


Commerce
Introduction

CSCI E 45b: The Cyber World – part B

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Introduction: learning goals



- Understand the types and scale of e-commerce
- Understand the payment systems in use for e-commerce
- Understand the concepts and reasons for copyright
- Understand the issues with digital rights management
- Understand the US legal requirements to protect copyright material

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Topics



- E-commerce – R
The types and scope of e-commerce
- ANX – O
The failed Automotive Network Exchange
- Card-based payment systems – R
Credit and debit cards
On-line fraud

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Topics, contd.



- SET – O
Secure Electronic Transaction
- Non-card payment systems-
R



Tokenized cards
Auto fill-in systems
E-cash systems



- Copyright – R
History of copyright
Copyright rights



- DMCA – R
Digital Millennium Copyright Act

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Commerce
e-commerce

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E-Commerce

- Catching on
But still a small percent of all commerce
- Different categories
 - Business-to-business (B2B)
e.g., cisco.com, ussteel.com, adm.com, ...
 - Business-to-consumer (B2C)
e.g., amazon.com, netflix.com, wsj.com, ...



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B2B



- Businesses selling to businesses
a.k.a., wholesale
- Some areas doing much better than others
 - Total manufacturing: 67.8% was e-commerce - \$3.8T
 - Merchant wholesale trade sales: 33.3% is e-commerce (\$2.8 T)

2019 stats (published Aug 2021)

<https://www.census.gov/newsroom/press-releases/2021/e-estats-report-electronic-economy.html>

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B2B, contd.



- Early assumption: need special systems for B2B
 - To limit players
 - To ensure reliability
 - To ensure security
 - To ensure performance
- Some systems were developed
 - e.g., Automotive Network Exchange (ANX)
- But the regular Internet won out

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B2B, contd.



- As did large resellers and individual suppliers
- Businesses act as normal consumers
 - With tax exempt numbers
 - Some suppliers have wholesale-only web sites

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B2C

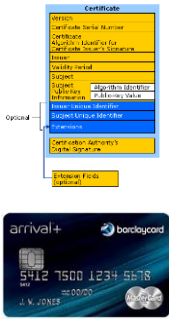


- The web enables everyone to be in business
 - From Amazon to me (in theory)
- Issue: can not tell from a website the scale or reliability of the organization behind it

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B2C

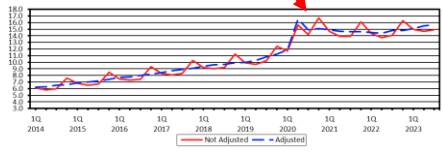


- Most B2C companies use web servers and HTTPS
- Server has a certificate that identifies a domain name
- You connect to a site by addressing a specific domain name
- The server responds with a certificate that includes the domain name signed by a "trusted" CA
- Communications are encrypted
- Users identify themselves using some other method
- For example by the knowledge of a payment card number, expiration date, CCV and a billing address

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U.S. retail e-commerce

Q3 2023: \$284.1 B **COVID-19 bump**



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<http://www.census.gov/retail/e-commerce.html>
Quarterly E-Commerce Report

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- 7 <http://www.businessinsider.com/sb/best-credit-cards-2015-2015-1>
- 8 <http://www.census.gov/retail/index.html> - Quarterly E-Commerce Report


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Commerce
Automotive Network Exchange (ANX)

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Auto industry



- A few large manufactures
- Thousands of suppliers
- Thousands of dealers
- Manufactures had leased lines to dealers

If a dealer sold multiple lines of vehicles they would have multiple terminals

- Same for the larger suppliers
- Small suppliers worked with FAXs

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ANX

1995
The Telecommunications Project Team is created to develop the Automotive Network eXchange (ANX)®, a communication link between all automotive trading partners using the Internet and enabling communication through a single, secure access point.

Automotive Industry Action Group (AIAG) History

- Established December 1995
- TCP/IP-based “extranet”
Connect “big-3” US automakers and suppliers
- Support dealers and suppliers
- Reduce to single terminal
- Support small dealers & suppliers

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ANX

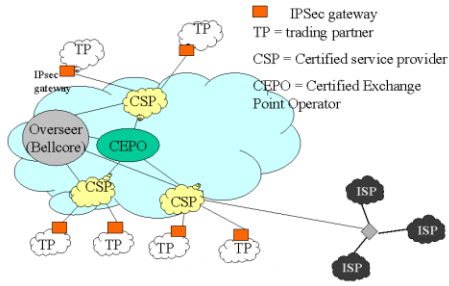


- The big-3 got together to create a closed communications environment with support for authentication and ensured quality of service Tunned over the Internet
- Used certified service providers (ISPs)
- Used certified exchange point operator
- Certified meant guaranteed service quality

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ANX, contd.



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ANX, contd.

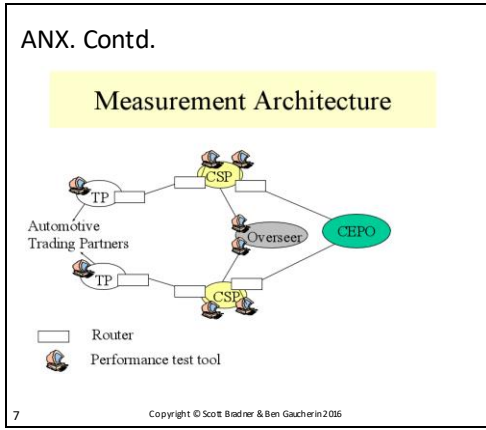
"Business-to-business e-commerce will be improved by VPNs. It's simple: they cut down the cost of sales and lower the overhead of order processing and procurement."

