

# P2P File Sharing

Keith W. Ross

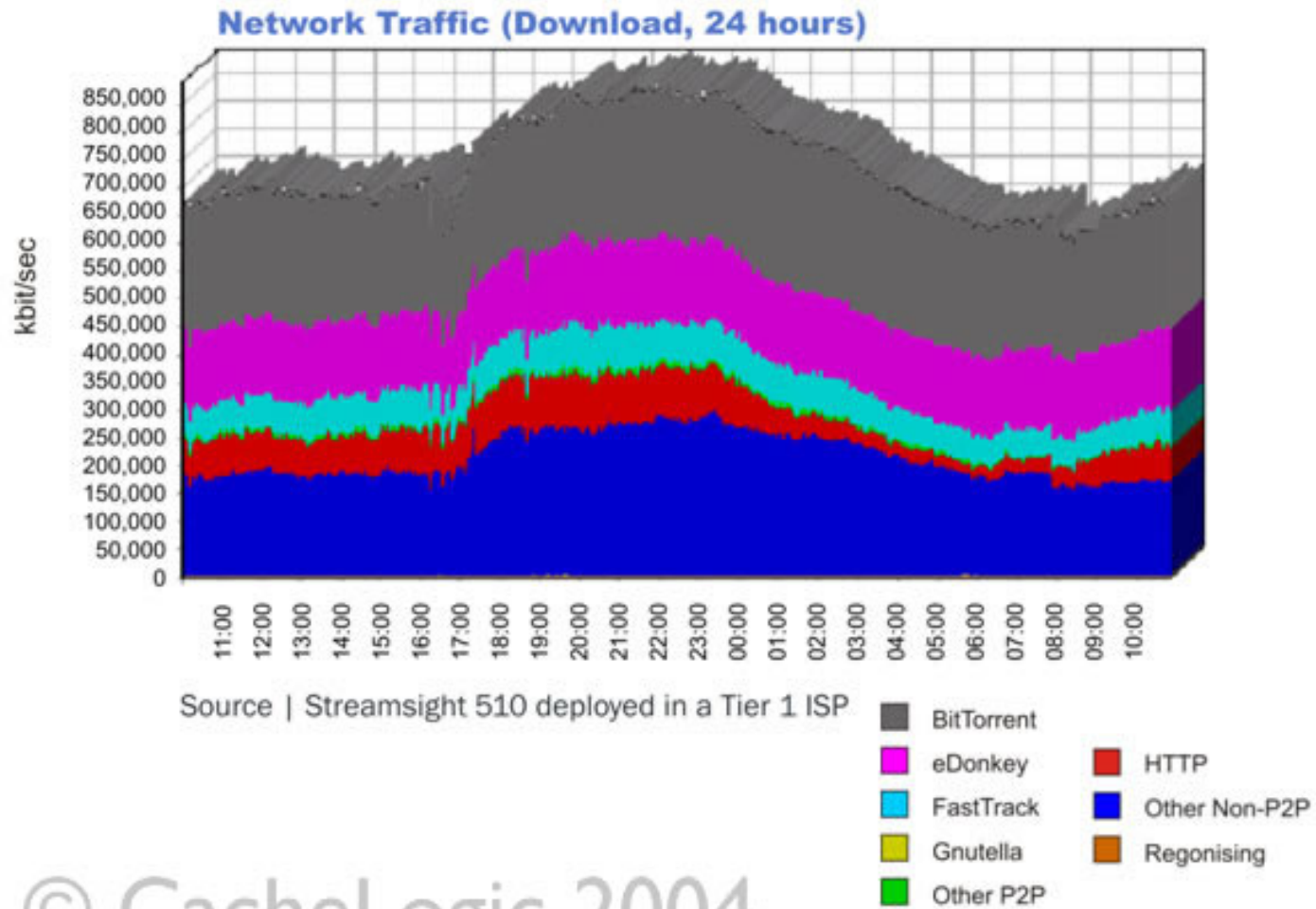
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Polytechnic University  
Brooklyn, N.Y.

<http://cis.poly.edu/~ross>

# Outline

- P2P Landscape
- Overview of
  - Napster
  - FastTrack
  - BitTorrent
- Pollution in File Sharing
- The Untapped Resources

