

P2P File Sharing Technology

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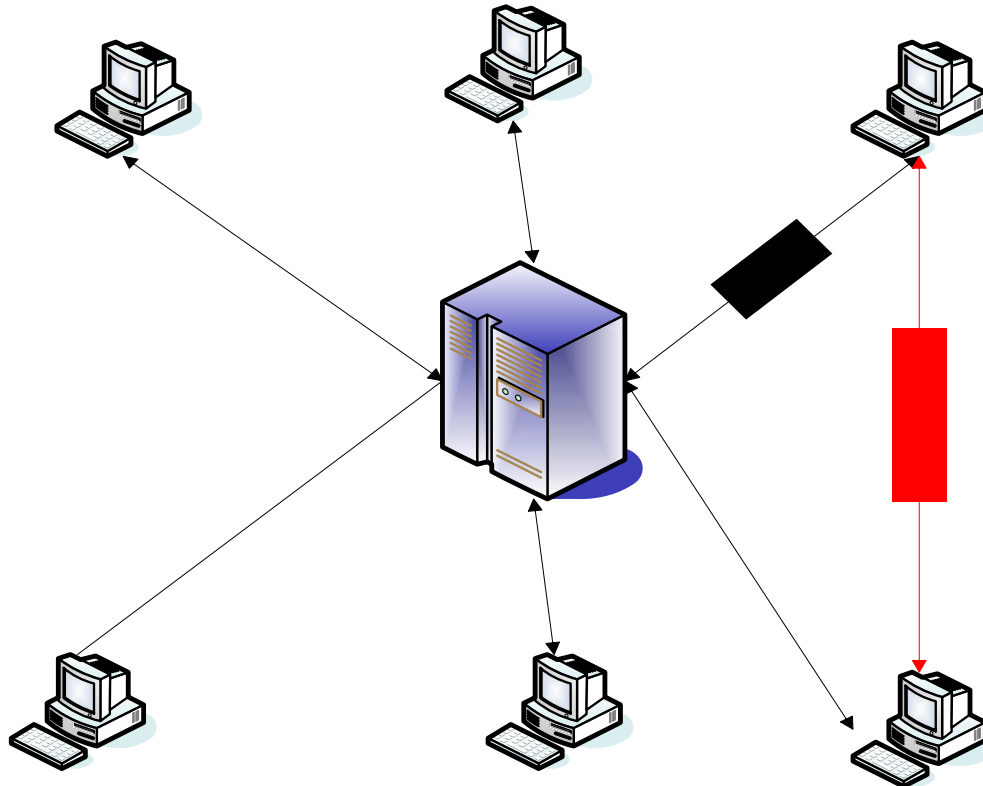
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Outline

- Introduction
- KaZaA
- eDonkey
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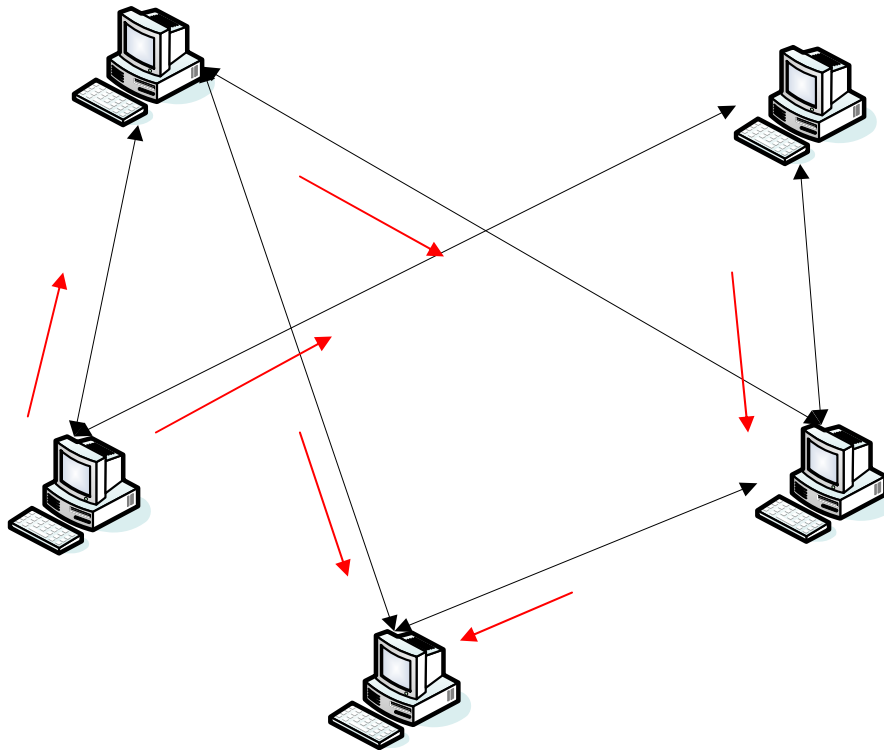
Introduction

- First Generation P2P : Centralized P2P
 - Centralized server(ex : Napster)