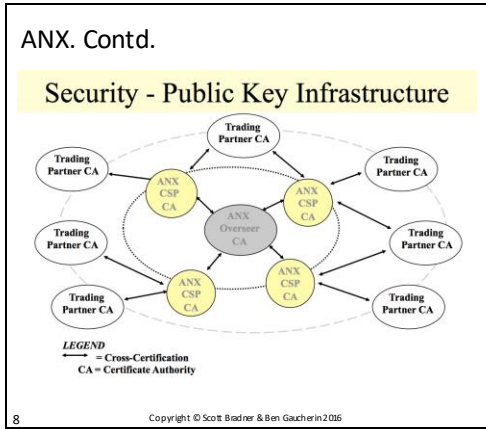
Suresh Joseph, analyst at Frost & Sullivan

- Common wisdom was that the Internet was not good quality enough on its own
- Common wisdom was that a consortium was needed to coordinate security
- ANX provided connectivity and security management
Overseen by Bellcore which enforced 130 technical and business metrics across eight areas of service quality

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ANX: the problem changed

- ANX “failed”
- The generally improving Internet removed the need for the network performance guarantees
- The ANX security was seen as too complex
 - “Normal” B2C processes turn out to work just fine
 - Other than the use of credit cards for big purchases
 - Use EFT or electronic checks
- Twice as expensive as normal Internet service

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ANX: the problem changed

- ANX was sold off in 1999 and became a general B2B service provider

ANX
"the most robust, highest performing and most secure methods for doing B2B communications" www.anx.com

UPDATED no web site – Jan 2024

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Card-based payment systems

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Payment systems



- Payment cards used on the Internet
Credit & debit cards
- Electronic payment systems
Secure Electronic Transaction (SET)
PayPal
Micropayments



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Payment cards


- 1st credit card: Diners' Club - 1950
- For years plastic card with magnetic stripe
Stripe includes card number, name on card, expiration date, etc.
Easy to clone
- Now includes "chip"
Chip is a processor
Chip crypto interacts with reader
Very hard to clone



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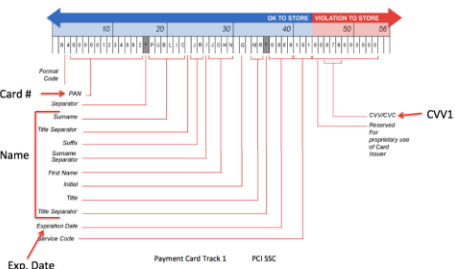
Payment cards

- **Card number:**
Identifies issuing bank, unique account number & check digit
Mod 10 consistency check
- **Expiration date**
Used to show user has card in "card not present" cases
Embossed on card
- **Card Verification Code (CVV)**
Used to show user has card in "card not present" cases
Never embossed on card



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Payment cards, contd.



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Payment Cards, contd.


- **Credit cards**
Build up debt, charge up to limit
Monthly bill sent to card holder
Card company makes money on transaction & interest charges + fees
- **Debit cards**
Take money from bank account
Charge up to amount in bank account
Monthly summary sent to card holder
Card company makes money on transaction fees
Many also charge fees to card holder



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Payment Cards, contd.

- **Big business**
e.g., Visa:




4.3 B cards
\$12.3 T total annual volume
212.6 B annual transactions

Fee: 1.15%-2.95% of total bill + \$.10-\$.21 per transaction

Visa Inc. revenues: \$32.7 B, pre tax income: \$17.3B

(Visa 2023 annual report)
<https://annualreport.visa.com/financials/default.aspx>




<https://annualreport.visa.com/financials/default.aspx>


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Payment Cards, contd.

- **Two types of use**



“Card present”
Card swiped through or inserted into a card reader
Fraud check: store supposed to check signature &/or photo
Balanced against employees not handling cards



“Card not present”
e.g., phone or Internet orders
Multiple fraud checks

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Payment cards: online fraud

Table shows fraud management KPIs (Ordered metrics shown for all KPIs)

| | 2020 | 2021 | By region—2021 | | | | By size—2021 | | |
|---|------|------|----------------|--------|--------|------|--------------|------------|-----|
| | | | North America | Europe | LAT AM | APAC | Enterprise | Mid-Market | SMB |
| % of eCommerce revenue lost to payment fraud globally | 2.4 | 3.1 | 2.6 | 3.2 | 3.7 | 4.8 | 3.0 | 3.4 | 3.0 |
| % of eCommerce revenue lost to payment fraud from domestic orders | 2.1 | 3.0 | 2.5 | 2.9 | 3.9 | 3.9 | 3.1 | 3.4 | 2.7 |
| Order rejection rate for domestic orders (%) | 2.5 | 3.8 | 2.8 | 2.8 | 4.8 | 3.8 | 3.3 | 3.7 | 2.4 |
| Order rejection rate for international orders (%) | 5.1 | 5.6 | 5.8 | 5.6 | 8.9 | 5.7 | 5.5 | 6.2 | 5.1 |
| % of eCommerce orders that turned out to be fraudulent | 2.3 | 2.6 | 2.2 | 2.5 | 3.5 | 3.6 | 2.7 | 3.8 | 2.3 |
| % of eCommerce orders that led to chargebacks | 1.3 | 2.7 | 2.2 | 2.6 | 3.8 | 3.6 | 2.9 | 3.8 | 2.4 |


3.1% revenue loss to fraud 2021

CyberSource Online Fraud Report for 2021
<https://www.cybersource.com/en-us/solutions/fraud-and-risk-management/fraud-report.html>



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Payment cards: fraud, contd.