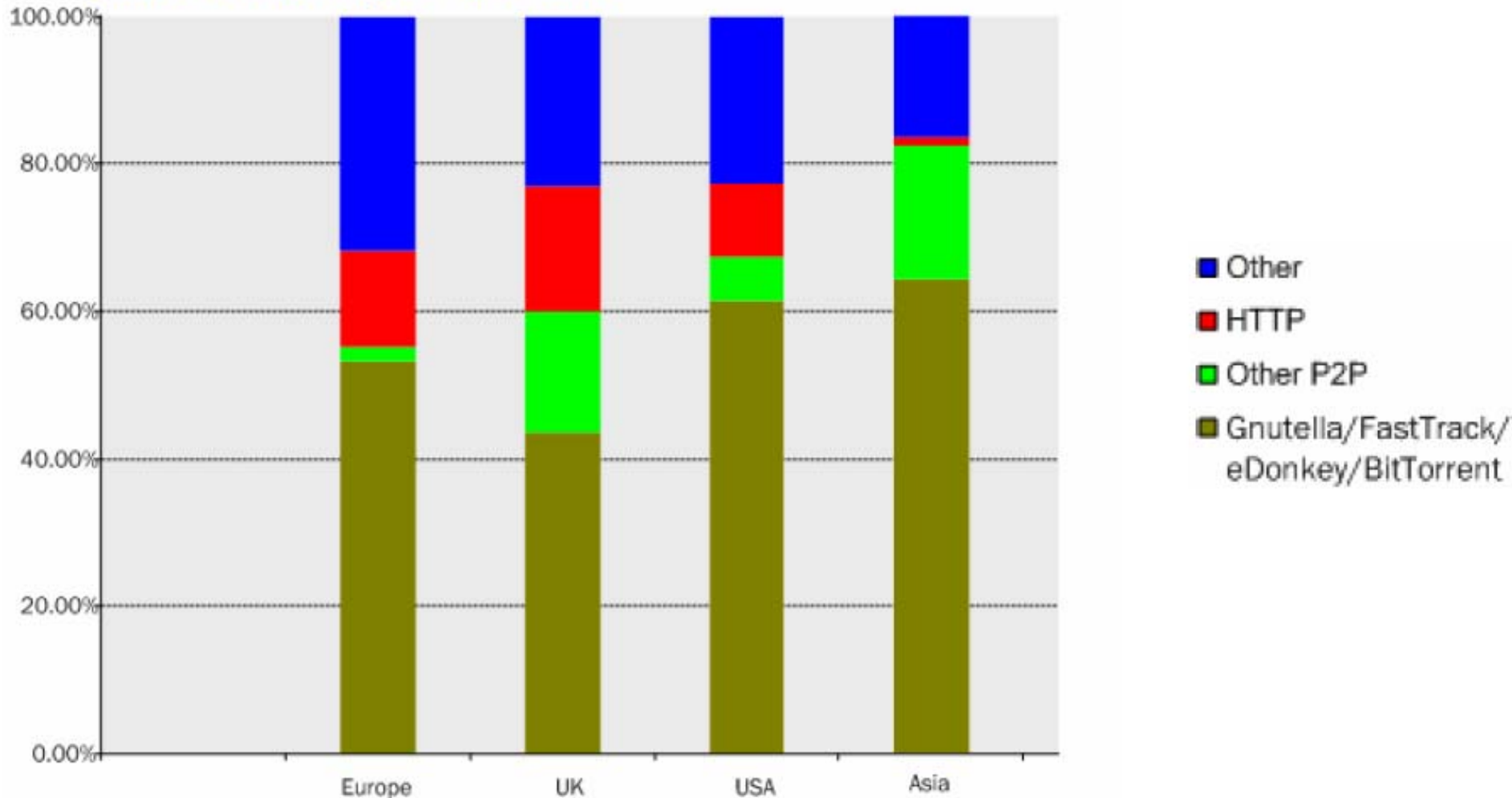
# Traffic Volumes



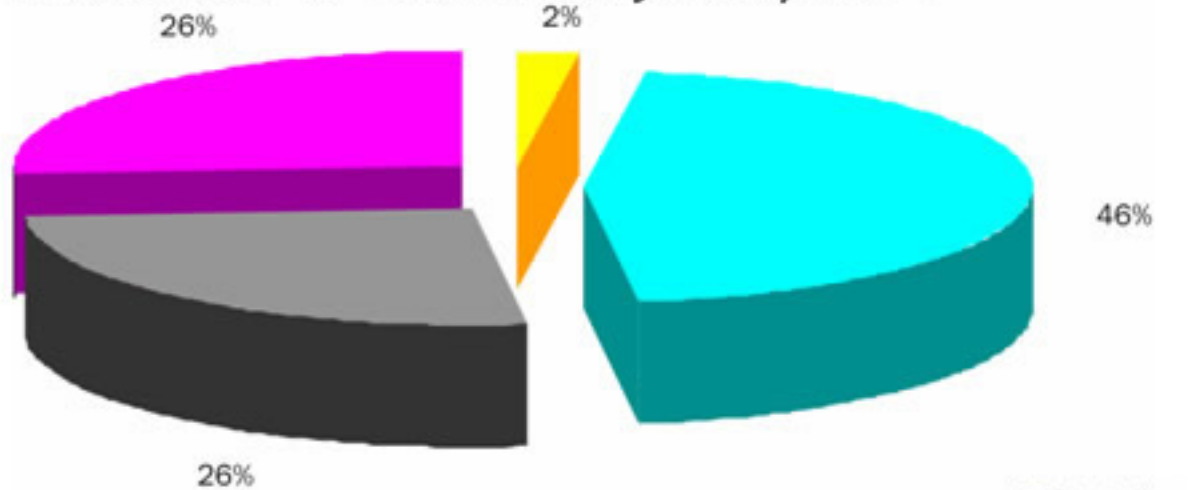
© CacheLogic 2004

# Global Traffic

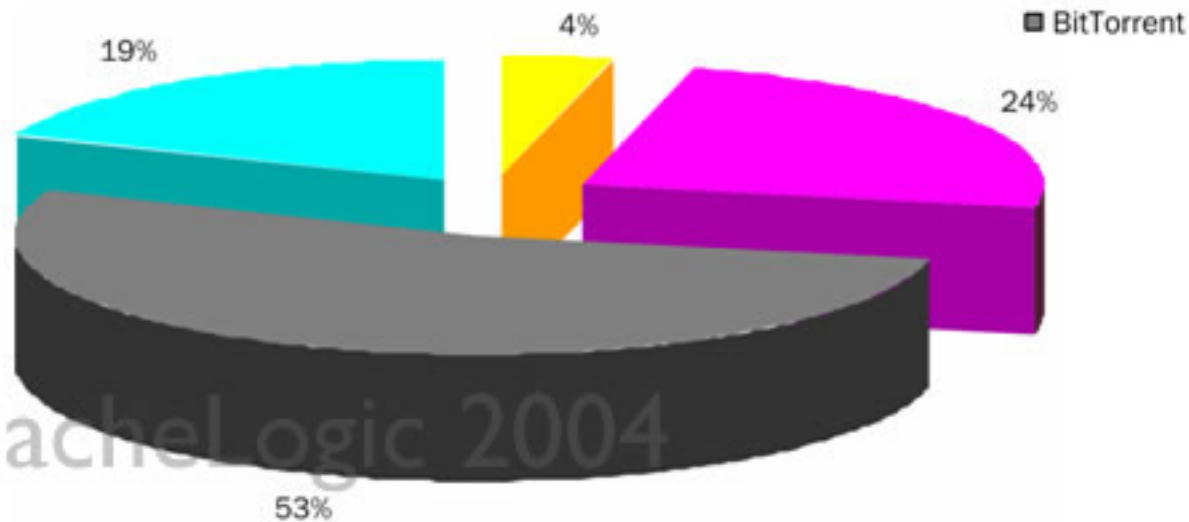
Global Traffic Analysis - June 2004



### Mix of Peer-to-Peer Traffic: January 2004



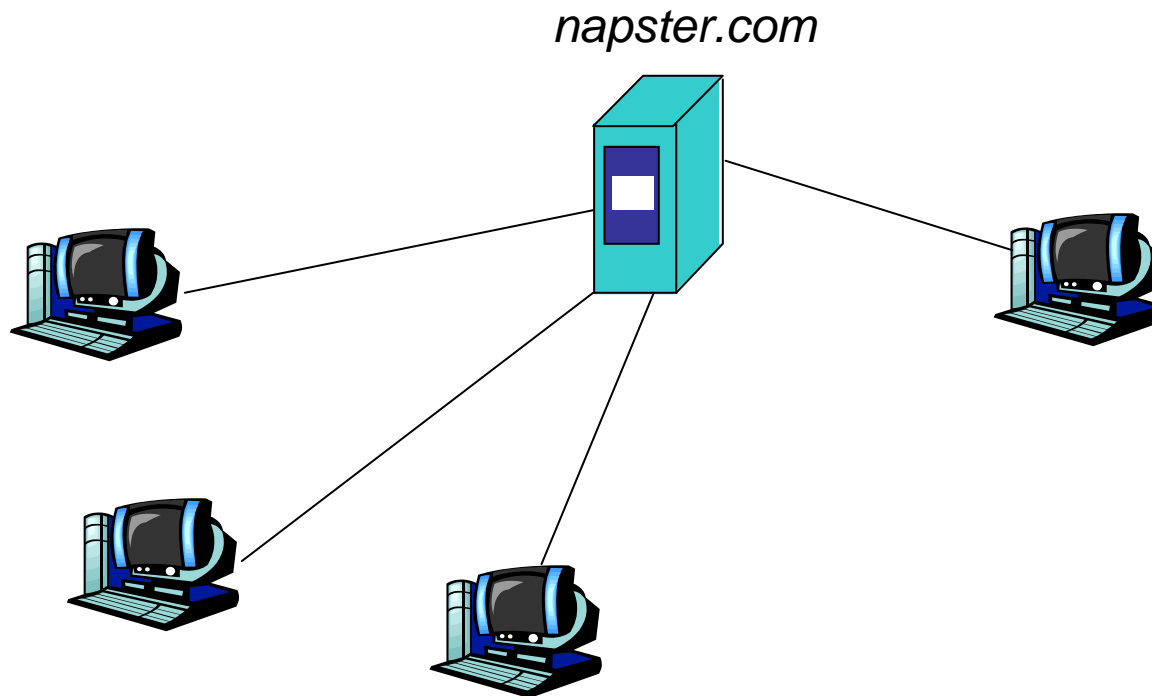
### Mix of Peer-to-Peer Traffic: June 2004



