat customer is worthier than finding 100 new customers**

Establishing the customer relationship

1. **Advertising networks :** most sophisticated application of internet database (Ad server selects appropriate ad based on cookies, web bugs, backend user profile databases
2. **Advertising exchanges** : Auction and slot over many advertising networks
3. **Permission marketing :** obtain permission from consumers (opting in ; opt out)
4. **Affiliate marketing :** commission for new business ex. Amazon has a strong affiliate program consists of more than 1 million participant sites
5. **Viral marketing in the web 2.0**
   - Ex. Blog, social networking (share ideas with your friends)
6. **Blog marketing**: using blog to market goods through commentary and advertising
   - Ex. Twitter (microblog : maximum 40 characters)
7. **Social network marketing : driven by social e-commerce**
   - **Social sign on** (log in account)
   - **Collaborative shopping** (lots of people to shop in this webpage ex. Facebook
   - **Network notification** (people will be like your comment and click it to notify you)
   - **Social search** (recommendation)
8. **Mobile marketing**: fastest growing marketing platform
9. **Local marketing** : location-based, "daily deal" coupon sites
10. **Brand leveraging :** using the power of an existing brand to acquire new customers for a new product or service

Customer Retention

1. **Mass marketing:** national media message (global) ex. TVC
2. **Direct marketing :** direct mail, phone message
3. **Micromarketing** : Aim at geographical units (neighborhoods,cities)
4. **Personalized, one-to-one marketing** (ex. Amazon STP-segmentation, targeting, positioning)
5. **Personalization** (increase consumer sense of control and freedom)

Other customer retention marketing techniques

1. **Customization :**customize product to user preferences
2. **Customer co-production :** customer interactively involved in product creation
3. **Customer service** (FAQs, real time customer service chat systems, automated response systems)

Net pricing strategies

1. **Pricing :** traditionally based on
    - Fixed cost
    - Variable cost
    - Demand curve
2. **Price discrimination :** selling products to different people and groups based on willingness to pay
3. **Free and freemium** : can be used to build market awareness (Skype for free but pay for premium)
4. **Versioning :** creating multiple versions of product and selling essentially same product to different market segments at different prices
5. **Bundling :** offers consumers two or more goods for one price (buy one get two)
6. **Dynamic pricing**
    - **Auction:** eBay
    - **Yield management:** perishable product : food (empty seat in airline try to sell at low price in the last hour)
    - **Flash marketing:** very limited time, compulsive shopper

Chapter 7: E-commerce marketing communications