Bit Torrent

KunYo Lin

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Outline

- BT vs. eMule (demo)
- BT Overview
- BT Algorithm
- BT User behavior
- BT File content
- Conclusion & Future work
- Reference

BT vs. eMule (demo)

- Software
  - BitComet 0.56
  - eMule v0.44d

BT Overview(1)

- BT purpose
  - Figure out Which peers have what parts of the file & where they should be sent
  - Fairness
  - Keep download rate from being zero

BT Overview(2)

- BT character
  - Seeders – who have whole file
    - Publisher
    - Leechers →Seeders
  - Leechers – who have partial file
  - Tracker – tell them where to find each other

BT Overview(3)

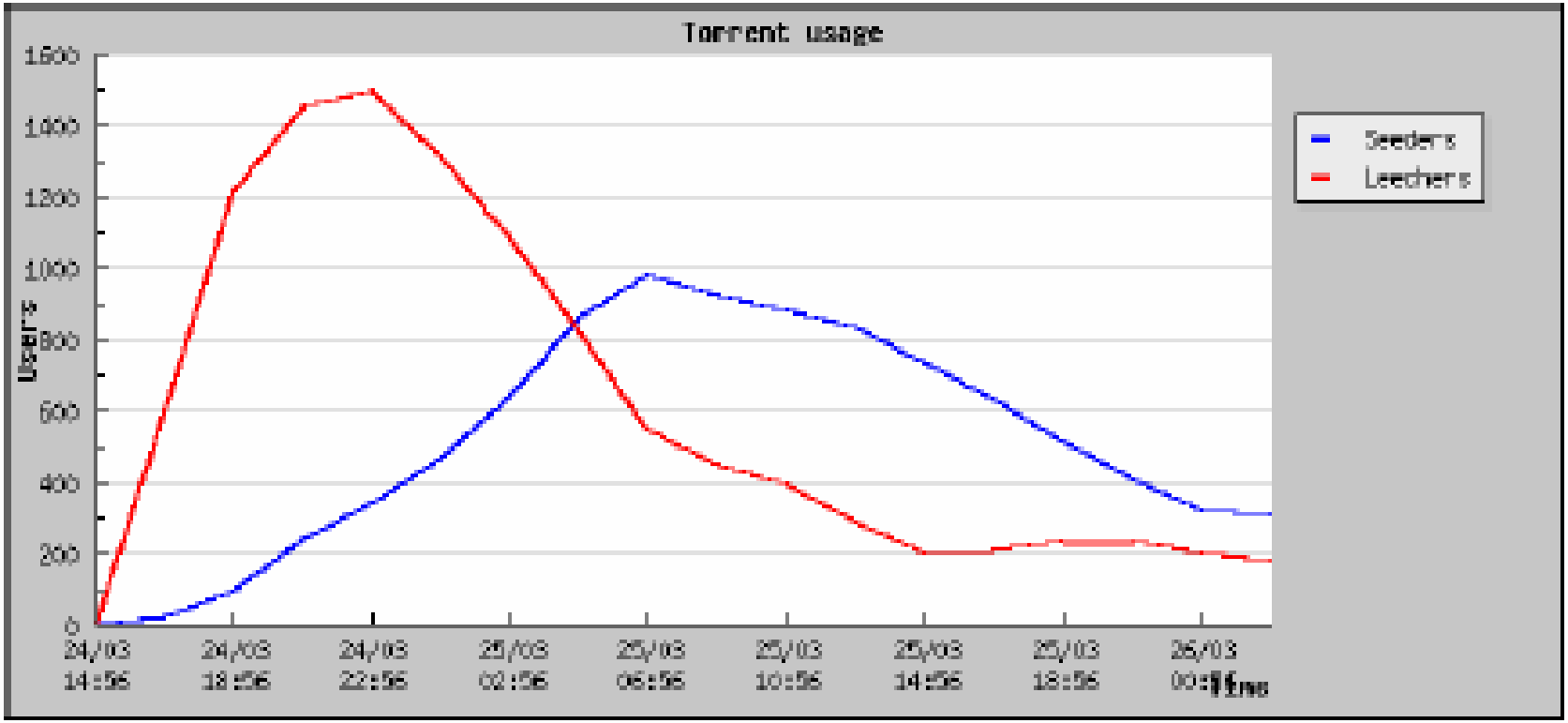
- Tracker's Algorithm
  - Which peer to choose?
    - Random Selection nice
- What tracker to use? (Still a Problem)
  - User decision
  - Software default (Demo)
  - Consider Robust , Distance