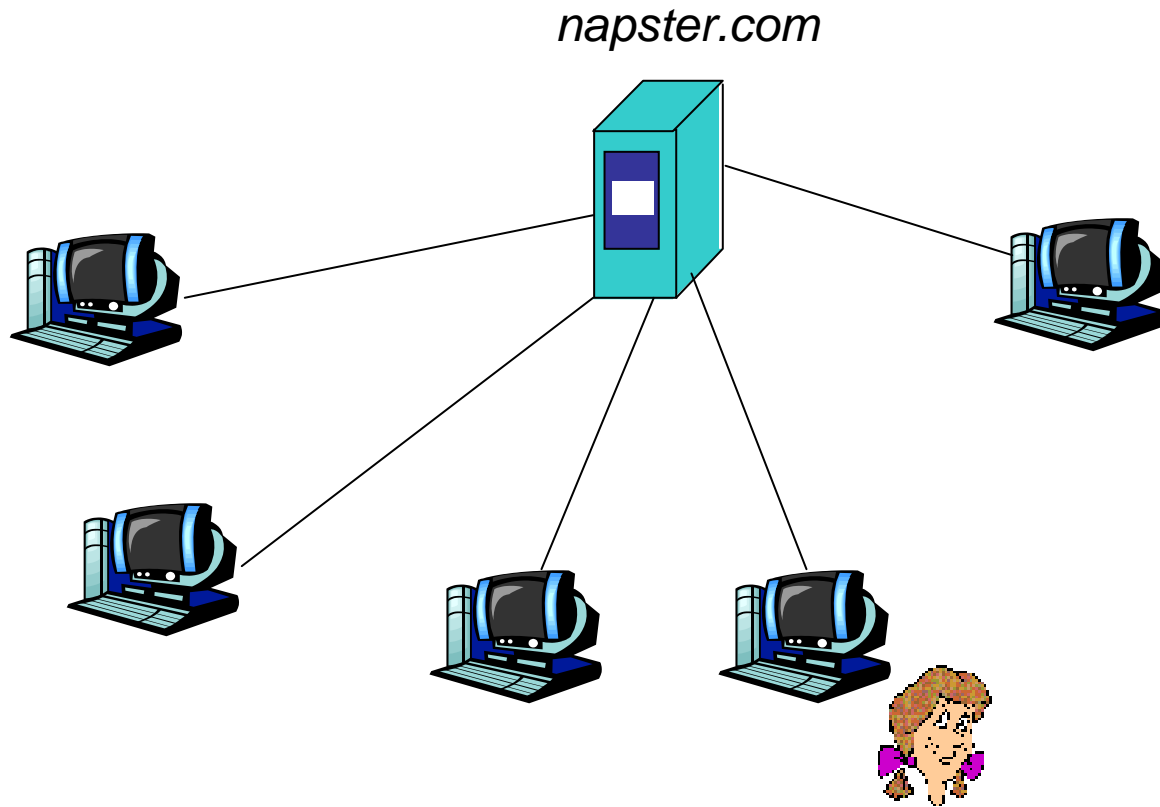
Napster

circa 2000

# 1. Centralized Directory

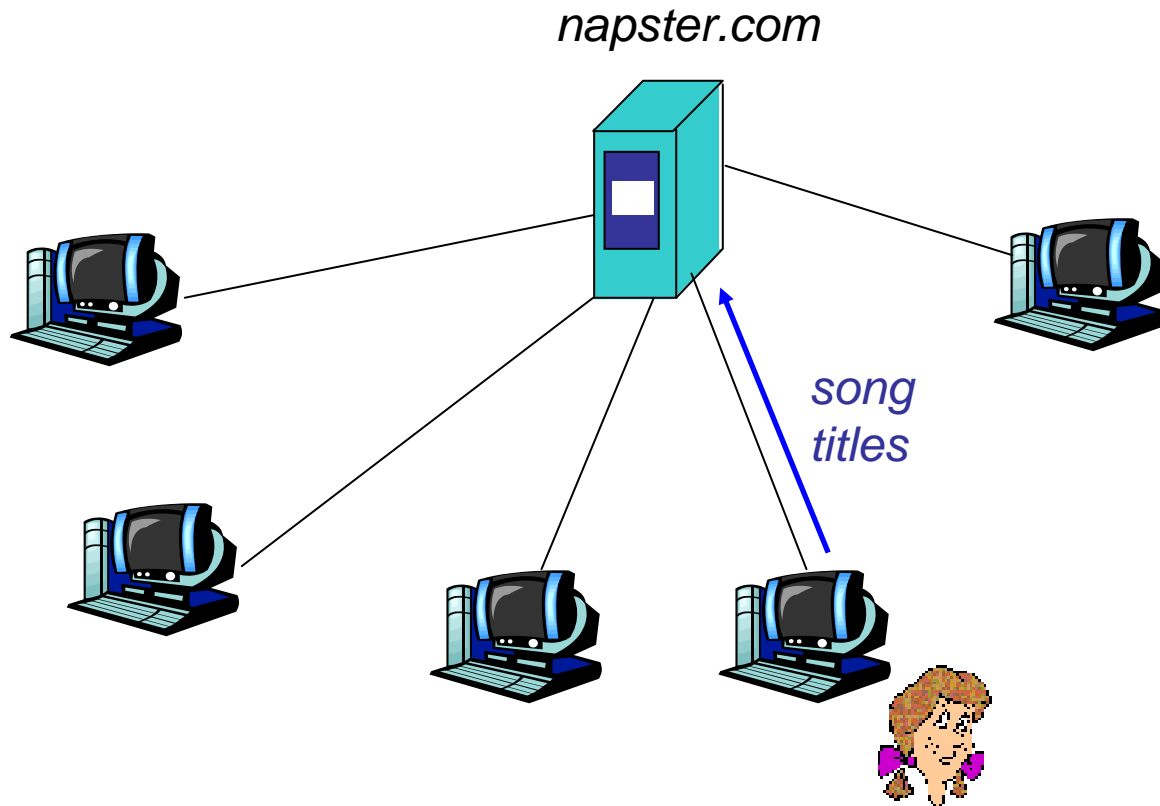


## 2. Alice Joins

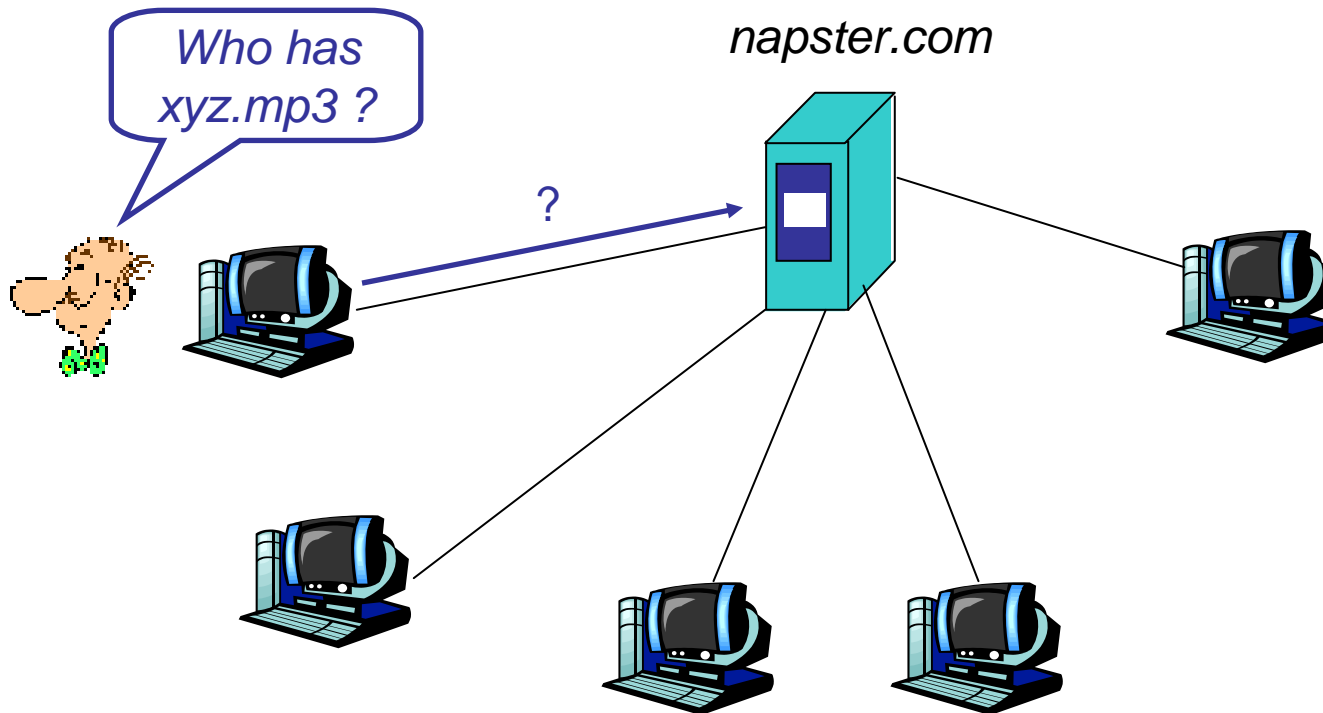




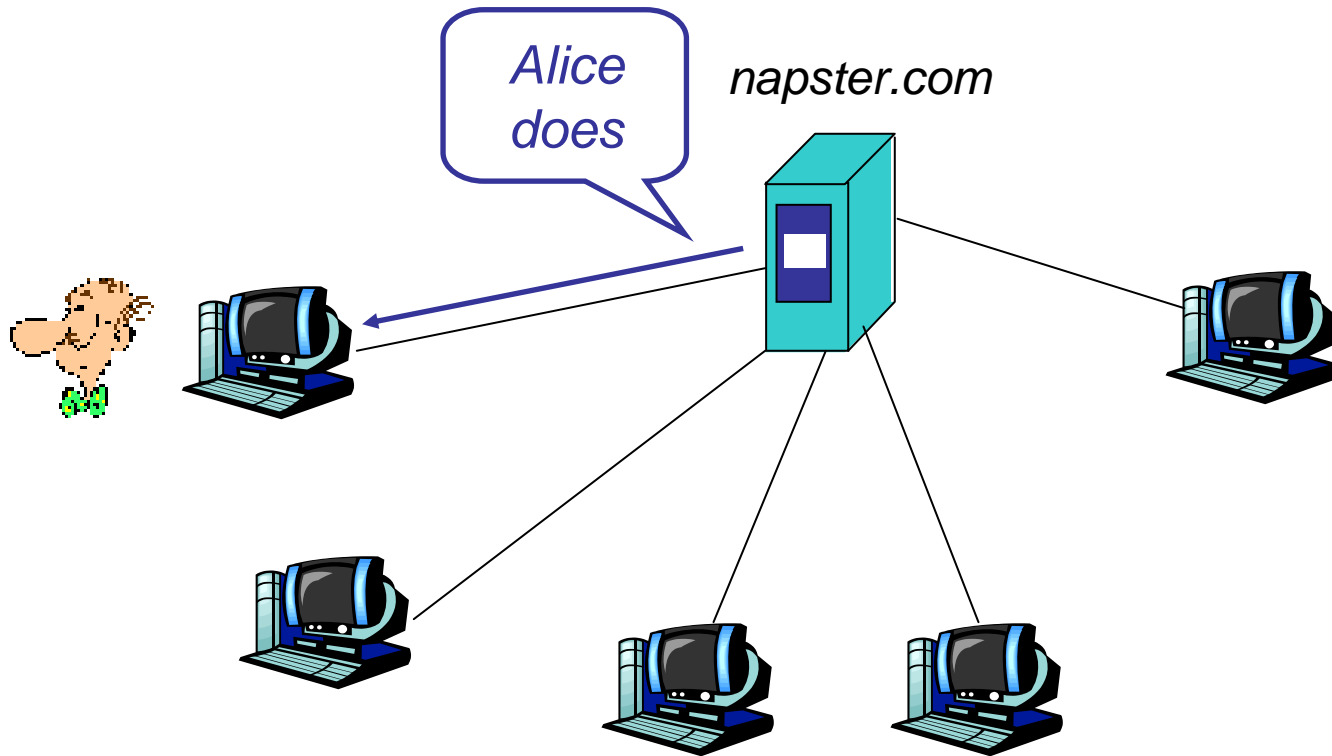
# 3. Alice provides her titles



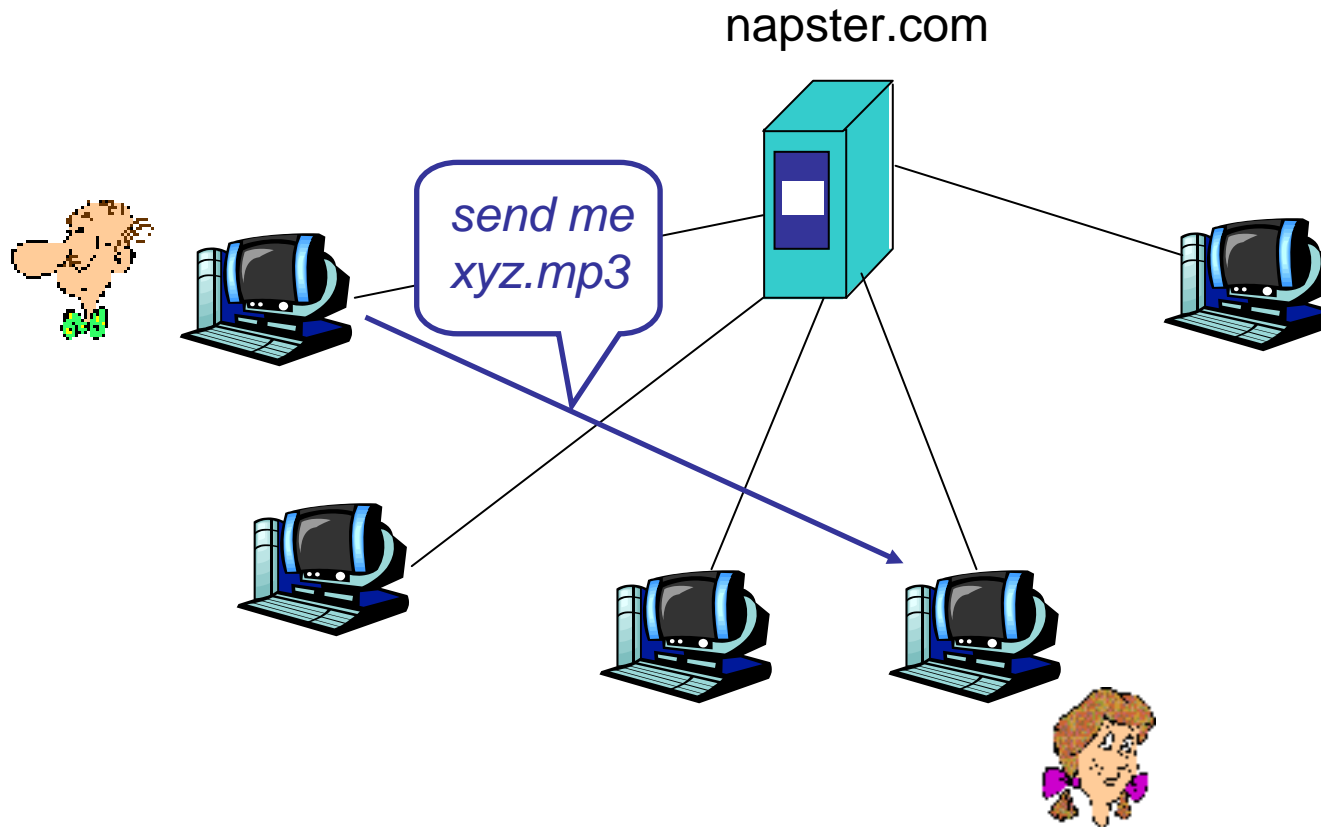
