

Sharing Files on Peer-to-Peer Networks based on Social Network

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Fighting Censorship

Standard peer-to-peer networks are vulnerable

→ Spies can locate content providers

States and Big Companies already have spies

on P2P networks

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States and Big Companies already have spies

on P2P networks

Social networks are less vulnerable to attacks by spies

⇒ peer-to-peer network + social network

⇒ less vulnerable to censorship...

maybe

Peer-to-Peer + Social Network

Each user allows his computer to connect
only to his friends' computers

What can we do with such a network ?

File-Sharing

Three main operations:

Resource discovery: find which resources exist

Resource localization: find which resources are available and where

Resource access: download the resources

File-Sharing

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My main requirement:

- Content providers should remain unknown
- while Links (friends) are not hidden
 - ISP must share such information with spies

Related Work

Restrict unstructured networks to social based networks

[Gnutella](#) Simple flooding (Turtle)

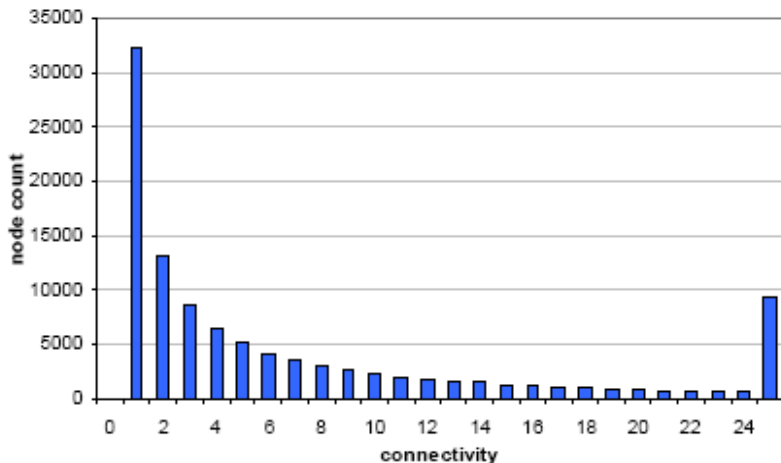
[FreeNet](#) Local Routing with replication

[GnuNet](#) Flooding with probabilistic shortcuts

The Turtle Network

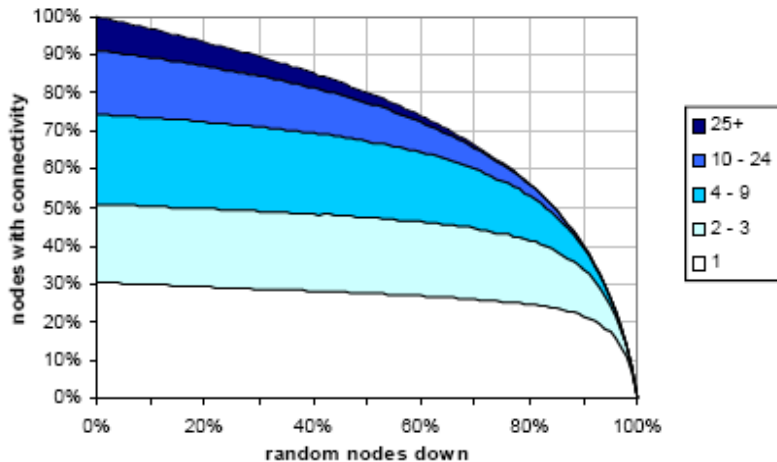
- Gnutella on a Social Network
- Search by flooding the neighbours
 - Tree Structure
 - Reply from leaves to root
- Too expensive in bandwidth
 - But interesting simulations on Orkut

