

## COMP 3410 – I.T. in Electronic Commerce

### eTrading 4. eTrading in Digital Objects & P2P

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<http://www.rogerclarke.com/EC/> ...  
ETIntro.html, OhdsET3.ppt

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## E-Trading in Digital Objects

### Agenda

1. Copyright
2. Copyright Objects
3. Technological Protections / DRM
4. eSharing Digital Objects using P2P
5. eTrading Digital Objects using P2P

## 1. Copyright: A Bundle of Monopoly Rights

- US/WIPO/Au Post-Internet
- **Of Long Standing**
  - **reproduction**
  - **publication**
  - **adaptation**
  - performance
  - **More Recent**
  - broadcast
  - moral rights
- communication to the public**, dissemination by wire or wireless means, incl.
- 'push' (electronically transmit) e.g. email, FTP put
  - 'pull' (make available online), for public access when they wish, e.g. web, FTP get

## 2. Copyright Objects

- **Format Types**
  - page-format publications (text, image)
  - sound
  - animation, video
  - 'multi-media' – each with its own rights
  - software
  - 'objects' – right relate to each element
- **Content Types**
  - news, weather, sport, musical performances, cartoons, films, video-clips, entertainment, infotainment, edutainment and education

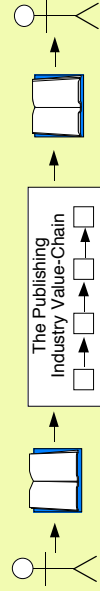
## Copyright Objects in the Digital Era – 1

- convenient, inexpensive **Creation** ('born digital') desktop publishing packages, PC-based graphic design tools, animation, digital music generators
- convenient **Conversion** of existing materials scanners, OCR, digital audio-recording, digital cameras
- near-costless **Replication** disk-to-disk copying, screen-grabbers, CD/DVD-burners as a consumer appliance

## Copyright Objects in the Digital Era – 2

- very rapid **Transmission**, unmeasurably low costs modem-to-modem transmission, CDs/DVDs in the mail, emailed attachments, FTP-download, web-download
- inexpensive and widespread **Access** PCs, PDAs, mobile phones, public kiosks, web-enabled TV in the workplace, the home, public kiosks, Internet cafes
- computer-based **Analysis** of data data-matching, profiling, data-mining, pattern-recognition
- convenient **Manipulation** of data-objects word-processors, sound and image processing tools

## Conventional Publishing, 1450-1995

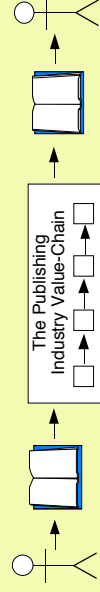


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## Conventional Publishing, 1450-1995

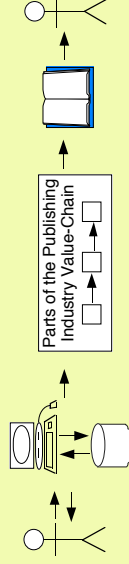


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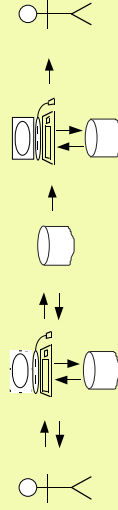


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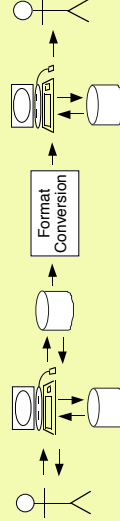
## Desk-Top Publishing, 1985-20..



## Electronic Publishing, 1990-20..



## Cross-Media Publishing, 1998-20..

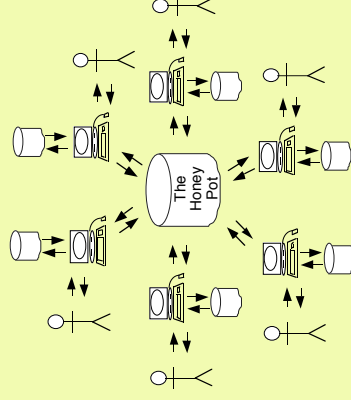


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## Interactive 'Publishing', 1995-2095 'Bees Around a Honey-Pot'



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## Cyberculture Ethos

- Inter-Personal Communications
- Internationalism
- Egalitarianism
- Openness
- Participation
- Mutual Service
- Community
- Freedoms
- Gratis Services

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## Categories of Creative Commons Licence <http://creativecommons.org.au/licences>

Name	Version	2.5 Licenses:	Characteristics
Attribution		BY	BY
Attribution-NonDerivs		BY: ND	BY: ND
Attribution-NonCommercial-NoDerivs		BY: NC ND	BY: NC ND
Attribution-NonCommercial		BY: NC	BY: NC
Attribution-NonCommercial-ShareAlike		BY: NC SA	BY: NC SA
Attribution-ShareAlike		BY: SA	BY: SA