BT Overview(4)

- What Information Tracker keep ?
  - Show My Tracker (Demo)
    - Why use BT?
    - Publisher / Downloader
  - Show Information
    - http://bt.21dx.com:8000/
    - BitComet

BT Overview(5)

- Seeders vs. Leechers (2 days)



BT Algorithm(1)

- Cut Files into pieces
  - 128KB , 256KB(Default) , 512KB ,1MB
- Cut Pieces into sub-pieces
  - 16KB
- Pipeline
  - Always keep 5 sub-pieces requests

BT Algorithm(2)

- Piece Selection(1)
  - Strict Priority
    - Sub-pieces at same piece will be required first
    - To get complete pieces as quickly as possible
  - Rarest First
    - Seeder must upload All pieces
    - Different downloader get different pieces
    - Redundant less, Seeder cost down, performance better

BT Algorithm(3)

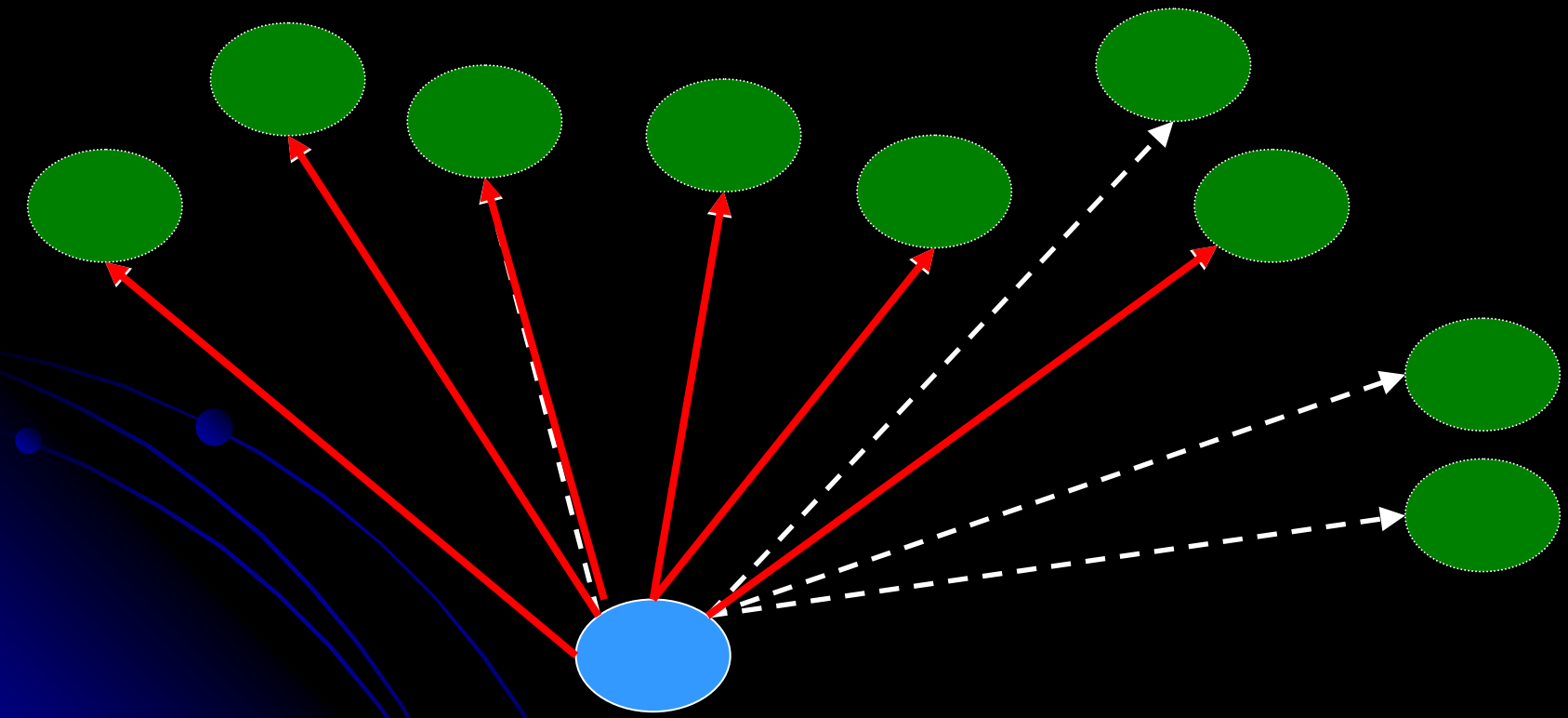
- Piece Selection (2)
  - Random First Piece
    - At first, no sub-piece was already downloaded
  - Endgame Mode
    - Sometimes a piece download rate is slow
    - Send requests for all sub-pieces to all peers
    - When arrived, Send Cancels