Popularity of Users



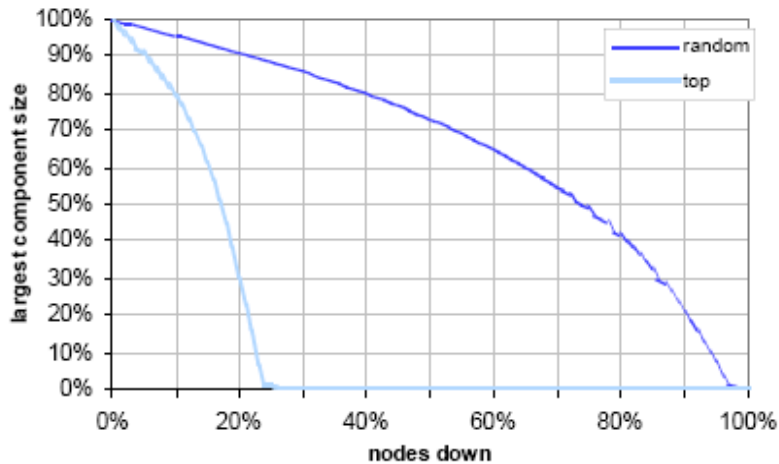
Orkut trace: 106,481 users in 2004

Connectivity

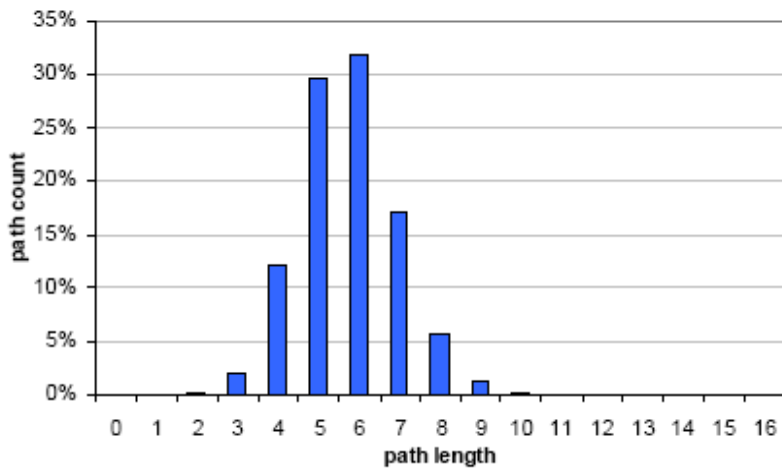


Users linked to the main component

Size of largest Component

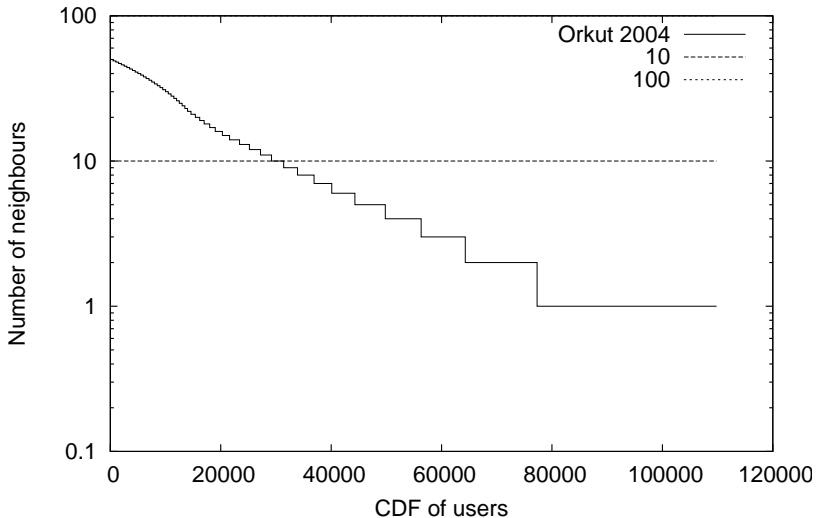


Distribution of Path Lengths



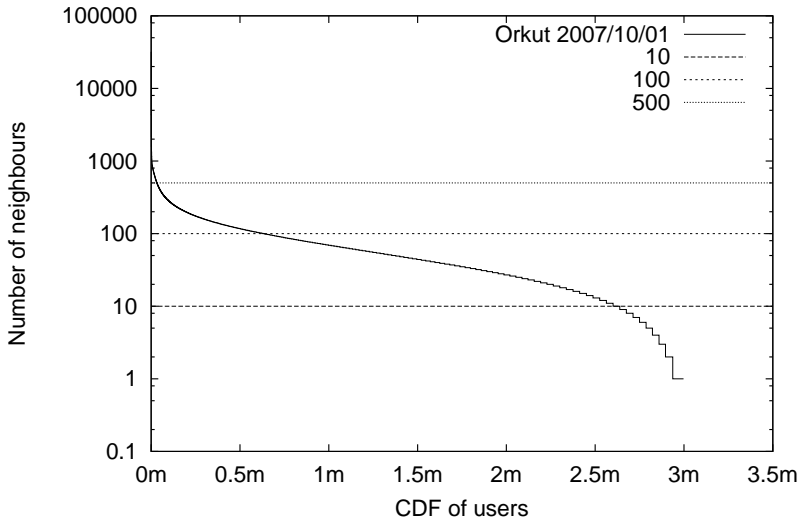
Orkut Crawl (2004)