- Type of fraud (2016)
 - Counterfeit Credit Cards 37 %
 - Lost or stolen cards 23 %
 - No-card fraud 10 %
 - e.g., Giving card information to non-legit telemarketer
 - Stolen cards during mailing 7 %
 - Identity-Theft Fraud 4 %


UPDATED

not updated from 2016 since the report is now behind a paywall

<https://www.statsicbrain.com/credit-card-fraud-stats-tcs/>


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Payment cards: card not present



- Multiple fraud checks
 - Address validation
 - Check that customer knows correct billing address
 - e.g., zip code request on gas pump
 - Check that delivery address is the same as the billing address

Payment cards: card not present, contd.



Card Verification Value (CVV2) printed on card

a.k.a., CVN2, CVC2, CID, CSC

Value that is not on magstripe and not embossed on card

i.e., cannot be read by rogue card reader & cannot be stolen from card slip from an impression maker

PCI security rules prohibit storage of CVV



Thus information from stolen card number databases cannot be used in card-not-present places that require CVV

| Guidelines for Cardholder Data Elements | | | |
|---|------------------------------|-------------------|---|
| | Data Element | Storage Permitted | Render Stored Data Readable and Reusable? |
| Cardholder Data | Primary Account Number (PAN) | No | No |
| | Cardholder Name | No | No |
| | Service Code | No | No |
| | Expiration Date | No | No |
| | Full-Track Card | No | Cannot store per Requirement 3.2 |
| Sensitive Authentication Data | CARDHOLDER ID | No | Cannot store per Requirement 3.2 |
| | EMV PIN Block | No | Cannot store per Requirement 3.2 |

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eCommerce: fraud detection

- Small % of card-not-present transactions are fraudulent
- Additional fraud checks:
 - Geolocation (e.g., source IP address)
 - Is delivery location near order placement location
 - Check to see if fraud alert on credit bureau record
 - Check commercial database to see if buyer is dead
 - US Postal service maintains list of suspicious addresses





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eCommerce: fraud detection, contd.

Look for patterns of orders
 Source IP address, shipping address, etc.

Look at source of order
 Country &/or service - e.g., Hotmail, etc.



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Fraud detection usage

Figure 14: Effectiveness of tools among those who use them (in rising order of ascending effectiveness)

| Validation method | Has that greater success | Uses that more granular filters |
|---------------------------------------|--------------------------|---------------------------------|
| Card card verification service | 97% | 97% |
| Botware solutions | 95% | 95% |
| Next-to-the-browser web protection | 95% | 95% |
| Proxy address verification | 95% | 91% |
| Cloud service check | 95% | 90% |
| Spam email filters | 95% | 90% |
| IP reputation services | 95% | 88% |
| IP geolocation services | 93% | 97% |
| Hotmail services | 93% | 94% |
| Geographic rules and filters | 93% | 94% |
| Geographic rules and filters | 93% | 94% |
| Mailbox vendor verification services | 93% | 94% |
| Social networking sites | 93% | 93% |
| Customer order history | 93% | 93% |
| Order status monitoring | 93% | 92% |
| Address verification | 93% | 91% |
| Postal routing code comparison | 93% | 90% |
| Regional verification | 93% | 89% |
| Phone address | 93% | 89% |
| Customer order fraud pattern analysis | 91% | 97% |
| Mail merchant data | 90% | 97% |
| Special agent BCI fraud filters | 90% | 97% |
| Purchase order tracing | 91% | 93% |
| China registration | 91% | 93% |
| Device location services | 91% | 93% |
| Customer order fraud pattern analysis | 90% | 91% |


old data - CyberSource Fraud Report no longer published **Online**

3% of orders rejected due to suspicion of fraud in North America

UPDATED CyberSource Online Fraud Report for 2019
<https://www.cybersource.com/en-us/solutions/fraud-and-risk-management/fraud-reports/download-report.html>

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Payment cards: players

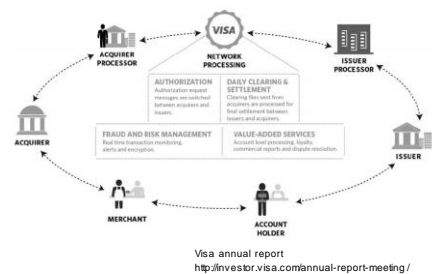


- **Cardholder**: person with a payment card
- **Merchant**: location that accepts payment cards
- **Acquiring bank**: the merchant's bank
- **Issuing bank**: the bank that issued the payment card
- **Clearinghouse**: 3rd party that processes transactions for acquiring banks

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Card processing cycle



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Payment card: current process




- Cardholder presents card to pay for a purchase
- Merchant submits card and billing information to acquiring bank (or clearing house)
- Acquiring bank sends request for money to issuing bank
- If card OK then issuing bank sends OK to acquiring bank
- Acquiring bank sends OK to merchant

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Payment card: issues and liabilities



- Security issues
 - No full authentication of merchant or cardholder
 - Merchant: server certificate used to validate web site
 - Cardholder: knowledge-based validation in card not present case, card + knowledge in card present case
- Privacy issues
 - Merchant and card company know who you are and what you bought

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Payment card: issues and liabilities



- Liability
 - Card present transactions
 - Card company has liability
 - Card-not-present transactions
 - Merchant has liability

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Payment card: issues and liabilities, contd.