# 4. Bob Queries



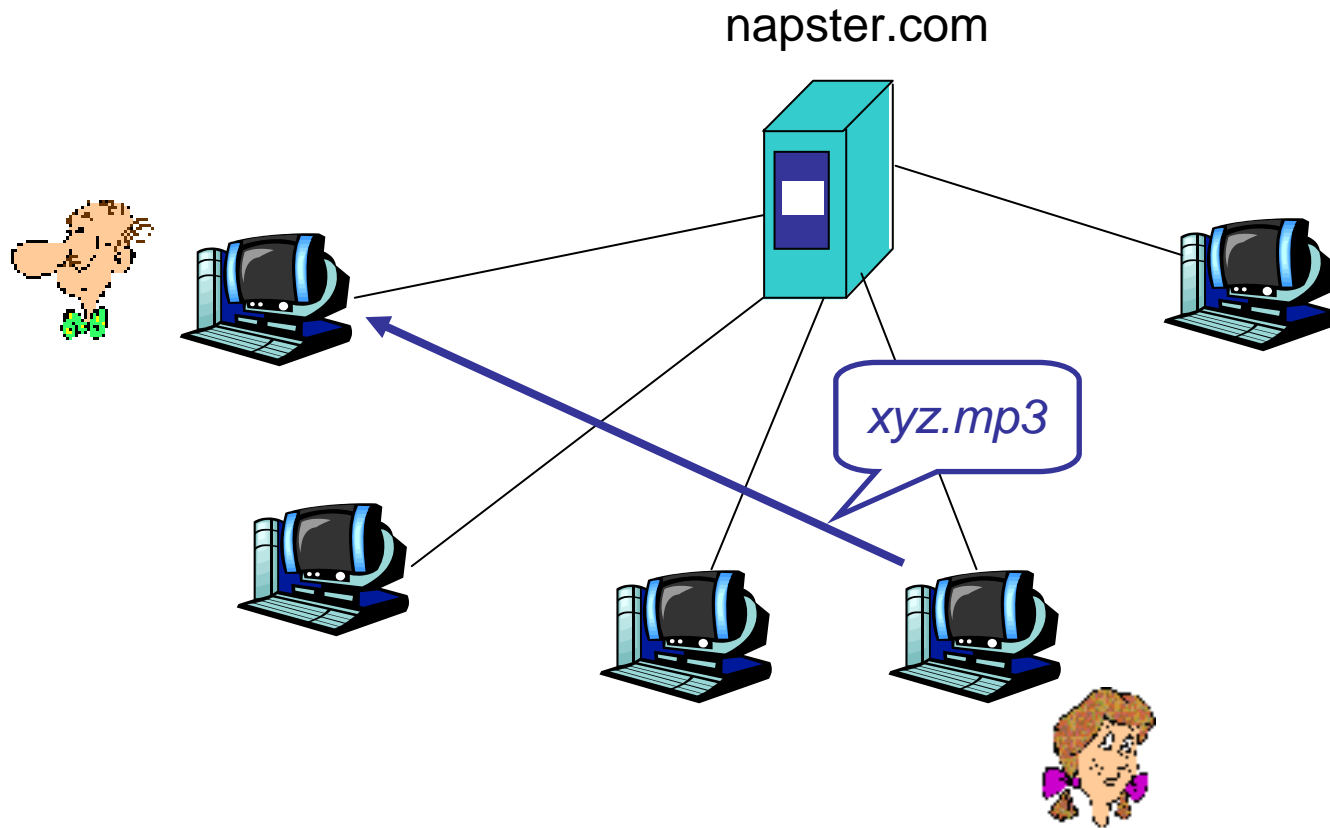
# 5. Server Responds



# 6. Bob requests file



# 7. Alice provides file



# FastTrack Network

Supports many user programs:

- Kazaa (Sharman)
- Grokster
- iMesh
- kazaa-lite

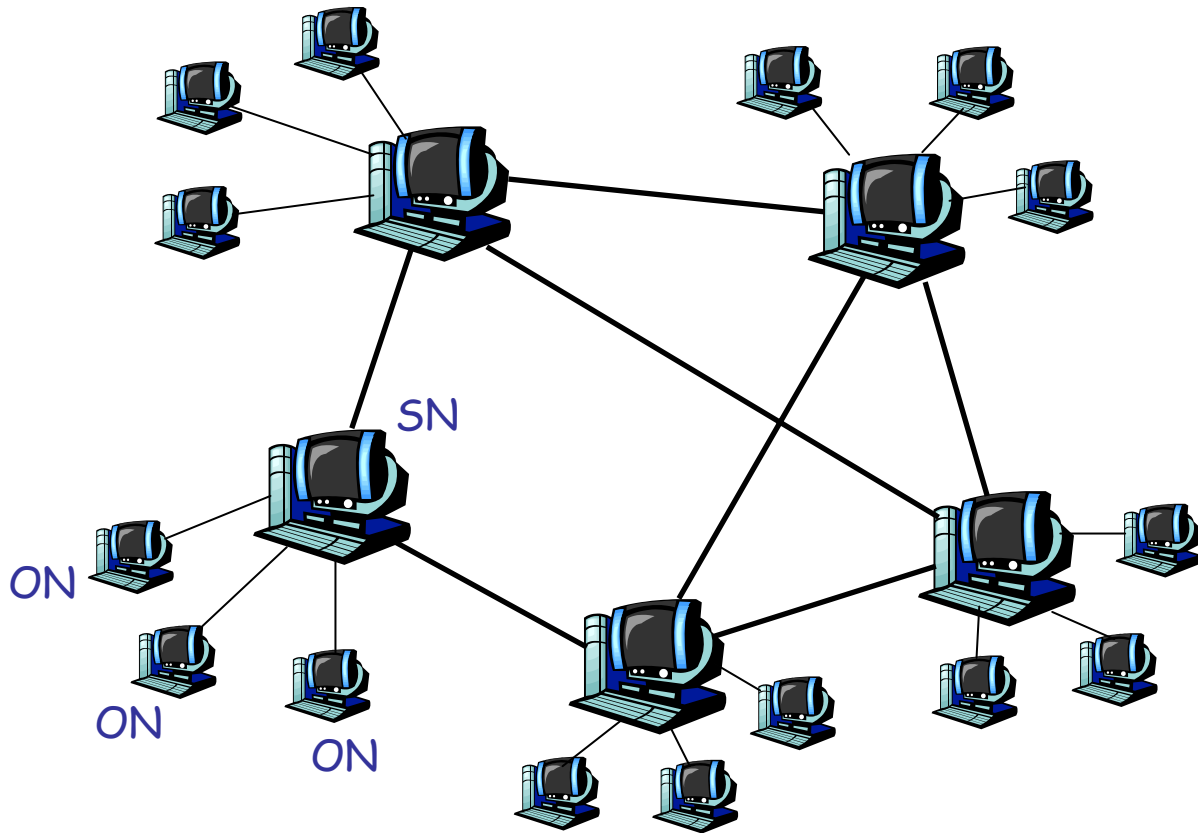
Supports arbitrary file types:

- audio, video, documents, games, software

# FastTrack Overlay

ON =  
ordinary node

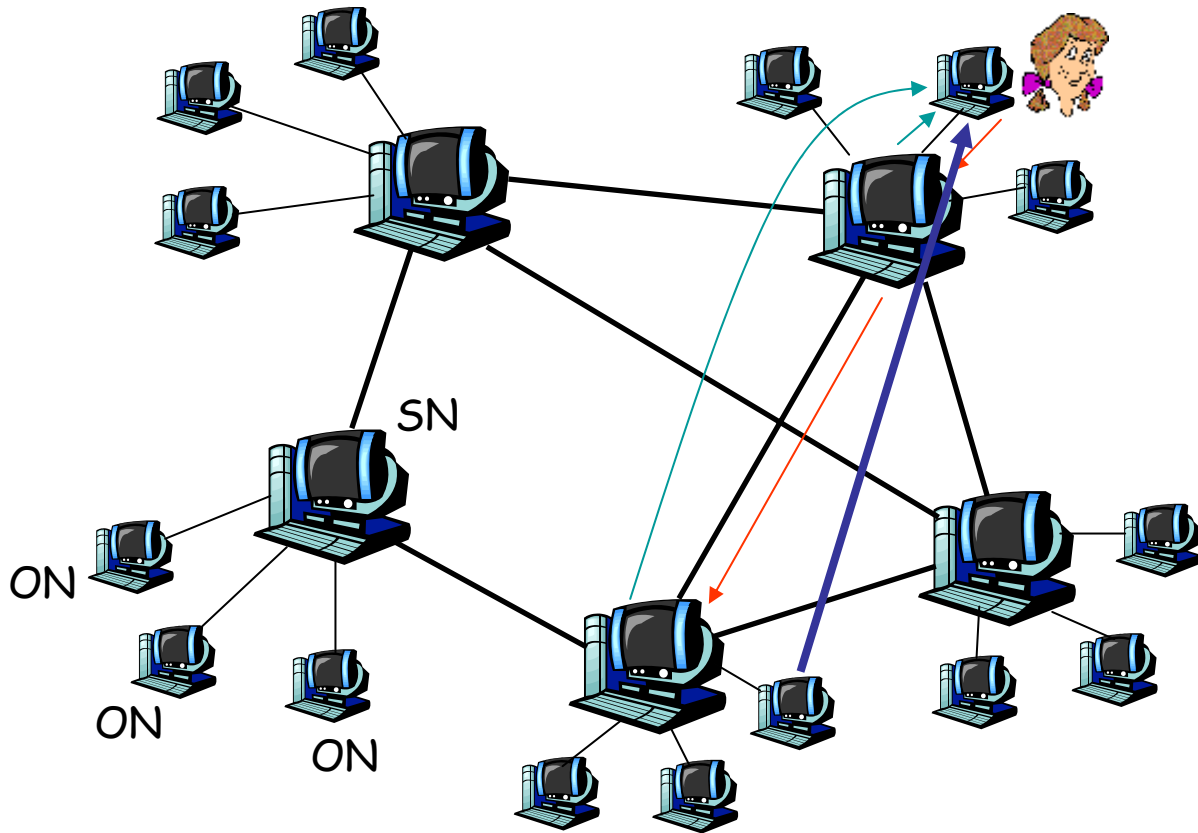
SN =  
super node



# Fast Track Operation

ON =  
ordinary node

SN =  
super node





# What is P2P File Sharing ?

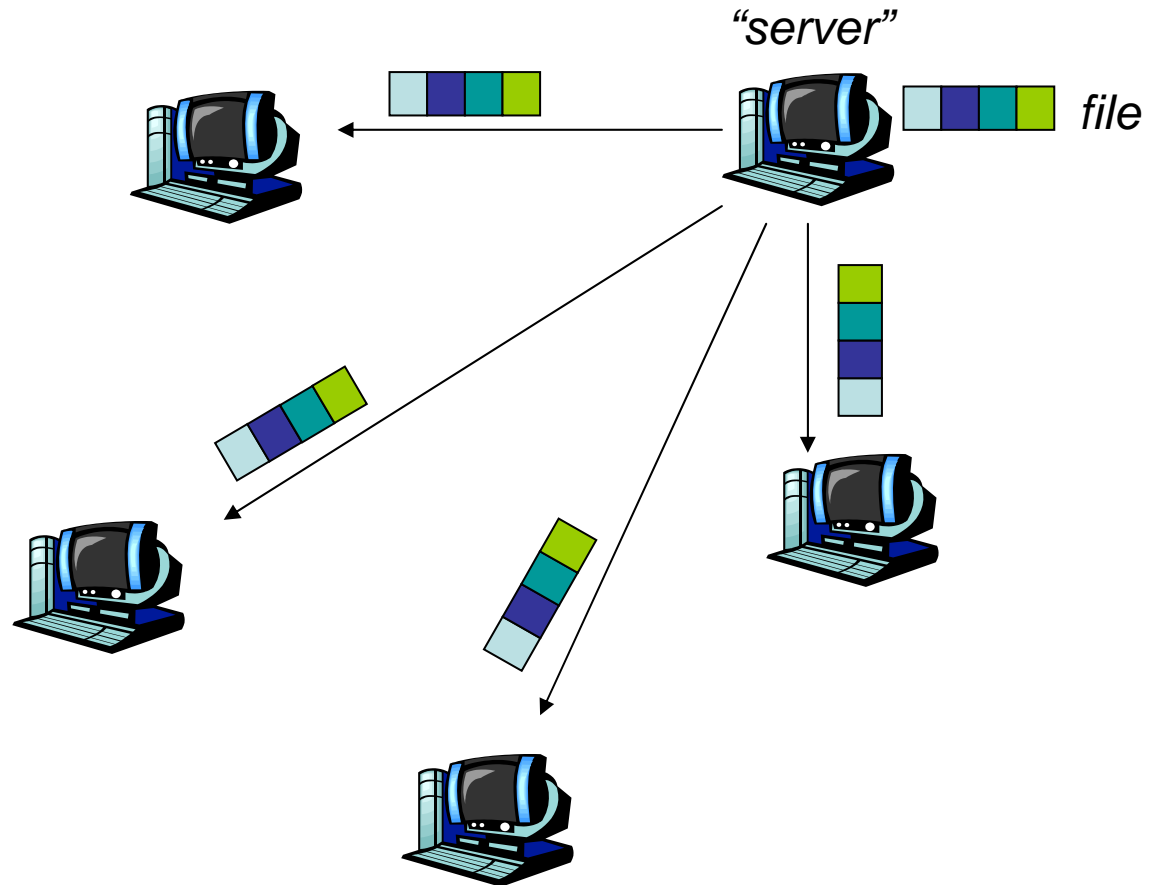
- Distributed software application
  - running in users' computers (peers)
- Allowing a group of users to pool their files
  - distributed pool
- Allowing users in group search the pooled files
  - with keywords
- Allowing users in group to download discovered files
  - from peer to peer