BT Algorithm(4)

- How to tit-for-tat
  - Choking Algorithms
    - Choking is a temporary refusal to upload; It stops uploading, but downloading can still happen. And the connection doesn't need to be renegotiated when choking stops.
  - BT's Choking Algorithm
    - Peers reciprocate uploading to peers which upload to themselves (transfer both direction)
    - Always un-chokes 4 peers;
    - Current download rate → which peers to un-choke
    - 10 Seconds recalculate (compare with foregoing)

BT Algorithm(5)

- BT's Choking Algorithm (10Sec)



BT Algorithm(6)

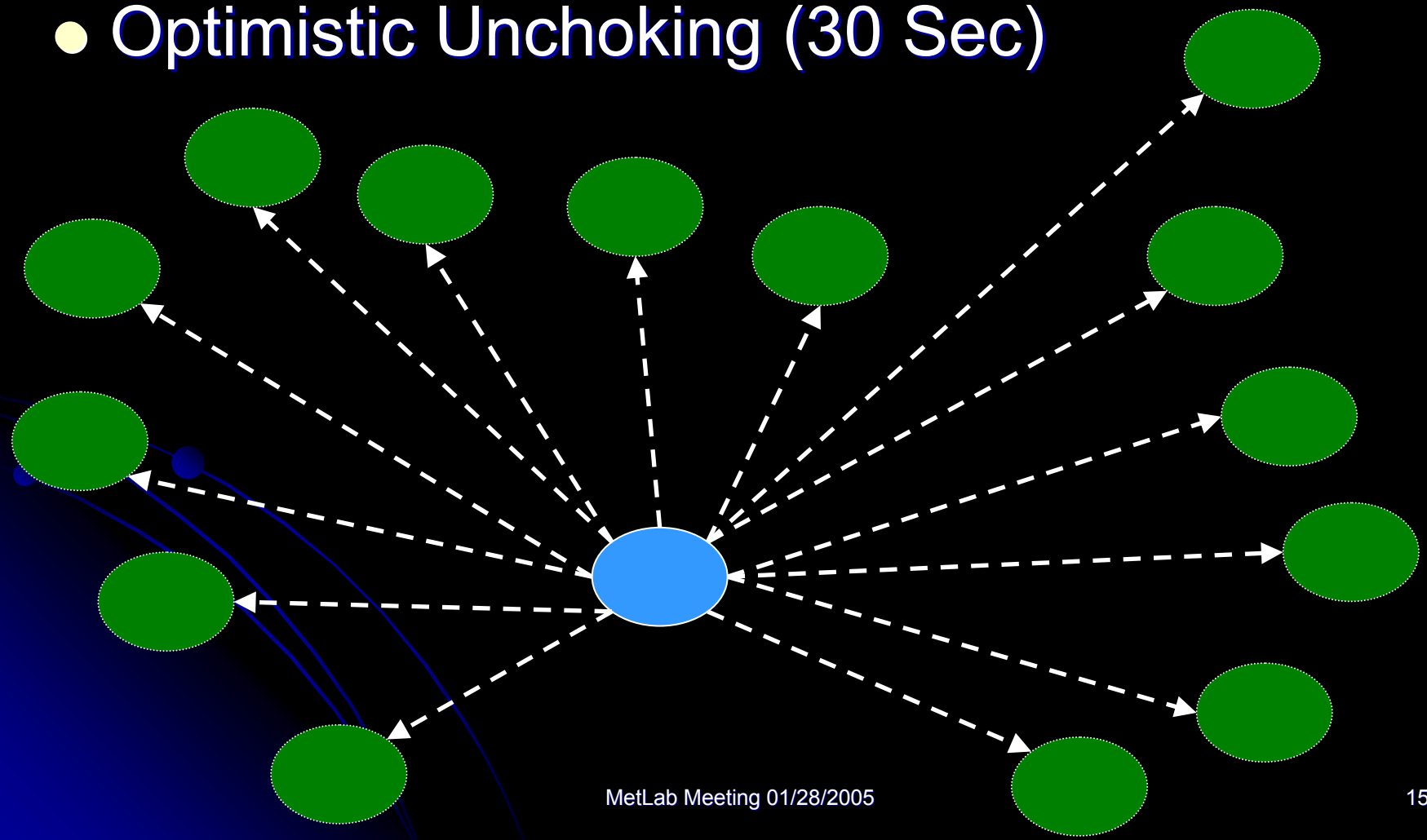
- Optimistic Unchoking
  - Every 30 Seconds, do Optimistic Unchoking
  - For unconnected peers
  - Push to Choose Cooperation at first Move in prisoner's dilemma