- Liability changed in US 10/2015 for card present transactions (ATMs & gas stations: 2017)
 - To push conversion to EMV smart payment cards
 - EMV = EuroPay-MasterCard-Visa
- Revised liability rules:
 - Player with the least security has the liability in case of fraud

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EMV cards

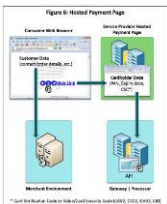


- Modes: (bank & merchant choice)
 - Chip & PIN - safer
 - Chip & Signature – what is generally being done in U.S.
 - 'card upgrade a joke': Walmart exec (April 2015)
 - Does not deal with stolen card problem
- Does not change card-not-present risk
 - Eliminates the counterfeit card risk

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Payment card gateways



- Commerce web site redirects to payment card gateway to receive and process payment cards
 - Commerce web site never sees the payment card numbers e.g., PayPal
- Commerce web site avoids most of the PCI security risks – transfers that risk to payment site

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Payment card gateways



- Using organization may still need to conform to PCI standards to protect redirection code
 - i.e., hacker could redirect to fake PayPal site

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- 8 & 20 <http://blog.cardbackin/2013/03/28/cardback-suggests-difference-between-card-present-and-card-not-present-transactions/>
<http://www.teltech.co.uk/Products/Telephones/Interquartz/Interquartz-Q10.aspx>
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- 11 <http://blogs.creditcards.com/2014/05/zip-codes-gas-station-pay-pump-fraud.php>
- 12 <https://www.cvnumber.com/>
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- 24 <https://www.promise.com/security-compliance/pci-dss-compliance/>

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Secure Electronic Transaction (SET)

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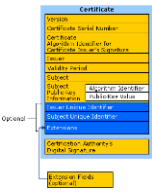
Secure Electronic Transaction (SET)



- Developed in 1996 by Visa and MasterCard
- Replacement for current payment card authorization/payment system using Internet
- 1,000 page specification

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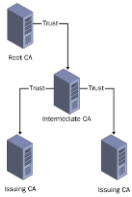
Secure Electronic Transaction (SET)



- Provides three services:
 1. Secure (i.e., encrypted) communication between parties
 2. Trust via X.509 certificates for all parties
 3. Reduce risk by eliminating information (e.g., card #s or list of purchases) where it is not needed

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SET, contd.



- Assumed PKI for all parties
- Users needed key pairs and certificates before they could use SET
- Other players needed certificates as well

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SET, features



- Only issuing bank knows payment card number not merchant or acquiring bank
- Digitally signed messages - ensure merchant can not modify cardholder messages
- Authenticates cardholder
- Lets cardholder verify that merchant has valid relationship with an acquiring bank

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SET, issues



- All players had to be on-line all the time
Not much of an issue these days
- Generally SET is a system that provides a disincentive to most players
e.g., merchant did not get payment card info - useful for selling info to credit bureaus
Special cardholder user software was required and was more complex to operate
System was complex to install and operate

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SET, issues



- SET did not catch on - but is a good lesson in what can go wrong when designing a big system
- Note: some of the same disincentives are present with new payment systems such as Apple Pay

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| 2 | http://vectorsforbrowse/54860/set |
| 3 | https://technet.microsoft.com/en-us/library/cr776447%28news-10%29.aspx |
| 4 | http://www.womioq.us/desktop/8366.aspx |
| 5 | http://www.clipartand.com/categories/laptop-clipart-pictures |
| | http://www.infyways.com/author/abhilash/page/21/ |
| | http://www.nsdgraphics.com/nsd-icons/bank-building-icons/nsd/ |
| 6 | https://commons.wikimedia.org/wiki/File:Apple_Pay_logo.svg |

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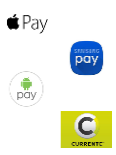
Commerce
Non-card payment systems

CSCI E 45b: The Cyber World – part B

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Non-card-payment systems

- Micropayments
- E-cash
- Apple pay
- Samsung Pay
- Android Pay
- CurrentC
- BitCoin



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Card number tokenization




TARGET
40 M card #s
stolen by hacking
payment systems

- Use random “token” instead of credit card number
- No one has to have card # except payment processor
Specifically, the merchant does not get card #
Therefore it can not be stolen from merchant’s servers – the most vulnerable attack points
Merchant may not even get user name or address
- Requires an user-end application to supply token
E.g., on a smartphone

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Example Token-based systems

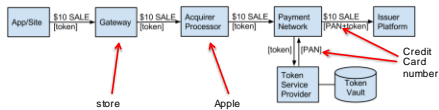
- **Apple Pay**
Near Field Communication (NFC)
- **Samsung Pay**
Two modes:
 - Near Field Communication (NFC)
 - Magnetic Secure Transmission (MST)
Simulates card swipe
- **Android Pay**
Near Field Communication (NFC)
- **CurrentC**
Scan QR code on register screen