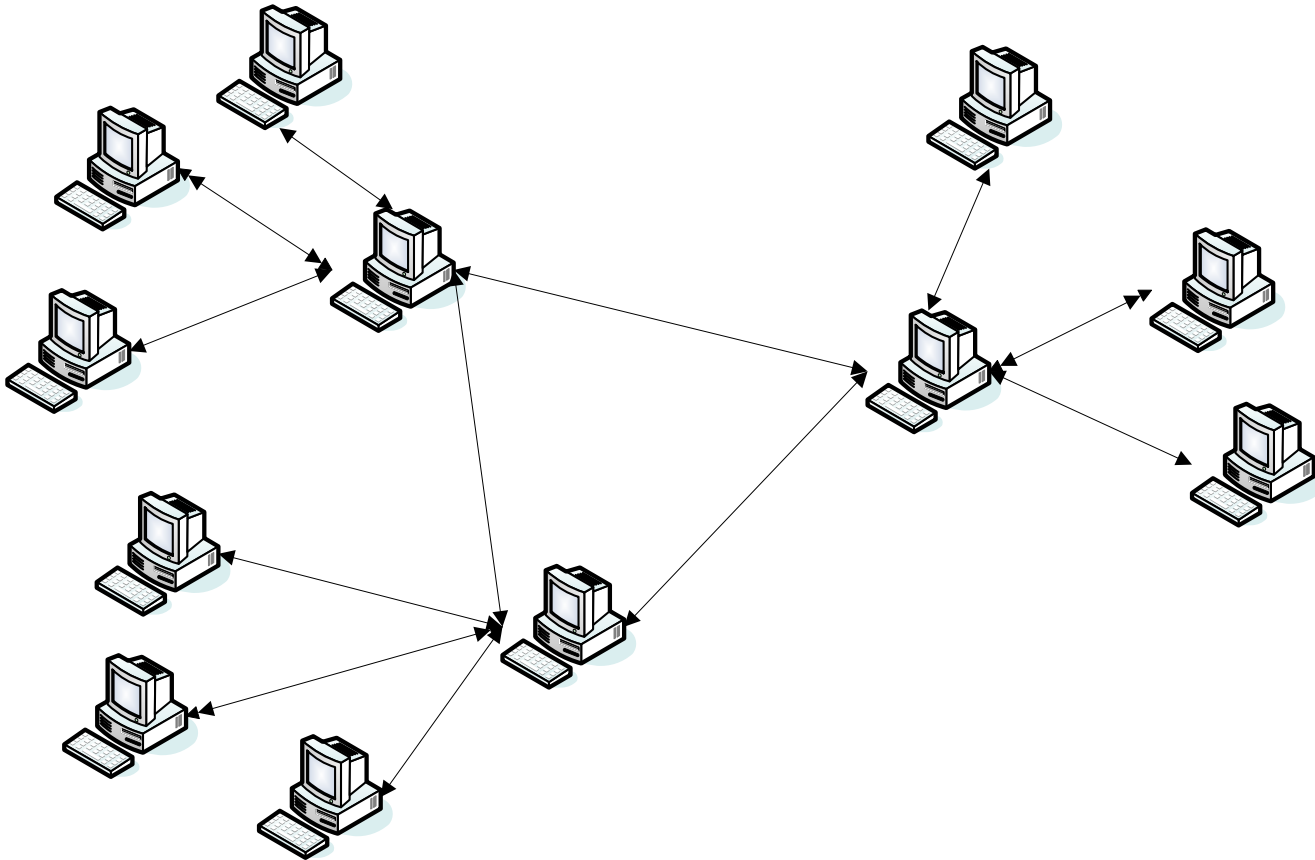
Introduction

- Second Generation P2P : Decentralized P2P
 - All Peers are equal(ex : Gnutella)



Introduction

- Third Generation P2P : Hybrid P2P
 - 1st+2nd generation P2P(ex : KaZaA 、eDonkey)

