Peer to Peer Networking

Some Technical and Social Aspects of Unlimited Resource Sharing

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Napster

- Year 2000 was the year of Napster
  - The fastest growing application in the history
  - Shawn Fanning, alias Napster, 18.
  - Created a global musical library
  - Utilizing users resources
  - Supported by artists who feel exploited by publishers and 40.000.000 users
  - Sharing or stealing?

Great expectations

- "Peer-to-peer is the next great thing for the Internet"

  Lawrence Lessig, Stanford Law School
- A string of P2P projects
  - Gnutella, SETI@home, Publius, Free Haven, Popular Power, Jabber, Freenet, Morpheus
  - P2P in B2B: Microsoft's .Net
- Applications are inventing their own protocols
- SUN Microsystems is proposing open standard and library for development of P2P applications

P2P was already here

- Small Office Networks (WfW, Lantastic..)
  File and Printer sharing
- Early Internet was P2P
  - Connecting 5 universities, all hosts were equals
- Usenet (1979) is an early example of decentralized service
  - New discussion groups opened by consensus
  - alt.* newsgroups as institutionalized anarchy

Client/server

- Hierarhical services were introduced to cope with growing number of hosts
  - DNS distributed hierarchical database for mapping names to addresses
- Fits naturally in commercial environment
  - Publishers run servers
  - Clients are seen as consumers

Horizontal structure

- Internet is stil horizontaly organized
- Each PC with dial up connection can be server and client at the same time
- Client for one service, server for some other
- PC's are getting stronger
  - More memory, CPU power, larger disks
- Faster upstream bandwidth (56 Kbs, ISDN, DSL…)

What is P2P?

- Decentralization
- Avoiding DNS - allowing variable, temporary IP addressing
- Authonomy for nodes on the edge of Internet
- Ownership - users own hardware
- User centric - simple, low tech applications, zero administration

Political mission

- Avoiding censorship
- Privacy and anonymity for users
- To free network of phisical limitations, and move it to virtuality
- Democratic networking
  - Easy creation of cooperative groups
  - LAN on demand

Technical issues

- Commercialized Internet has many obstacles:
  - Firewalls
  - Caching proxy servers
  - Dinamic IP addresses
  - NAT
- Protocol centric addressing instead of machine centric
  - Mapping username to temporary IP address
  - napster://BadBlueBoy

Two-way Web?

- http hyperlinks are P2P
- Everyone who has a web browser should have a web server!
- Desktop computers only had browsers
- Microsoft's answer: Personal Web Server
- UNIX users have browser and web server
- SOAP protocol for exchange of information in a decentralized, distributed environment
- Metadata - type of content, searchability

Social impact of P2P

- Ad-hoc creation of interest groups
- Easy exchange of information and ideas
- Does P stand for people?
- P2P should not promote antisocial behaviour
- Authentification, Trust, Reputation, Security
- Control of content?
- Should information be free?

P2P Paradigma

- Client is server
- Network is the computer
- Tolerate unreliability
- Tolerate redundancy
- Tolerate asymmetry
- Follow the users
- Information wants to be free!