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Example Token-based system

Apple Pay





Charges credit or debit card account

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CurrentC

- Walmart, Target, CVS, Exxon, Kmart, Mobil, Sears, etc.
- Log into phone, launch app, Scan QR code
- Direct withdrawal from bank account
- No credit card companies involved
- Avoids card fees



UPDATED Abandoned in May 2016 after a trial run at Target

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E-Wallet



- Used to provide information about an individual to cooperating web sites
- Can be client-based or server-based

Client-based

- MasterCard Wallet
- Password managers



Server-based

- Microsoft Account
- Kantara Initiative
- Google Checkout
- PayPal



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MasterCard Wallet







- Rebranded IBM product - announced Sept. 1999
- Information stored on user's computer
 - Including payment card info, addresses, etc.
- User clicks on "autofill" button to fill out forms on a compliant site
- Compatible with SET
- Not a success, no longer being offered

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Password managers

- Manages personal information, including passwords
- Auto fill-in
- One password for application retrieves site-specific passwords and other information
 - E.g. addresses and credit card #s
- Some support multi-factor authentication



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Google Checkout



- Launched June 2006, closed November 2013
- Saved contact and other info (e.g., payment cards) on Google server
- Auto filled forms on cooperating merchants
- Tracked orders and shipping across sites
- Included fraud protection functions to protect merchants

10

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Google Wallet



- Same general functions as Google Checkout
- To be bundled on smartphones by carriers
- Google does not “currently” store transaction details but stores much other information

11

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Google Wallet: Terms of Service





revised 2021
– shorter
and not so
onerous

- 15 K words
- May need SSN
- You are > 18 (13-17 for Google Play Gift Cards)
- May record what you buy & from whom
- May show you “more relevant advertising”
- You will take care of taxes
- You indemnify Google for your use of the service

12

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PayPal




- Does payment processing for on-line services
- 435 M active customers
Customers record credit card or payment information
- Hold balances in 25 ²⁰²² _{information} currencies, withdraw funds in 56 currencies, supported in over 200 markets
- Supports two-factor authentication
Send code via easily hackable SMS

<https://www.paypal.com/us/webapps/mpp/stories/media-resources>

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Cash



- Physical payment system
- Small minimum payment
- Cash holder gets cash from a bank
- Cash holder gives cash to merchant to purchase things
- Merchant deposits cash into a bank to receive credit in the merchant's account
- Anonymous
Unless cash holder provides ID (e.g., store affinity card)

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Cryptocurrency

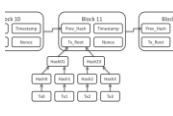


Satoshi Nakamoto

- Started in 2009
Bitcoin: A Peer-to-Peer Electronic Cash System. - Satoshi Nakamoto
Many additional cryptocurrencies introduced since
- Value assigned to electronic tokens by users
- Direct exchange of tokens
No controlling agency or government
- Token transactions are recorded in a distributed secure public ledger
"The Blockchain"

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Blockchain



- Sequential chain of records (blocks)
Blocks contain records of transactions
- Linked with hash of previous block on chain
Which includes hash of previous block, which includes hash . . .
Modifying a block would break the chain and disclose that there was a modification
- Chain replicated via p2p network

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Bitcoin





Burton, Michigan

- An example cryptocurrency
- Uses blockchain to record bitcoin transactions
Limit 21 M Bitcoins
- Compute intensive process to add sets of transactions to the blockchain
Called "mining", paid in bitcoins
- In use as a currency in many parts of the world
- Not fully anonymous
Transactions can reveal identity

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Bitcoin, contd.



UPDATED

\$19,149 \$3,858 \$16,450 \$42,288 \$68,790

<https://www.coinbase.com/price/bitcoin>
As of 1/1/24

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e-Gold



- Was digital gold currency
- Transferred ownership of physical gold between users
Transferred gold by weight of local value
\$4B/day worth of transfers
- E-Gold had gold held in a separate trust
65,844.08 oz. of gold held in trust
1/30/10 – worth \$93 M
Also had silver (85,243.84 oz.), platinum (400 oz.) & palladium (396.47 oz.)

17

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e-Gold, contd.



- Web-based exchange mechanism
Easy way to do international currency exchange
- Could be private (not quite anonymous)
Was used by criminals
- Owners pled guilty to money laundering - July 08
Company - \$3.7 M fine
Owners - \$2,500 fine each
- Closed down
Suspended operation Nov 2009

18

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Micropayments



- An attempt to monetize small transactions on the Internet
e.g., read an article on a newspaper
- Could be used elsewhere
e.g., parking tolls
- Bill payment cards or maybe put on phone bill

19

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Micropayments

- Two methods used to minimize impact of per transaction payment card fee

Aggregate charges over a time period

e.g., Apple iTunes

Pre-buy a chunk of service

e.g., old Microsoft Zune



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Micropayments, contd.



- Many failed startups
e.g., First Virtual, Cybercoin, Millicent, Digicash, Internet Dollar, ...
- Many because of a very poor understanding of user interface
Too much work to buy anything
- But maybe business model broken except within a service (e.g., iTunes)
- Significant privacy issue



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| 8 | https://commons.wikimedia.org/wiki/File:MasterCard_Logo.svg |
| 9 | http://www.asecurelife.com/dashlane-vs-lastpass-vs-1password-vs-roboform-vs-keepass/ |
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| 19 | http://www.1stissue.com/blog/google-launch-es-micro-payments-for-your-web-content/ |
| 20 | http://www.dafont.com/forum/read/5547/zune-font |
| 21 | http://arbascula.org/scripts/otjava/helo/w ebmail/english/cyb ercash.html |

Commerce
Copyright

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Copyright

- Some content owners want to control access to their content
 - Not all do -- Google, Yahoo, etc. search billions of web pages with the owners permission
 - Or at least they are not blocked
- All content has an owner under the Berne Convention - even if put in the public domain
 - i.e., all content has a copyright even if it does not say so

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Copyright, contd.