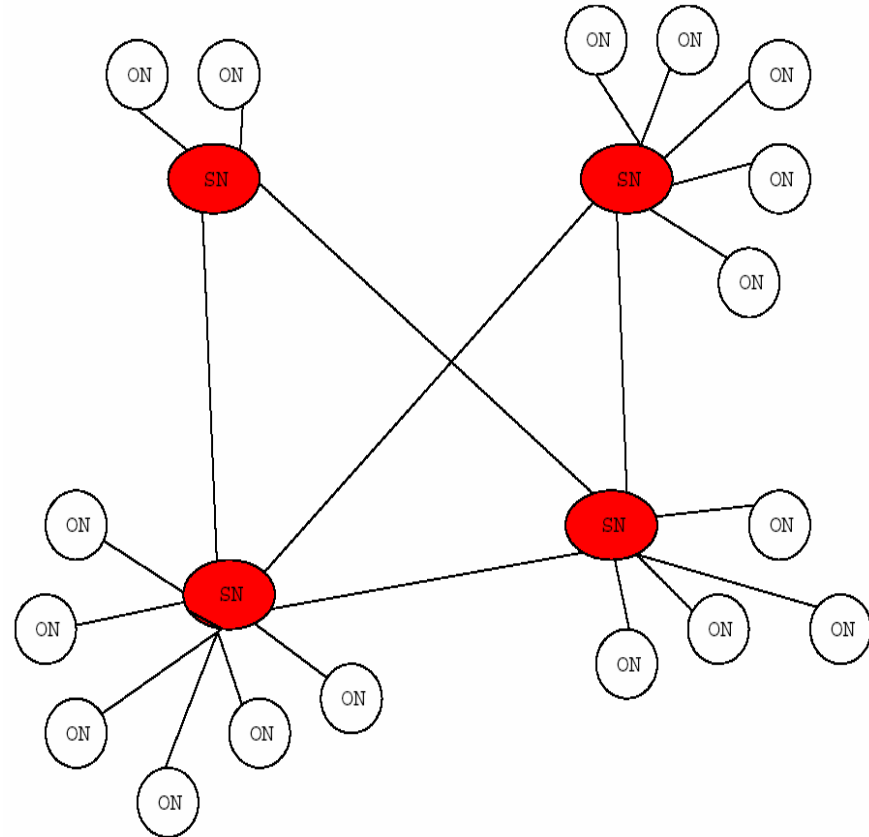


KaZaA

- KazaA uses peer-to-peer technology
- In 2001, KaZaA created by Dutch company Kazaa BV
- Based on FastTrack network
- Averaged 2.48 **million** users a day

KaZaA

- Two-tier hierarchical P2P file sharing system
- Two classes of peers
 - Ordinary Nodes (ONs)
 - Super Nodes (SNs)



KaZaA

- Super Nodes
 - Powerful Nodes
 - Track the content of its children (ONs)
 - Act as a proxy of its children (ONs)

KaZaA

- **Join**

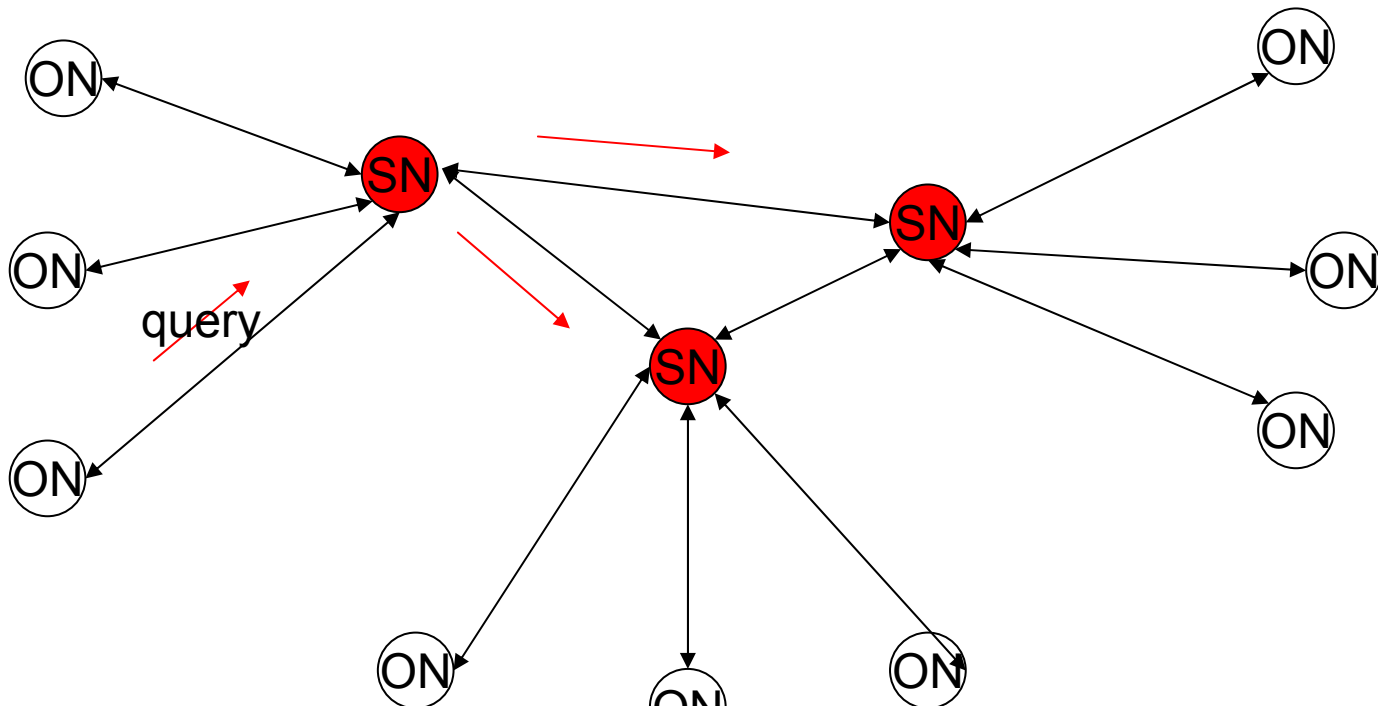
- on startup, client contacts a SN of list to join the network
- send list of files to SN