A \ B	X	O
X	(-1,-1)	(4,-2)
O	(-2,4)	(3,3)

(A,B)

BT Algorithm(7)

- Optimistic Unchoking (30 Sec)

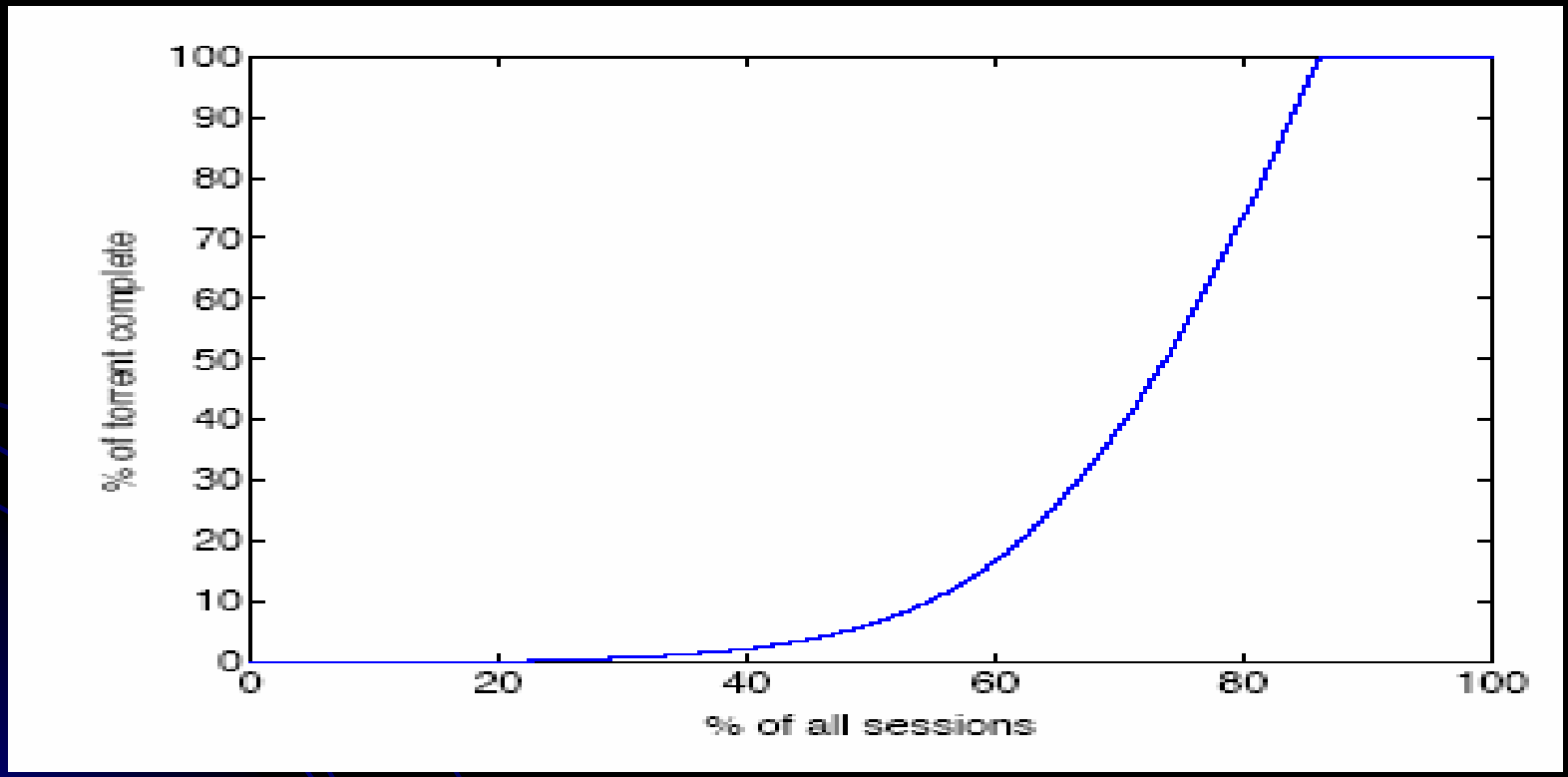


BT Algorithm(8)

- 2 Exceptions
  - Become to Seeder