- Old concept - Statute of Anne 1710 (GB)
 - Author is owner of copyright
 - Fixed term of exclusive rights
- In US Constitution
 - "To promote the Progress of Science and useful Arts, by securing for limited Times to Author and Inventors the exclusive Right to their respective Writings and Discoveries;"* - Art 1 sec 8
 - Note: aim is to **promote the progress of science and useful arts** -- not to enrich authors and inventors

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Copyright, contd.

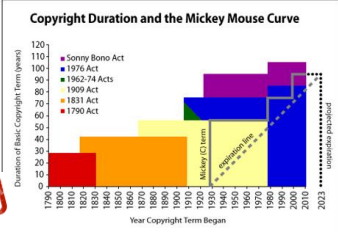


© May 21, 1928

Mickey Mouse out of copyright 11/1/2024

UPDATED

- US has a strong copyright lobby
- Keep lengthening “limited time” for copyright



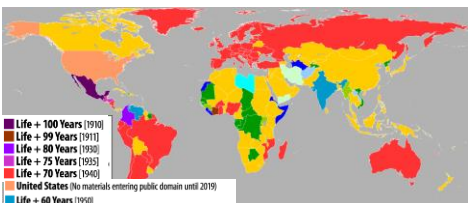
Copyright Duration and the Mickey Mouse Curve

Duration of Basic Copyright Term (years)

Year Copyright Term Began

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Copyright term



- Life + 100 Years (1910)
- Life + 99 Years (1911)
- Life + 80 Years (1930)
- Life + 75 Years (1935)
- Life + 70 Years (1940)
- United States (No materials entering public domain until 2019)
- Life + 60 Years (1950)
- Life + 50 Years (1960)
- Berne Convention (minimum: Life + 50 Years, except photographs)
- TRIPS (minimum: Life + 50 Years)
- Life + 30 Years (1985)
- Life + 25 Years (1985)
- No copyright
- Unknown

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Rights Under Copyright

TITLE 17—COPYRIGHTS

This title was amended by Public Law 101-508, 104 Stat. 2081, and Public Law 102-295, 116 Stat. 2061.

1. Subject Matter and Scope of Copyright
2. Copyright Ownership and Transfer
3. Duration of Copyright
4. Copyright Notice, Deposit, and Registration
5. Copyright Enforcement and Remedies
6. Importation and Exportation
7. Copyright Office
8. Proceedings by Copyright Royalty Judges
9. Protection of Semiconductor Chip Products
10. Digital Audio Broadcasting Devices and Media
11. Sound Recordings and Video Videos
12. Copyright Protection and Management Systems
13. Protection of Original Designs

- Copyright holder has exclusive rights
- Control the making of copies of the work and to sell those copies
- ~~To import or export the work~~
- To create derivative works
- To perform or display the work publicly
- To sell or assign these rights to others
- Some limits
- First-sale/rights exhaustion
- Fair use
- Compulsory license
- Moral rights

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First-Sale Doctrine



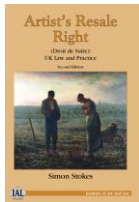
- You can sell a copyrighted work if you legally acquired it
e.g., copyright holder does not have any right to control the disposition of used books
- You can also loan the work to others
This is why libraries can operate
- Supreme Court ruled that first-sale also applies to books bought outside the US

Note: most software is leased not sold

7

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First-Sale: rights exhaustion



- Original copyright holder has no residual rights (other than moral rights) after an item is sold
- Some laws attempt to override this for art works
Droit de suite (right to follow) - artists get a percent of resale payment
In the EU, some other countries and in California
California law ruled unconstitutional

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Fair Use

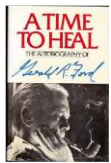


- In the US, the copyright Act of 1976 permits “fair use” of material in copyrighted works
- Different in different countries
- Common case: education

9

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Fair Use, contd.



- Carefully not clearly defined limits - some factors:
 - The purpose and character of the use
 - The nature of the copyrighted work
 - What amount and proportion of the whole work was taken, and
 - The effect of the use upon the potential market for or value of the copyrighted work

10

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Compulsory License

THE COMPULSORY MECHANICAL LICENSE PROVISIONS

Mechanical Royalties

- The fee payable for the use of the underlying composition (the "MC") Copyright is called a mechanical royalty.
- The compulsory license is the granddaddy exception to the copyright owner's complete control over the use of the copyrighted material. In effect, it puts a ceiling on what the publisher can charge record companies for the use of copyrighted music.

- Requires a copyright holder to license the use of the copyrighted work
 - e.g., "Compulsory License For Making and Distributing Phonorecords" US copyright law; Chapter 1, Sec. 115
 - Generally allows a singer to "cover" a song & for recordings to be played on the radio - for a fee
- Broader in some countries

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Moral Rights



"Play it, Sam"

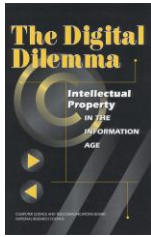
independently of the author's economic rights, and even after the transfer of the said rights, the author shall have the right to claim authorship of the work and to object to any distortion, mutilation or other modification of, or other derogatory action in relation to, the said work, which would be prejudicial to his honor or reputation.