KaZaA

- ONs keep a list of up 200 SNs whereas SNs appear to maintain lists of thousand of SNs
- When a peer A (ON or SN) receives a supernode list from another peer B, peer A will typically purge some of the entries from its local list and add entries sent by peer B
- SN to ON ratio
 - About 1:100-200
- SN to SN ratio
 - About 1:40-60

KaZaA

- Search
 - ON sends the query to SN
 - SN forwards the query to other SNs



eDonkey

- Sept. 2000: eDonkey2000 is born
- It Uses multiple servers
- averaged 2.54 **million** users a day

eDonkey

- The main features of eDonkey
 - It doesn't rely on a single central server
 - A file can be downloaded from several different peers at once
 - A file can be shared by a peer before it is completely obtained

eDonkey

- eDonkey Server
 - Anyone can become a server (simply need the server application)
 - The eDonkey server operates as an index server for file locations and distributes addresses of other servers (server list) to clients
 - In the eDonkey network no files are transmitted through the server

eDonkey

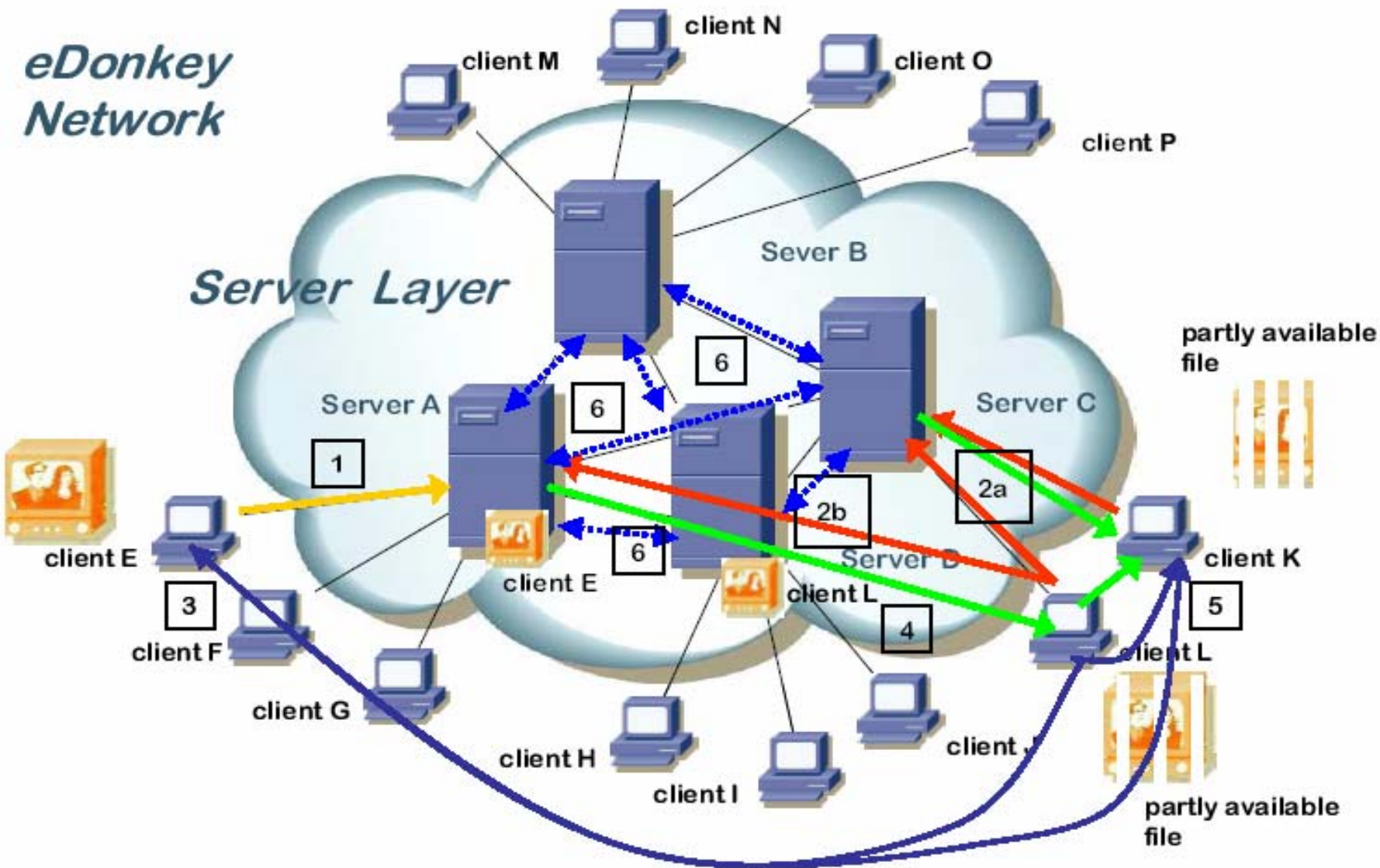
- Joining
 - Choose a server from the list
 - Each server set a limit on the # of users.
 - The client connects to the chosen server
- Leaving
 - Simply disconnect. The server will notice client is not responding and remove the client and client's shared files from its database