Users by Popularity



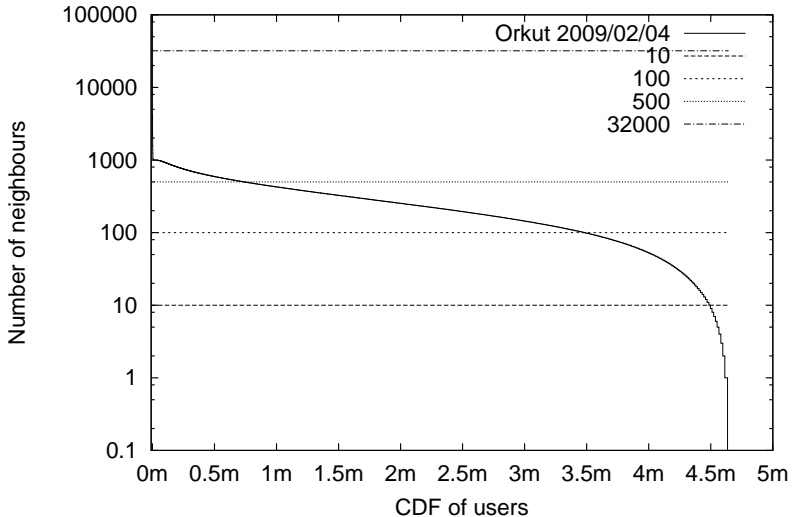
Orkut Crawl (2007)

Users by Popularity



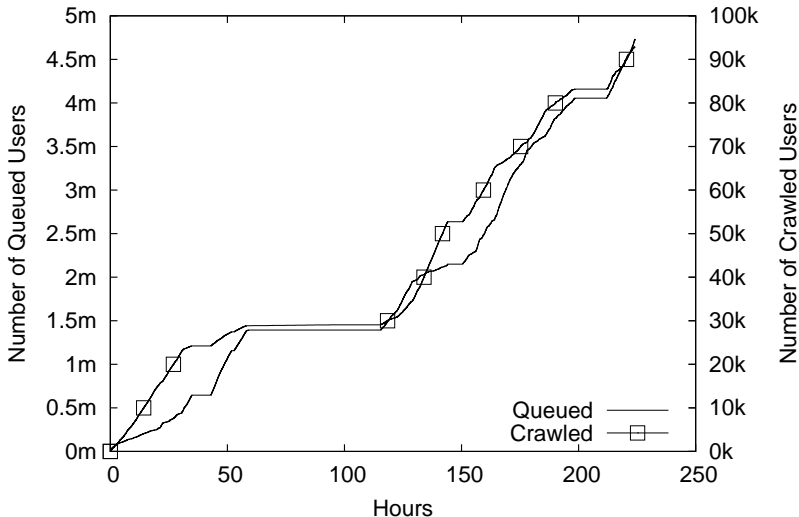
Orkut Crawl (2009)

Users by Popularity



Orkut Crawl (2009)

Crawler Performance



Reliability of Orkut Crawls

Real topology of a social network ?

- First crawl (2004):
crawled users and queued users probably mixed
- Second crawl (2007):
only links between crawled users were kept
- Third crawl (2009):
uses advertized popularity for queued users

FreeNet

Anti-censorship network for small documents

- Can be limited to friends
- Documents are encrypted
- Routing:
 - Depth First Search
 - Closest Neighbour first
- Access:
 - Document Replicated on way back

GnuNet

Same goal as FreeNet, but:

- Routing:
 - Limited-Breadth First Search
 - Shortcut system (not with friends !)
 - Credit System (anti-flooding)
- Optimizations are weaknesses

Can we do better ?

- Designed for small files
- FreeNet and GnuNet:
 - Expect stronger attackers:
 - Traffic analysis
 - Moving connectivity
- Turtle:
 - Unstructured

Queries or Publications

- Current Systems focus on **whole-system queries**
- My position:
 - Try to structure the network
 - Half query/half publication (like DHT...)
 - Whole-system publications
 - File-type optimizations/issues
- New problems:
 - Real network must be a sub-network of social one
 - Use source-coding for efficient big downloads
 - ⇒ Requires replica localization