- Latent rights in works even if the copyright has been reassigned
- The law in some countries
- In the Berne Convention
 - Prevented colorization of old movies in some countries

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Copyright in the Digital Age



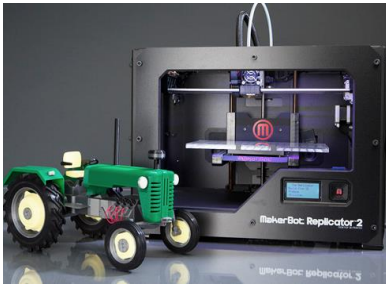
- The digital age is badly stressing the old concepts of copyright
- More and more works are digital
books, music, movies, newspapers, etc.
- Cost of copies of digital works is very, very low
- Quality of copies of digital works is equal to the original
For all generations of copies

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Copyright in the Digital Age

- 3-D printers: it's no longer just text



14

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When is a sale not a sale



- **Vernor v. Autodesk, Inc.**
Vendor can restrict software to leases, not purchases
Thus can include "post sale" restrictions
Normally blocked by First Sale Doctrine
- **John Deere tractors are subject to post-sale restrictions on who can repair the tractors**
John Deere says that this is OK because software in the tractor is leased, not purchased
Breaking protection on the software would violate DMCA



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| 5 | http://www.publicdomainday.org/sites/www.publicdomainday.eu/files/World_copyright-terms.jpg |
| 6 | https://www.gpo.gov/fdsys/pkg/USCODE-2011-title7/html/USCODE-2011-title7.htm |
| 7 | http://smallbiztrends.com/2013/03/resale-rights-you-bought-own.html |
| 8 | http://www.jaluk.com/stokes.php |
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| 12 | http://www.worth1000.com/entries/119948#asblanca-color |
| 13 | http://www.nap.edu/catalog/9601/the-digital-dilemma-intellectual-property-in-the-information-age |
| 14 | http://www.technologyreview.com/view/429566/nathan-myhrvold-s-cunning-plan-to-prevent-3-d-printer-piracy/ |
| 15 | http://smallbiztrends.com/2013/03/resale-rights-you-bought-own.html http://www.tractor.com/manufacturers/john-deere/2014-john-deere-7290r-review-16603.html |


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Commerce
DMCA


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DMCA




- Digital Millennium Copyright Act of 1998
- Intended to bring US copyright law into the digital age - and implement WIPO copyright treaties
- Blocks circumventing of DRM technology
"No person shall circumvent a technical measure that effectively controls access to a work protected under this title" - 1201[a][1]



The manufacture of scissors would be illegal.
The DMCA makes it illegal to make or distribute devices that can be used to break digital locks, no matter how flimsy.

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DMCA



- Some very limited exceptions in law
e.g., libraries, law enforcement, encryption research, security testing, reverse engineering, protecting privacy
- Other limits can be added by US Copyright Office
Open for suggestions every 3 years
Exceptions granted by the Copyright Office are few and small

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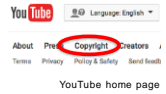
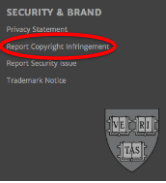
DMCA, contd.



- Anti circumvention provision used to sue (or threaten) researchers who disclose poor security
e.g., SunnComm over disclosure of shift key workaround
- i.e., the DMCA tries its best to ensure that the US has weak security on its products
Your government (and the copyright lobby) at work

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DMCA: ISP safe harbor



- Online service providers (OSPs) conditionally protected against any copyright violations of their users
- Must maintain & list a DMCA contact
- Must remove material that violates copyright if notified
- ISPs must disconnect repeat copyright offenders
- Failure to the above means OSPs become liable

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| 3 | https://commons.wikimedia.org/wiki/File:US-CopyrightOffice-5a81sv.g |
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Commerce
DRM

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Digital Rights Management (DRM)



- DRM is the application of technical protections to digital material
- Generally to control access or use of the material

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Digital Rights Management (DRM)



- Early example: IBM's *Cryptolope* (1996)
 - Content "packaged" in an encrypted envelope
 - Supported text, images, audio and video
 - Envelope included instructions for use (e.g., view only)
 - Interacted in real-time with Internet-based server
 - Report any use (privacy issue)
 - Could be used to change permissions

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Why DRM?: Claims

*"An uncontrolled distribution of digital content would make the content production industry collapse
Content providers would not open their archives, and stick to traditional media if no guarantee for a fair remuneration exist"*
Fore Basile - Metaware

- Stopping theft - billions of dollars per year
Value assumes all who stole would have paid
- Encouraging content holders to put content on-line
More content at lower prices
- Claim is that it's better than just saying "no"
Like the pre iTunes music world

4

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Why Not DRM?

**DRM IS
KILLING MUSIC**



FAIL

- Can always be circumvented (in theory) if used on a computer that is in the control of an attacker
- Preserve old business models rather than encourage new ones
- Interferes with fair use
- Can interfere with backups and archives
- Does not expire with copyright
Limit access to old content

5

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Why Not DRM?