eDonkey

- Search
 - The client sends the query to its server
 - The server returns a list of matched files and their locations
 - It can also query the other servers of server list to find more results

eDonkey Network

Server Layer



BitTorrent

- In 2002, B. Cohen debuted BitTorrent
- Focused on Efficient *Fetching*, not *Searching*:
 - Distribute the *same* file to all peers
 - Single publisher, multiple downloaders
- Based on tit-for-tat
 - I'll share with you if you share with me
- Basic elements
 - Peers
 - Seed , downloader
 - Tracker
 - .torrent

BitTorrent

- Peers
 - Seed
 - Complete file
 - Downloader
 - Part of the file

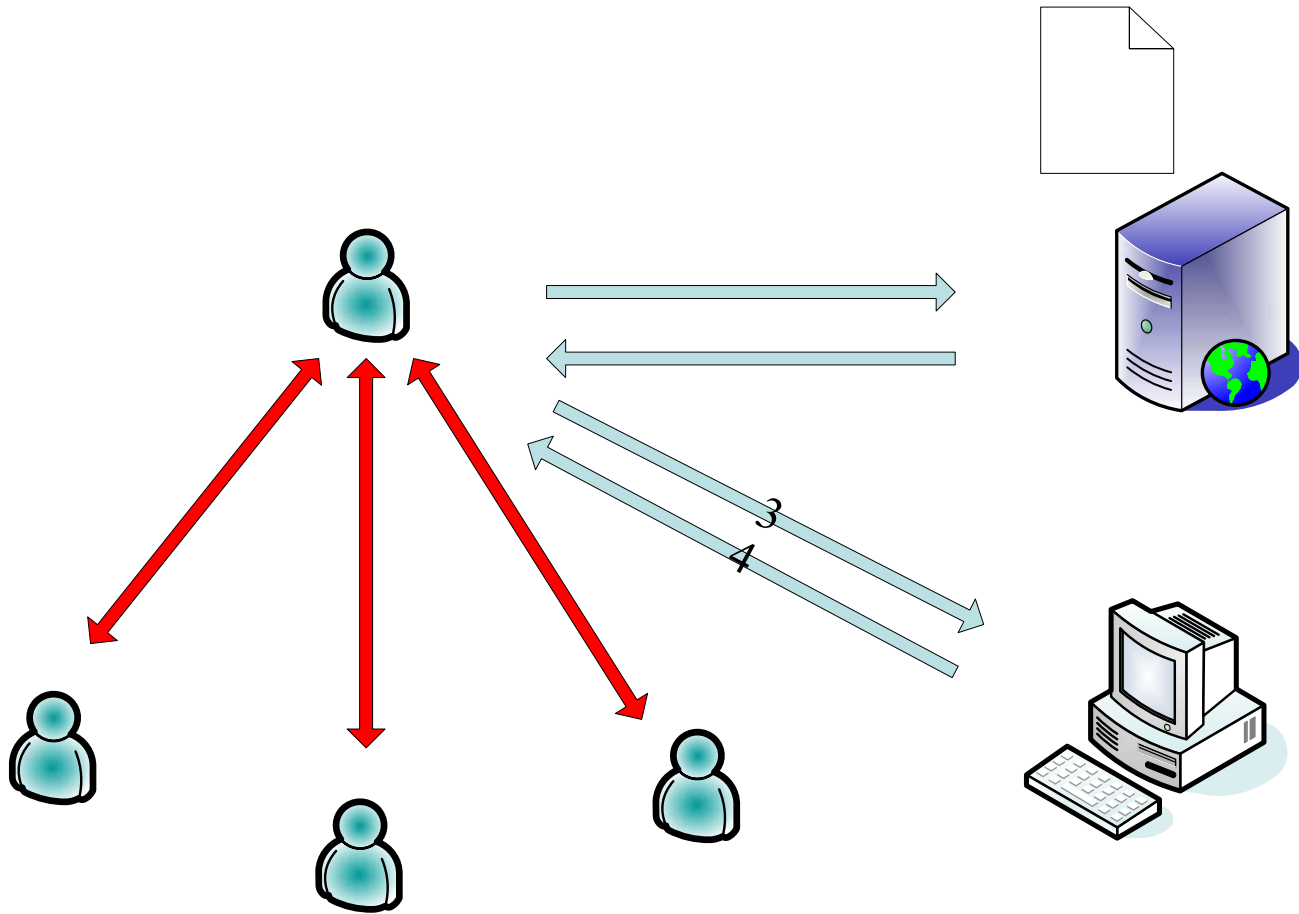
BitTorrent

- Tracker
 - Trackers are responsible for helping peers find each other
- .torrent
 - The .torrent contains information about the file
 - Length
 - Name
 - Hashing information
 - URL of a tracker
 - .torrent is put on an web server