# BitTorrent

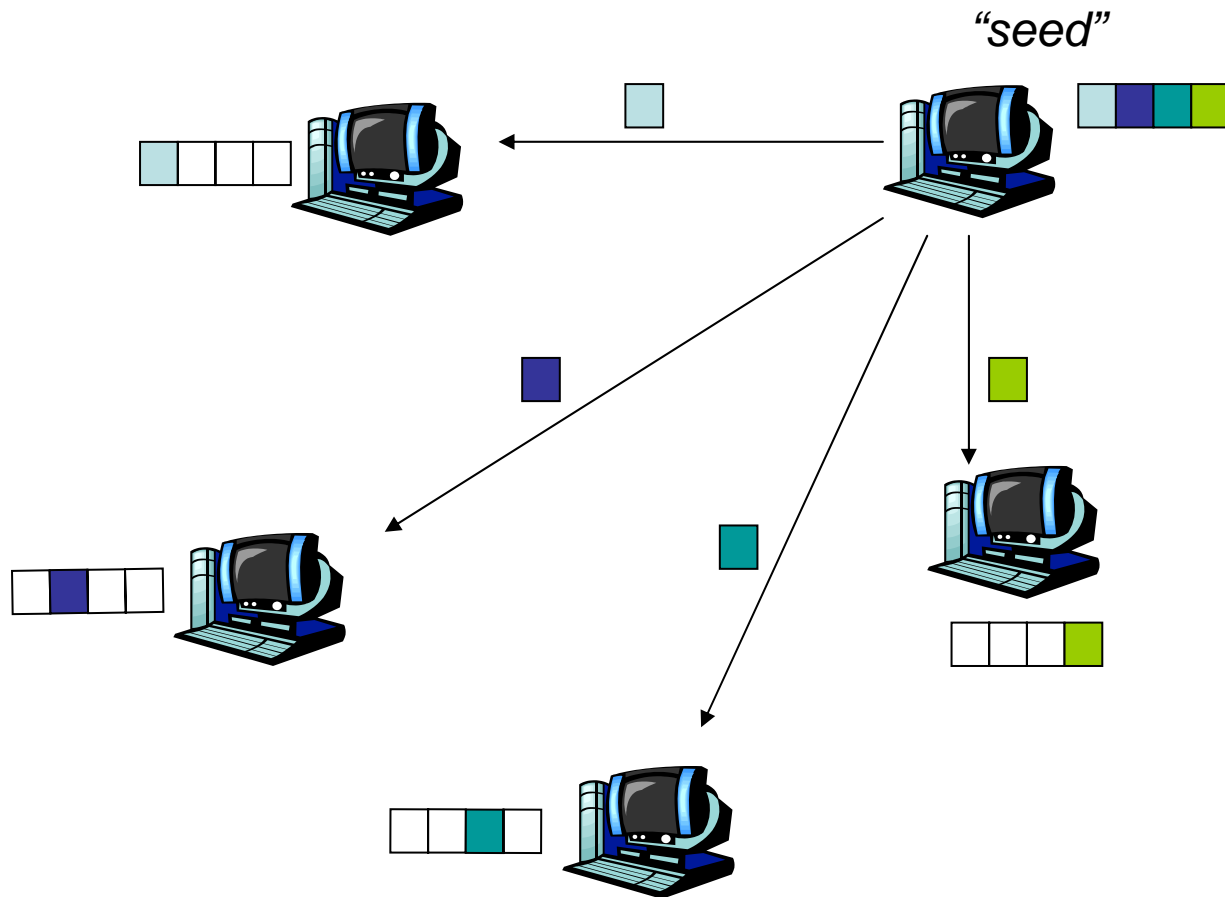
circa now

- Not sharing files
- Instead peers helping one other obtain a particular file

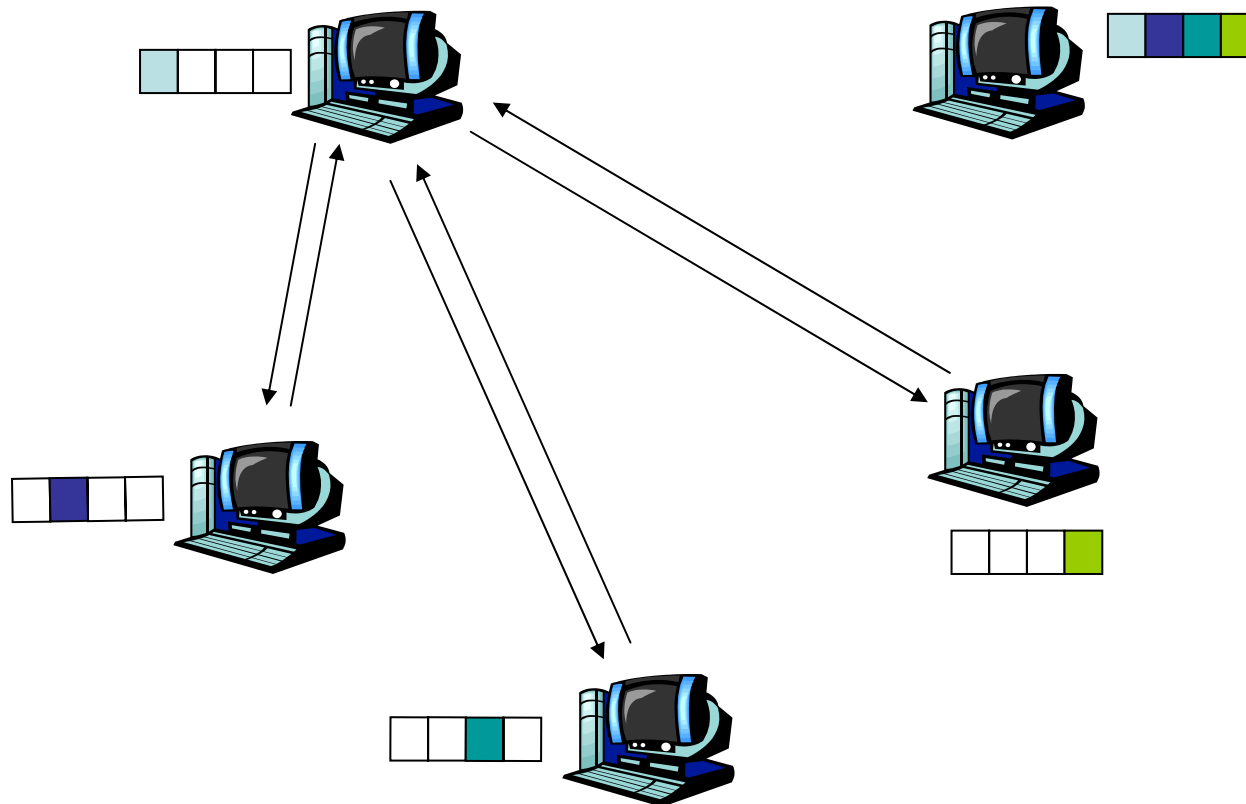
# Client-Server File Distribution



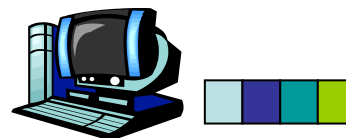
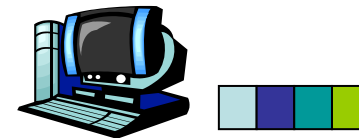
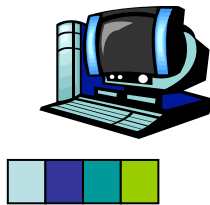
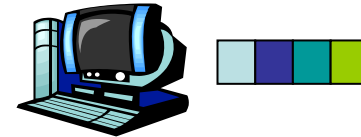
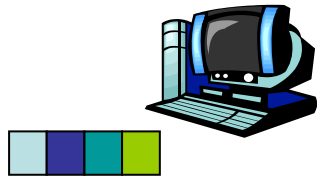
# 1. BT File Distribution