FAIL

- Some DRM schemes require user to identify themselves-privacy issue
- Company can stop supporting DRM servers

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DRM Technology

SONY



Microsoft



- Some standards
 - CSS - DVD protection
 - AACS - HD DVD protection
- But mostly incompatible proprietary systems, e.g.:
 - Paradigm Research Group (NPRG) report protection
 - Sony "Key2Audio"
 - SunnComm "MediaMax CD3"
 - E-Book Pro
 - FileOpen Systems eBook
 - Apple iTunes "Fairplay"
 - RealNetworks "Helix"
 - Windows Media "WM DRM"

7

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DRM Technology, contd.



- Many major DRM schemes have been broken
- Some schemes have been very stupid
 - FileOpen Systems eBook - put decryption key in file
 - Paradigm Research Group (NPRG) - ROT 13
 - Sony "Key2Audio" - Magic Marker
 - SunnComm "MediaMax CD3" - shift key
 - E-Book Pro - combine text with fixed string "encrypted"

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DRM Technology, contd.



Auguste Kerckhoffs

- Note that most DRM technologies are "secret" and thus unverified

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iTunes Lesson



- Well designed DRM is not a barrier to sales
- For most users the limits iTunes placed on copying were not an issue
 - Multiple computers, multiple players, burn CDs

10

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iTunes Lesson



- But some commentators and countries are upset that iTunes DRM audio content would not play on Microsoft-enabled players
 - Claim that this is a violation of the first sale doctrine, etc.
 - Apple response: only a small % of music on an iPod – what's the big deal? (most music is ripped CDs, etc.)
 - Apple moved to all DRM-free music, but still has DRM on books & movies

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iPhone/iPod & iPad



App Store

EU forcing Apple & Google to allow non-store downloads




- Closed applications process
 - All applications must be checked and approved by Apple
- Some complaints about process
 - But, with 4.5M applications, it seems to be a success
- Apple claims process is needed to protect system
 - e.g., battery life & malware
- Side effect, restricts competition for Apple applications

12

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THINKING OF BUYING FROM AUDIBLE.COM OR ITUNES?


REMEMBER, IF YOU PIRATE SOMETHING, IT'S YOURS FOR LIFE. YOU CAN TAKE IT ANYWHERE AND IT WILL ALWAYS WORK.



BUT IF YOU BUY DRM-LOCKED MEDIA, AND YOU EVER SWITCH OPERATING SYSTEMS OR NEW TECHNOLOGY COMES ALONG, YOUR COLLECTION COULD BE LOST.

AND IF YOU TRY TO KEEP IT, YOU'LL BE A CRIMINAL (DMCA 1201).

SO REMEMBER: IF YOU WANT A COLLECTION YOU CAN COUNT ON, PIRATE IT. HEY, YOU'LL BE A CRIMINAL EITHER WAY.



(IF YOU DONT LIKE THIS, DEMAND DRM-FREE FILES)

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| 2 | http://blog.ettiongard.com/why-use-ebook-drm/26/ |
| 3 | http://logodatabases.com/bm-logo.html/bm-logo |
| 5 | https://it.wikimedia.org/wiki/Digital_rights_management |
| 7 | https://commons.wikimedia.org/wiki/File:Sony_10_go.svg |
| amerige-group-729548.htm | http://www.marketwired.com/press-releases/sunncom-international-ak-beco-mes-the-amerige-group-729548.htm |
| logo/ | http://windowstenpro.blogspot.com/2013/12/real-player-16-build-1600282-final.html https://blogs.msdn.microsoft.com/zainnab/2012/08/24/introducing-the-new-microsoft-logo/ |
| 8 | http://archiveteam.org/index.php?title=File:Apple-lo-go.jpg http://www.securitybydefault.com/2010/05/hackeos-memorables-key2audio-de-primer.html |
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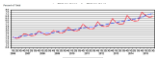

Commerce
Conclusion

CSCI E 45b: The Cyber World – part B

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Commerce, wrap up




- Electronic commerce is growing
- Business-to-business e-commerce makes up the majority of B2B commerce in the US
- Business-to-consumer e-commerce is still a small part of US B2C commerce
- At one point it was assumed that B2B e-commerce required special systems



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Commerce, wrap up, contd.

- Credit and debit cards are very big business
- Significant vulnerabilities when merchants collect card information
 - Chip cards help
- Many anti-fraud systems in place – on-line fraud rate low
- Fraud liability picture changing



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Commerce, wrap up, contd.



- On-line e-commerce systems do not need to be overly complicated
- Tokenized systems significantly reduce a key vulnerability
And can add privacy
- Auto fill-in systems can make life easier and improve password management

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Commerce, wrap up, contd.



- Micropayments have generally been a failure
- Bitcoin continues to grow
- Copyright is an old and important concept
- Copyright terms keep getting longer
- Copyright law is complex
E.g. the U.S. DMCA & its anti-circumvention provisions

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Commerce, wrap up, contd.



- Digital Rights Management is often invasive and clumsy
- DRM can give a copyright holder more control than the law actually allows
- Many DRM systems are quite poorly designed
- DRM can be mostly invisible is designed well

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| 6 | http://blog.digitonguard.com/why-use-ebook-drm/26/ http://www.securitybydefault.com/2010/05/hackos-memorables-key2audio-episode.html https://techwhackco/tag/apple-itunes-10/ |
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