    - Consider Upload rate to decide which to upload
  - Be choked by All peers
    - 60 seconds→ declare himself "snubbed"
    - Does "Optimistic Unchoking"
  - (Review BT vs. eMule)

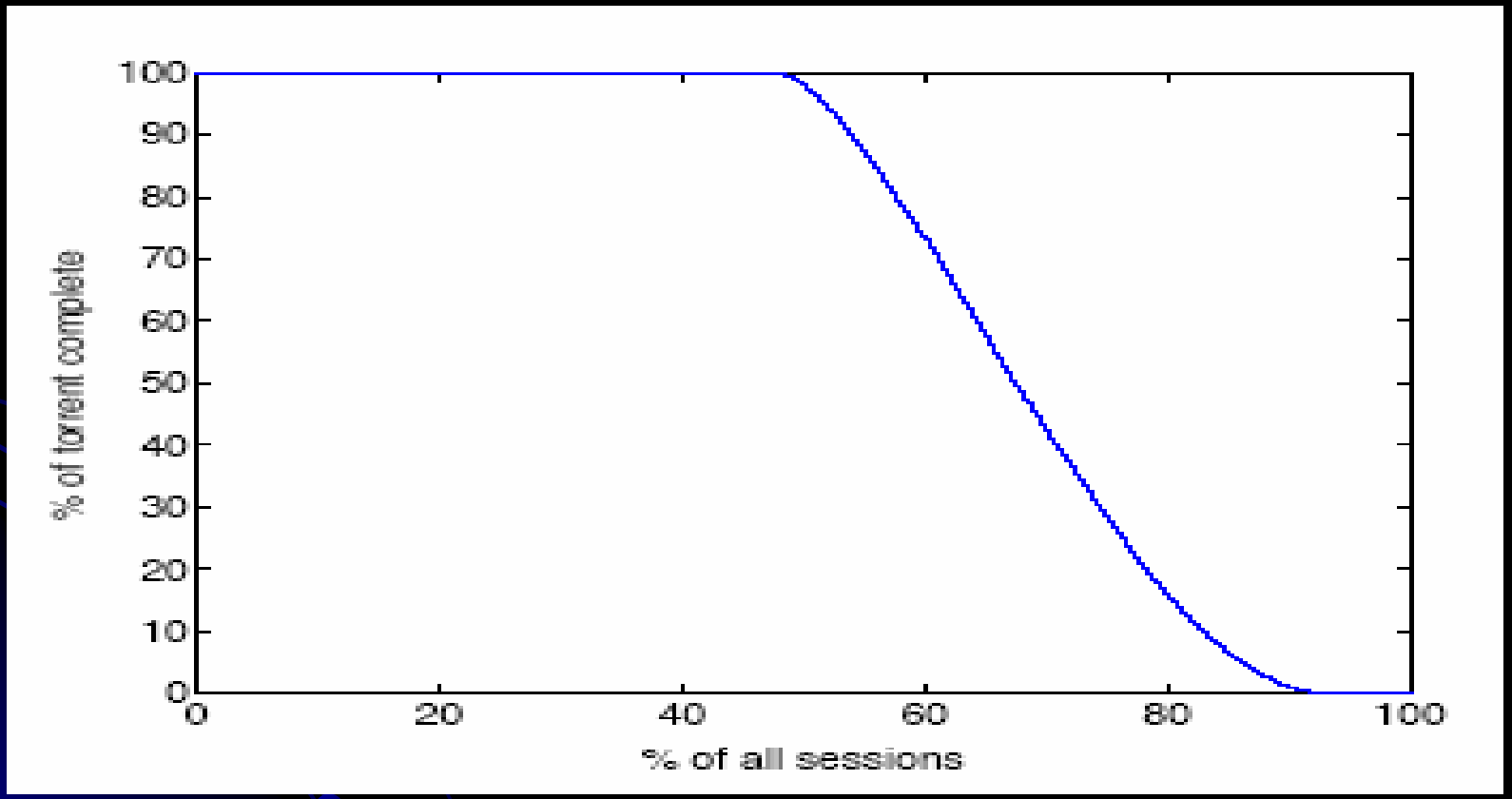
BT User behavior(1)