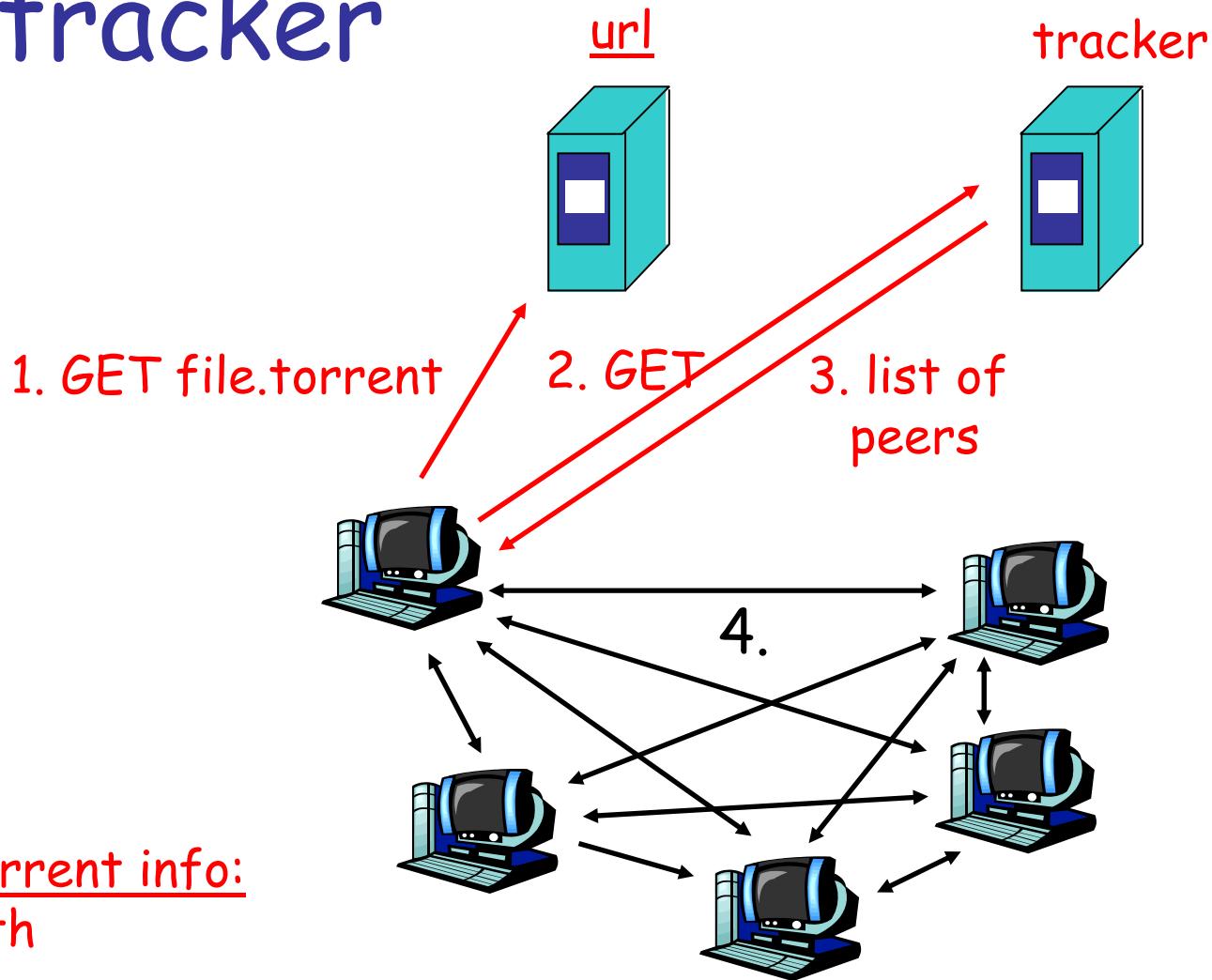
## 2. BT File Distribution



# 3. BT File Distribution



# BT tracker



## file.torrent info:

- length
- name
- hash
- url of tracker

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# SUPRNOVA.org

## UNIVERSAL BIT TORRENT SOURCE

version 2.0a

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# Pollution in P2P File Sharing Systems