Or Choose:



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### 3. Technological Protections for Digital Objects Digital Rights Management (DRM) Technologies

- **Passive**
  - Object-Protection
  - Tracing ('Watermarking', 'Fingerprinting')
- **Active**
  - Notification of Rights
  - Identification of licensees
  - Authentication of identities
  - Destruction / Disabling of the data object
  - Client-Side Enforcement (Recording, Prevention, Reporting)

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### 4. eSharing Files using Peer-to-Peer (P2P)

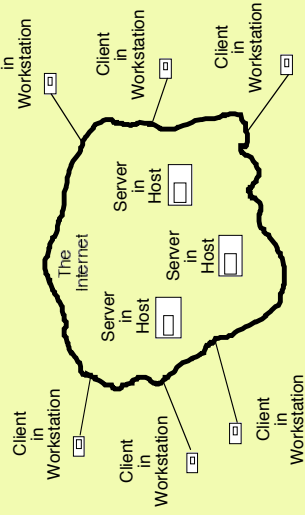
- MP3
  - CD-quality digital sound in files sized 1 MB/minute
- Napster
  - a central catalogue of a distributed database, to facilitate sharing of MP3 files
- Gnutella, KaZaA, et al.
  - a distributed catalogue of a distributed database, to facilitate sharing of (MP3?) files

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### Client-Server Architecture mid-1980s Onwards, esp. mid-1990s Onwards Internet-Mediated

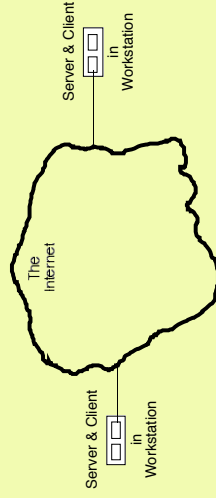


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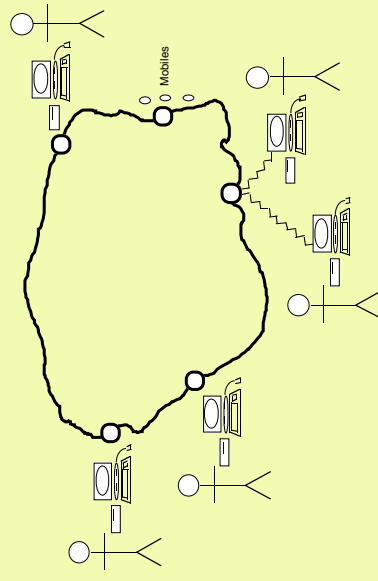
### P2P Architecture Cooperative Use of Resources at the Edge



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### Computing Power 'at the Edge'

### P2P – The Motivation

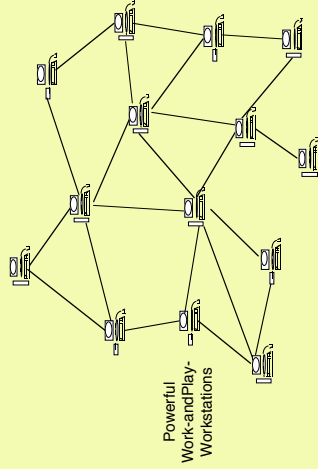
- Take advantage of resources that are available at the edges of the Internet
- **To do so, make each participating program both a Client and a Server** so each workstation acts as a host as well, e.g.
  - a music playstation can be a mixer too
  - your PC can host part of a music repository
  - your PDA can host part of a music catalogue

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## A Virtual Topology The P2P 'Overlay Network'



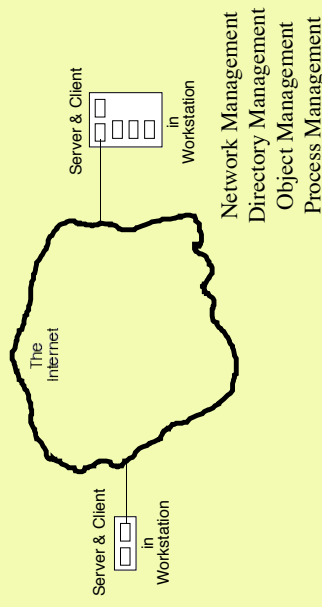
Powerful  
Work-and-Play-  
Workstations

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## The P2P Server-Component's Multiple Functions



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## Important Characteristics of P2P

- Collaboration is inherent
- Clients can find Servers
- **Enough Devices with Enough Resources act as Servers for discovery, and as Servers for services**
- 'Single Points-of-Failure' / Bottlenecks / Chokepoints are avoided by means of networking dynamics
- 'Free-Riding' / 'Over-Grazing' of the 'Commons' is restrained through software and psych. features