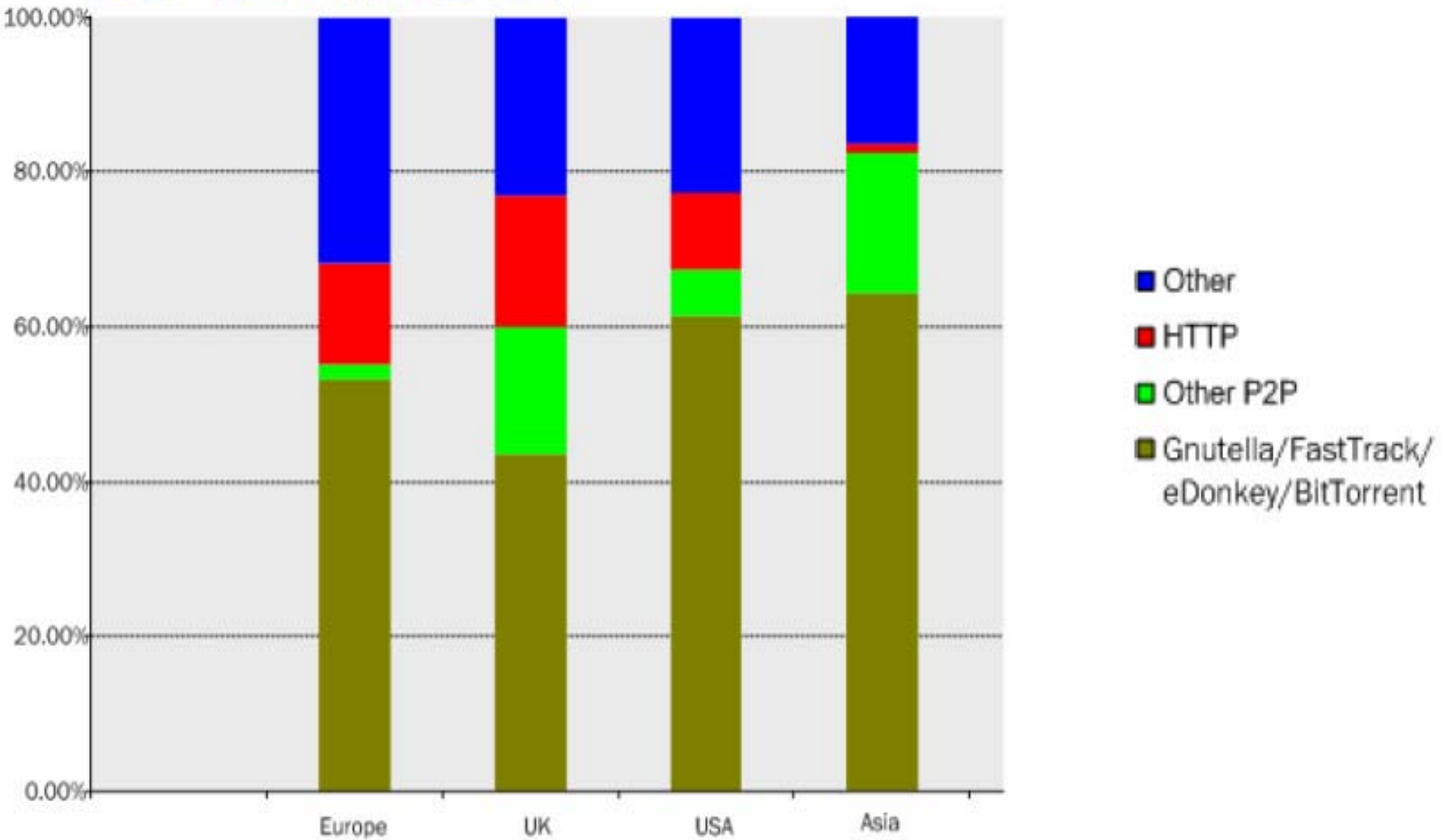
BitTorrent

- To start a BitTorrent deployment, a static file with the extension `.torrent` is put on an ordinary web server
- Peers use the information inside `.torrent` to locate the tracker
- Tracker will tell the client who is downloading the file