J. Liang, R. Kumar, Y. Xi, K.W. Ross, *Pollution in P2P File Sharing Systems*, Proceedings of Infocom 2005, Miami

# Pollution Process

original content

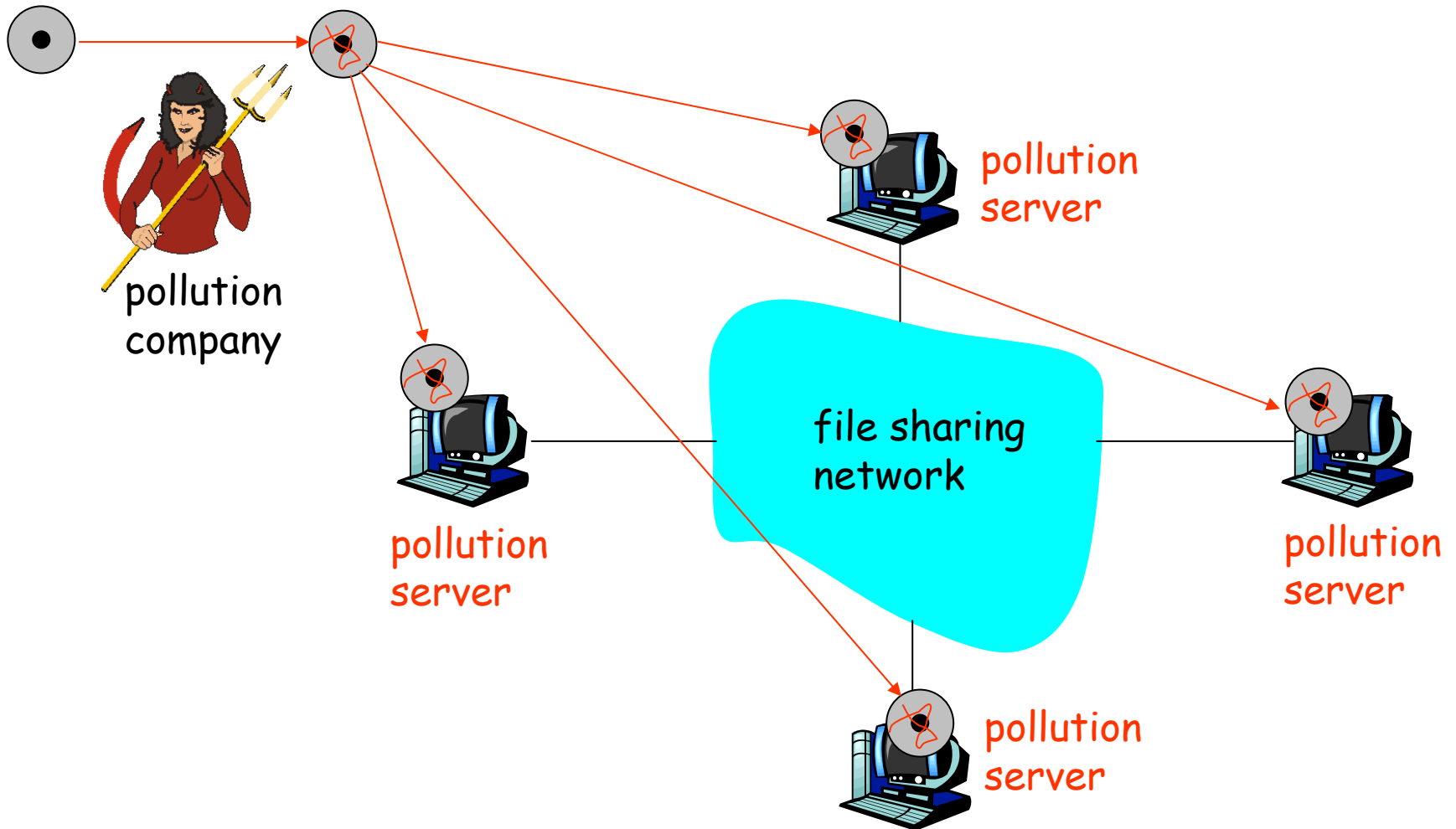


polluted content



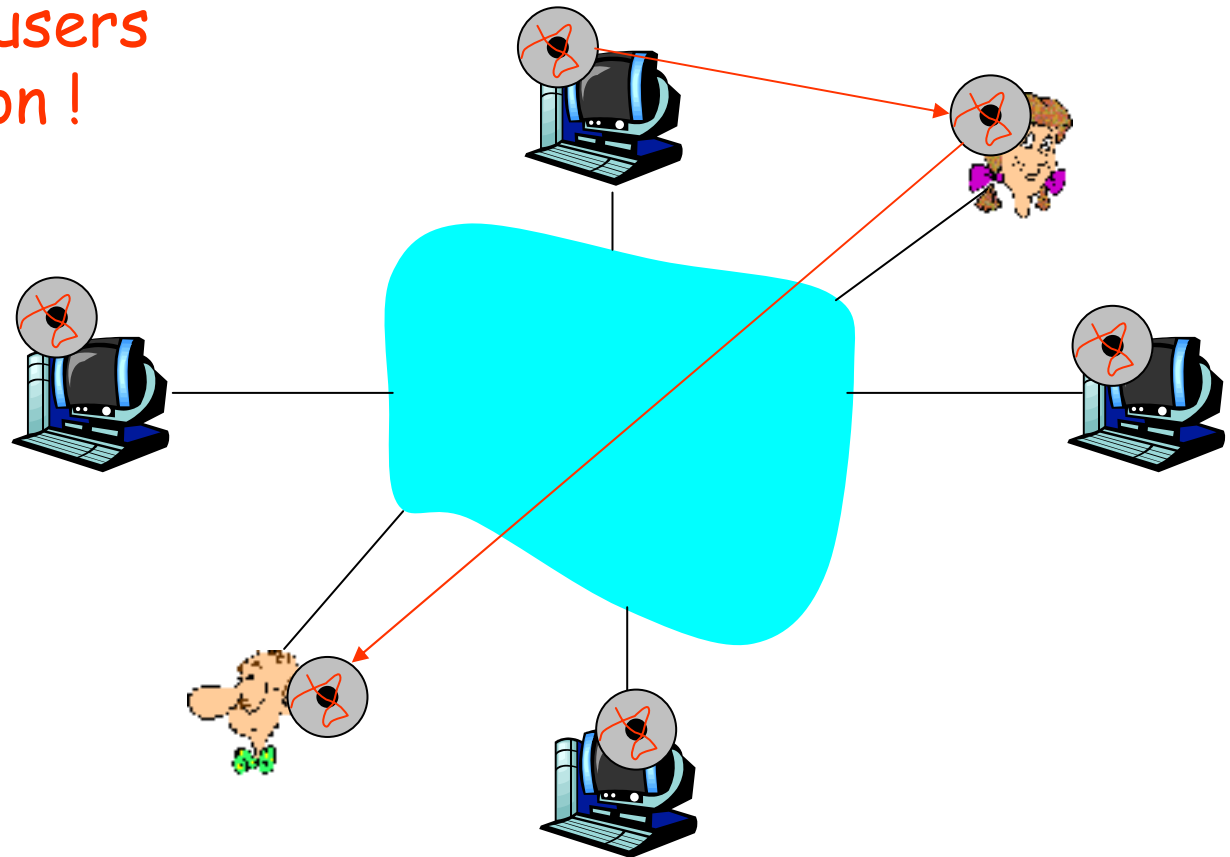
pollution  
company

# Pollution Process



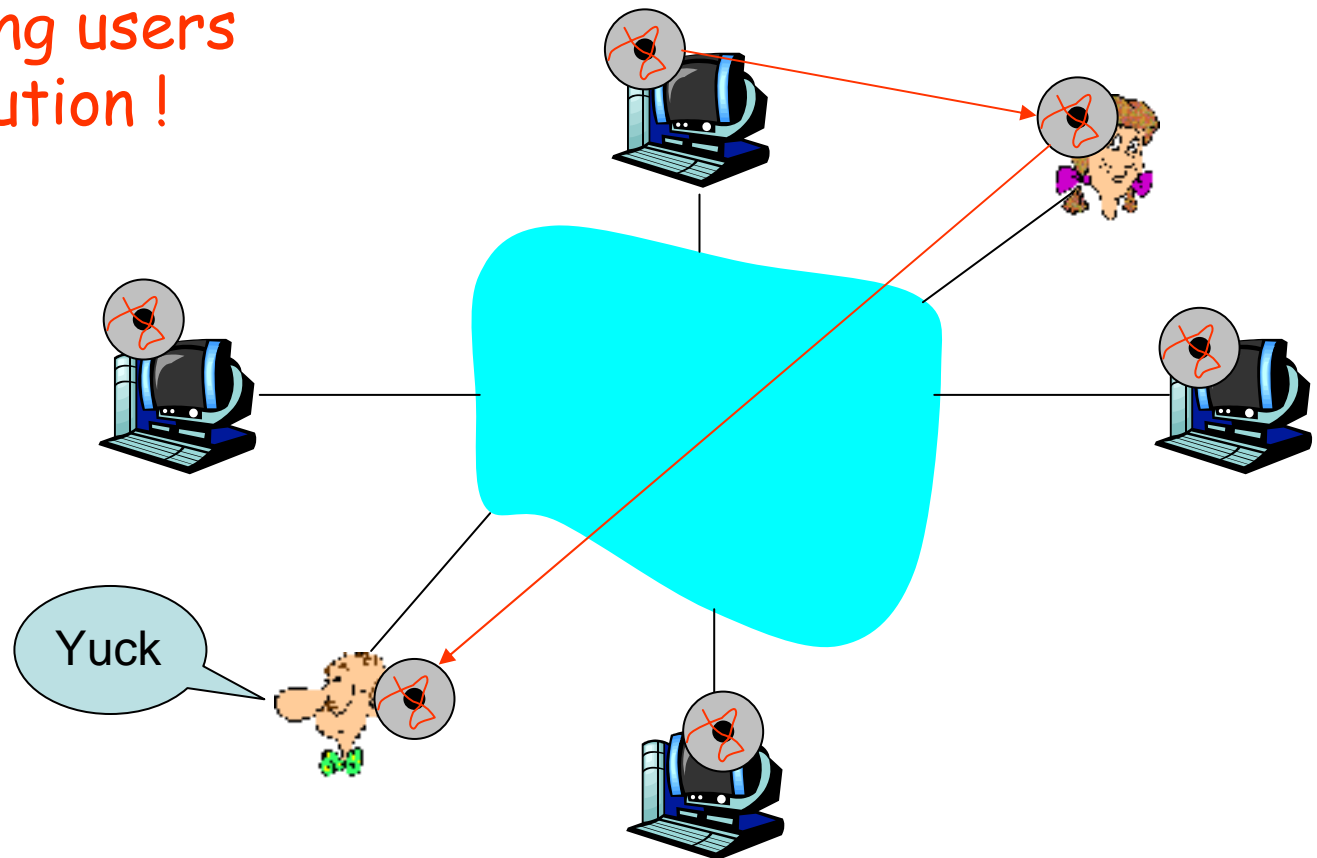
# Pollution Process

Unsuspecting users  
spread pollution !



# Pollution Process

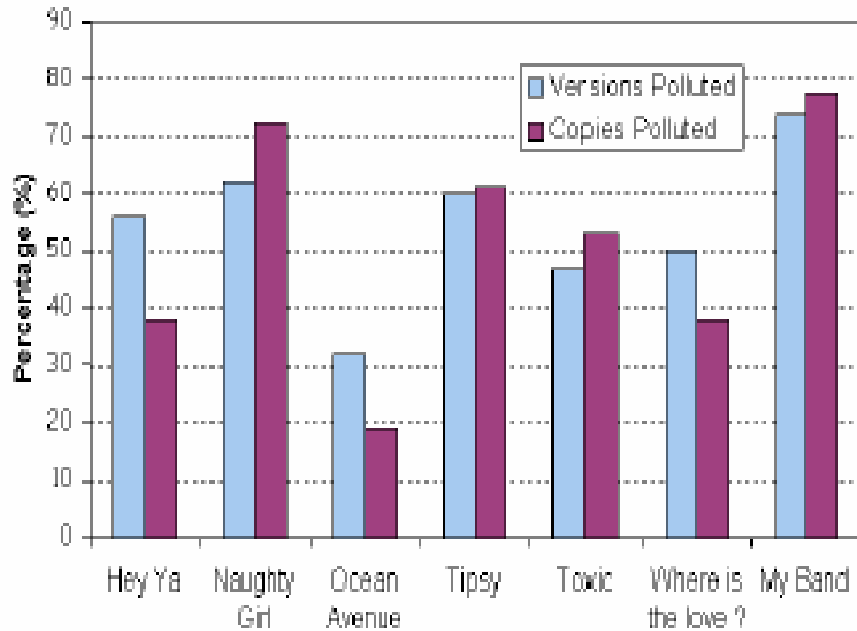
Unsuspecting users  
spread pollution !



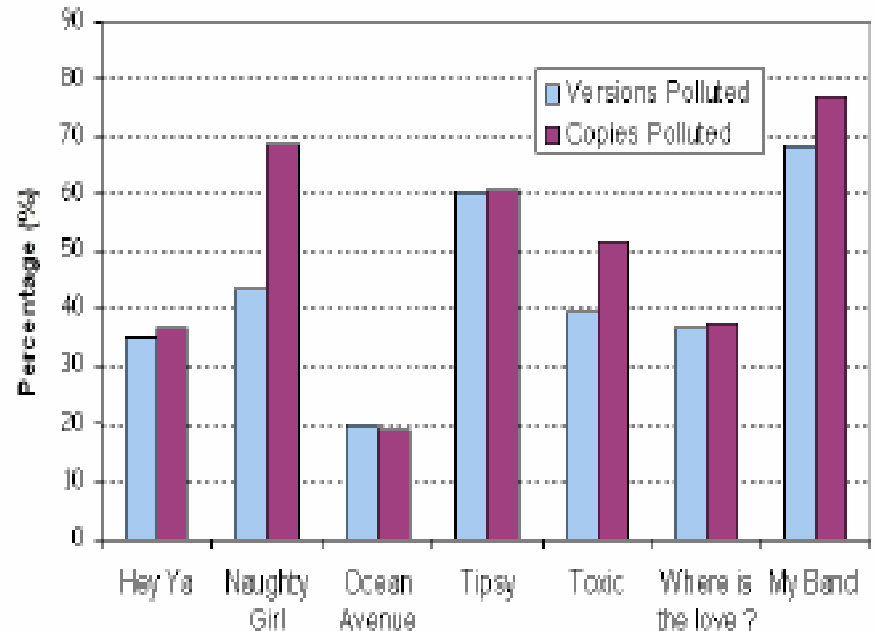
# Results for 7 test songs

<b>SONG TITLE</b>	<b>NUMBER OF VERSIONS</b>	<b>NUMBER OF COPIES</b>	$\alpha$
Naughty Girl	26,715	631,387	0.80672
Ocean Avenue	8,000	174,106	0.80339
Where is the Love ?	48,613	448,987	1.0215
Hey Ya	46,926	734,108	0.86035
Toxic	38,992	650,529	0.86135
Tipsy	32,893	853,688	0.77721
My Band	49,447	1,816,663	0.82019

# Pollution Results



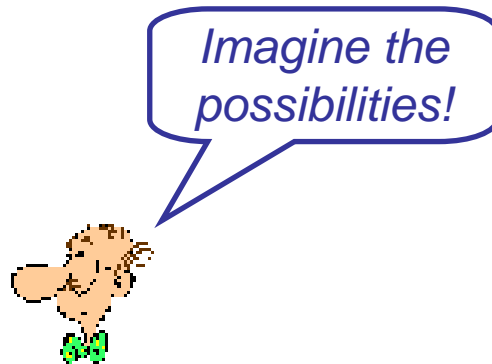
top 100 versions



top 500 versions

# The Untapped Resources

- All those computers in homes & offices
  - With gigabytes of unused storage
  - With gigahertz of unused CPU
  - With megabits/sec of unused bandwidth





# An Observation

- Microsoft could bundle in its next release a P2P application,
- allowing communities of users to form and
  - pool their files
  - search through those files
  - download those files
- But they won't in the current judicial/legislative climate.

# The Untapped Resources



*Imagine the possibilities!*



*File sharing is the first step!*