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## The Scale of the Undertaking

- The DNS grew to c. 30 million names in 18 years from its establishment in 1984 to 2002
- Napster achieved that many in 2 years
- The top 3 distributed-catalogue services combined quickly exceeded Napster at its peak
- AOL Instant Messaging is also very large
- **By 2005, the total of all P2P names probably exceeded the number in the DNS by a factor of 10**

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## Why P2P Is Attractive

- **Much-Reduced Dependence** on individual devices and sub-networks (no central servers)
- **Robustness not Fragility** (no single point-of-failure)
- **Resilience / Quick Recovery** (inbuilt redundancy)
- **Resistance to Denial of Service (D)DOS Attacks** (no central servers)
- **Much-Improved Scalability** (proportionality)
- **Improved Servicing of Highly-Peaked Demand** (more devices on the demand-side implies there are also more server-resources)

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## Technical Concerns about P2P

- **Address Volatility:** old addresses may not work (hence trust based on repetitive dealings is difficult)
- **Absence of Central Control** (hence risk of anarchy)
- **Inadequate Server Participation** (over-grazing)
- **Security Challenges:**
  - Malware, embedded or infiltrated
  - Surreptitious Enlistment (at least potential)
  - Vulnerability to Masquerade
  - Vulnerability to Pollution Attacks (decoys)

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## P2P Applications for Access to Digital Objects

- **Software:**
  - Fixes/Patches
  - Releases
- **Virus Signatures**
- **Announcements**, e.g. of technical info, business info, entertainment 'info', sports results, promotional messages, advertisements
- **News Reports**, by news organisations, and by members of the public
- **Emergency Services Data**
- **Backup and Recovery Data**
- **Games Data**, e.g. scenes and battle configurations
- **Archived Messages**, for conferencing/chat/IM, and cooperative publishing
- **Learning Materials**, in various formats
- **Entertainment Materials**, in various formats

## File-Sharers Are Adaptable

- They started on Napster (1998-2002)
- As it came under attack, they gravitated to Kazaa/FastTrack (2002-2003)
- As that became a target of legal action, they moved to BitTorrent (2004)
- When that was seen as too centralised, they moved to eDonkey (esp. in Korea), and Gnutella/-2 (esp. in the USA) (2005-)

## The Case of BitTorrent – Phase 1

- Breaks files into **chunks** (e.g. **250KB**) and spreads them around multiple locations
- To get missing pieces, each user must make available the chunks that they have. Their existence is advertised by means of **.torrent files**
- So it generates shared storage and transmission capacity, and for popular files is scalable
- It is usable for large files, e.g. video
- The design does not include a catalogue.
- The discovery of resources requires other services generically referred to as '**Trackers**'

## The Case of BitTorrent – Phase 2

- It is usable for large files, e.g. video
- It has been used by many people for putatively copyright-infringing file-transfers
- But repositories and catalogues are easy to find
- MPAA found several and forced their closure
- 'May the source be with you'  
The Guardian, Thursday June 2, 2005  
By Quinn Norton  
<http://www.guardian.co.uk/online/story/0,3605,1496722,00.html>

## The Case of BitTorrent – Phase 3

- It is also used for software distribution and patch distribution e.g. for games software  
[http://en.wikipedia.org/wiki/BitTorrent#Legal\\_uses\\_for\\_BitTorrent](http://en.wikipedia.org/wiki/BitTorrent#Legal_uses_for_BitTorrent)
- New deals with video-games publishers
- Discussions with MPAA members about applications to legitimate video distribution
- 'BitTorrent moving uptown'  
SiliconValley.com, Mon, Aug. 01, 2005  
By Dawn C. Chmielewski, Mercury News  
<http://www.siliconvalley.com/mld/siliconvalley/12276446.htm>

## 5. The Scope for eTrading in Music

- **Identify price resistance-points in the various customer-segments** i.e. 'what the market will bear'
- Set prices accordingly (and hence sustain payment morality)
- **Make backlists and new releases available via for-fee P2P channels**
- Discourage and prosecute breaches where the purpose is commercial
- Take no action over breaches by consumers (esp. time-shifting, format-change, even sharing?)

### The Evidence

- Since 2003, Apple iTunes charges USD 0.99/track!?
- Copyright-Owners get USD 0.70
- In 2005-06, they asked for more
- And argued with Jobs about variable track-pricing

## eBusiness Era Revenue Sources

- **Direct and Immediate Reciprocity**
  - low prices for volume sales
  - higher prices for services that are value-added / differentiated / customised
- **Indirect and/or Deferred Reciprocity**
  - donations, sponsorship, advertising
  - the-artist-pays / vanity press
  - 'shareware' – use now, maybe pay later
- **'The After-Market'**
  - accessories • upgrades
  - enhancements • extensions

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