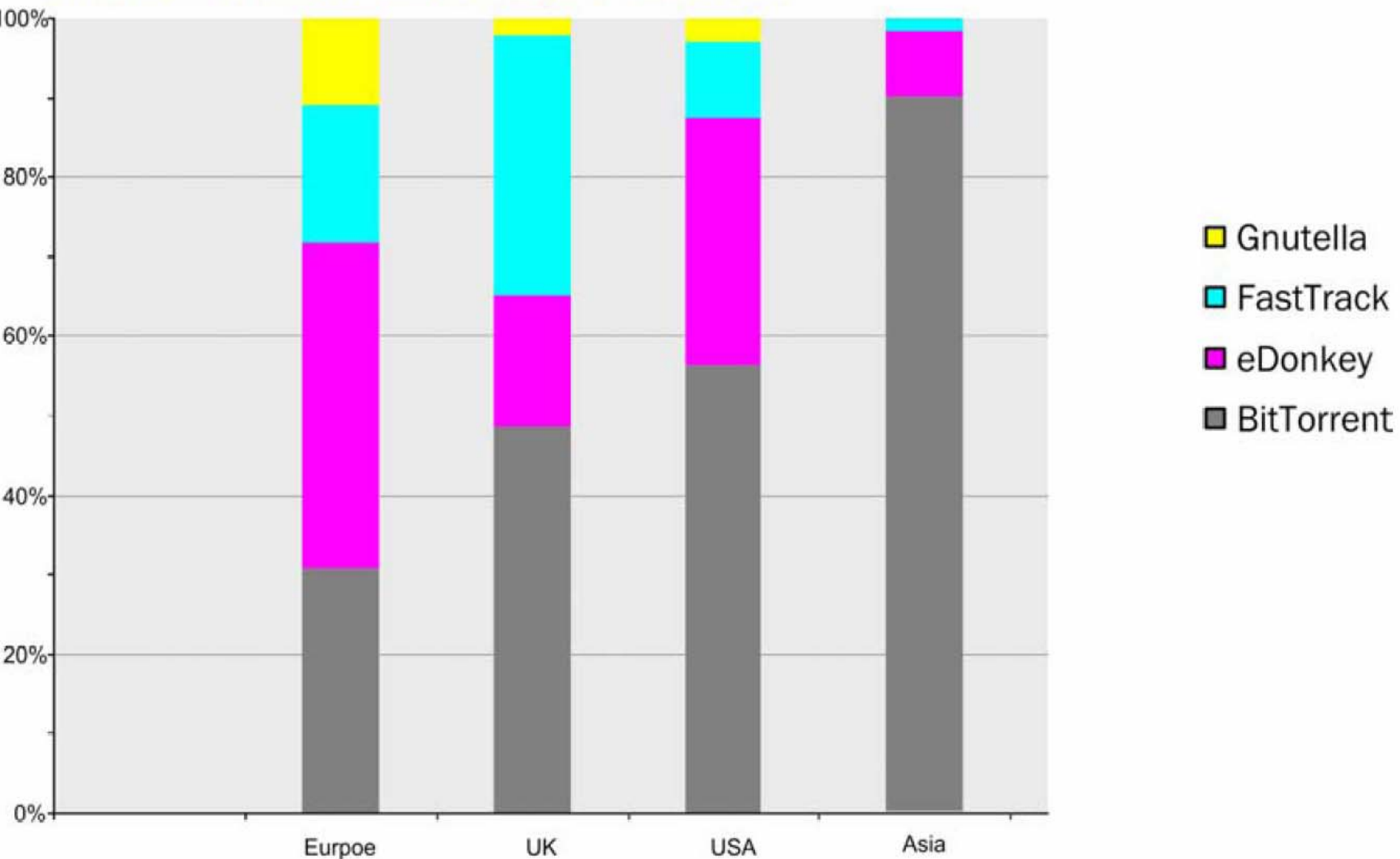
BitTorrent



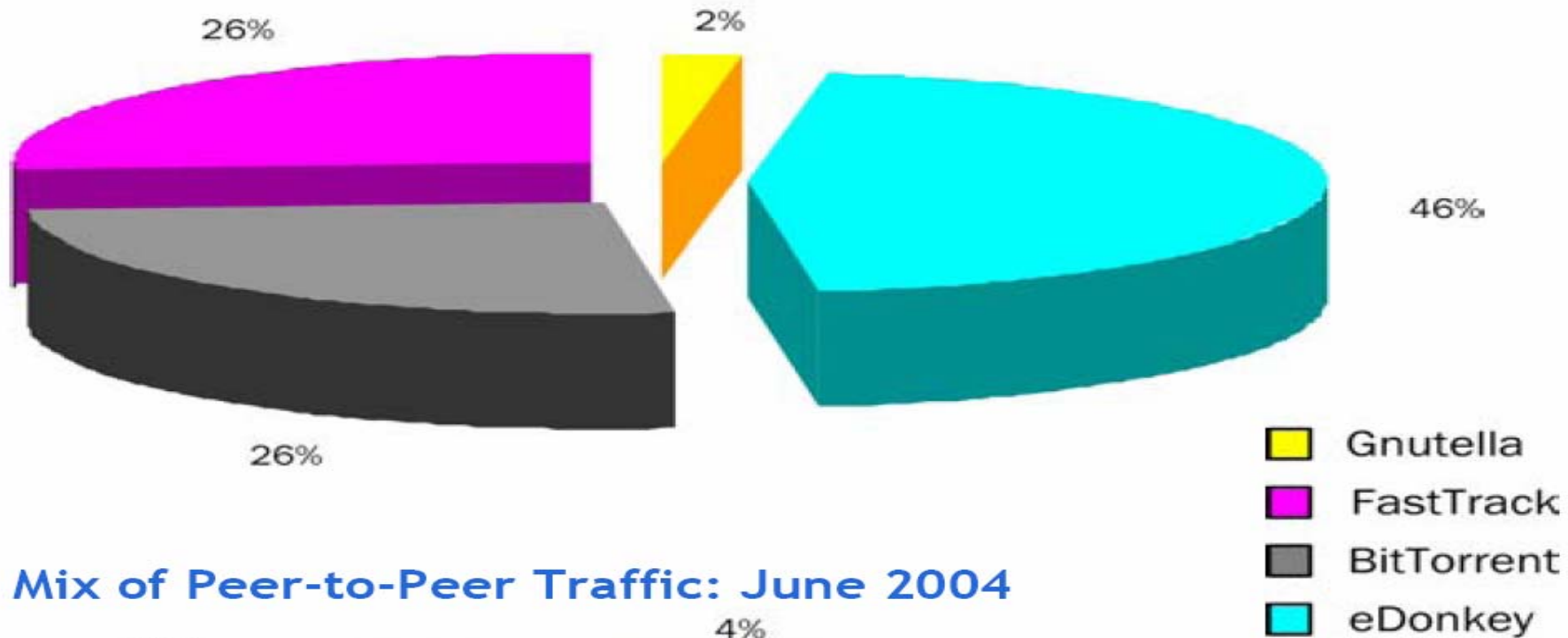
Global Traffic Analysis - June 2004



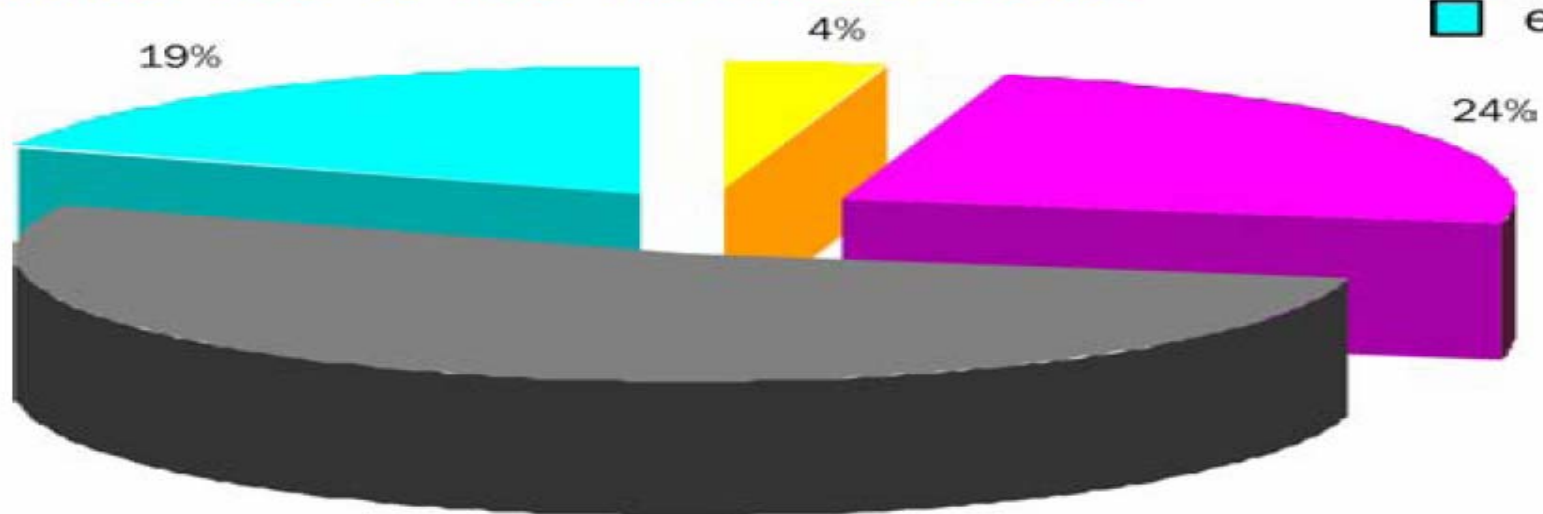
Global Peer-to-Peer Traffic Analysis - June 2004



Mix of Peer-to-Peer Traffic: January 2004



Mix of Peer-to-Peer Traffic: June 2004



References

- KaZaA, <http://www.kazaa.com/>
- BitTorrent, <http://bittorrent.com>
- eDonkey, <http://www.edonkey2000.com/>
- The eMule/eDonkey protocol, <http://www.cs.huji.ac.il/labs/danss/presentations/emule.pdf>
- The True Picture of Peer-to-Peer File sharing, <http://www.cachelogic.com/research/slide1.php>