- "Session" (5 months)
- New Peer Join



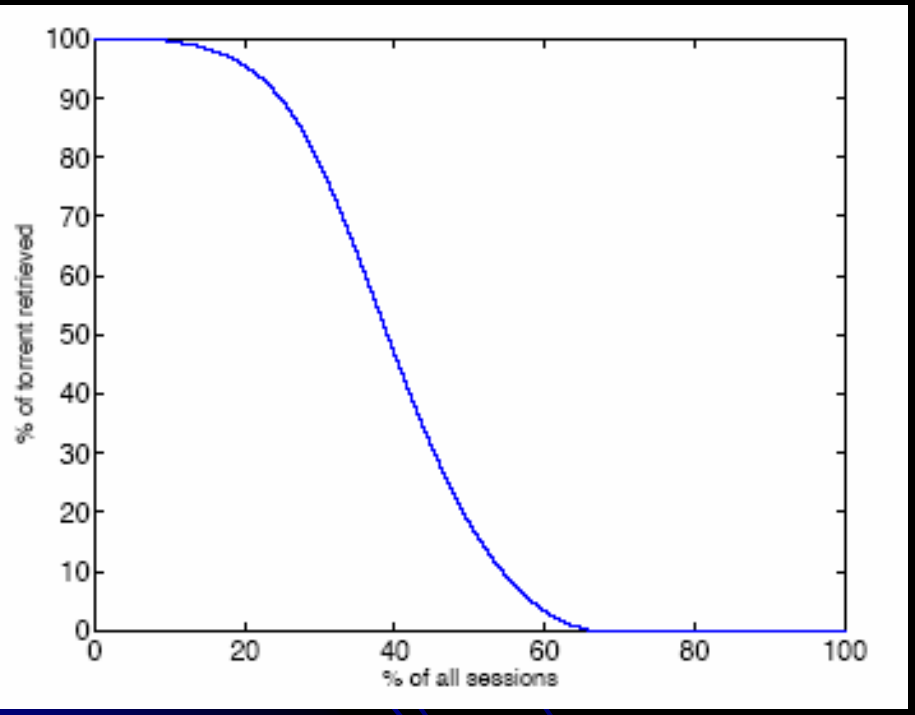
BT User behavior(2)

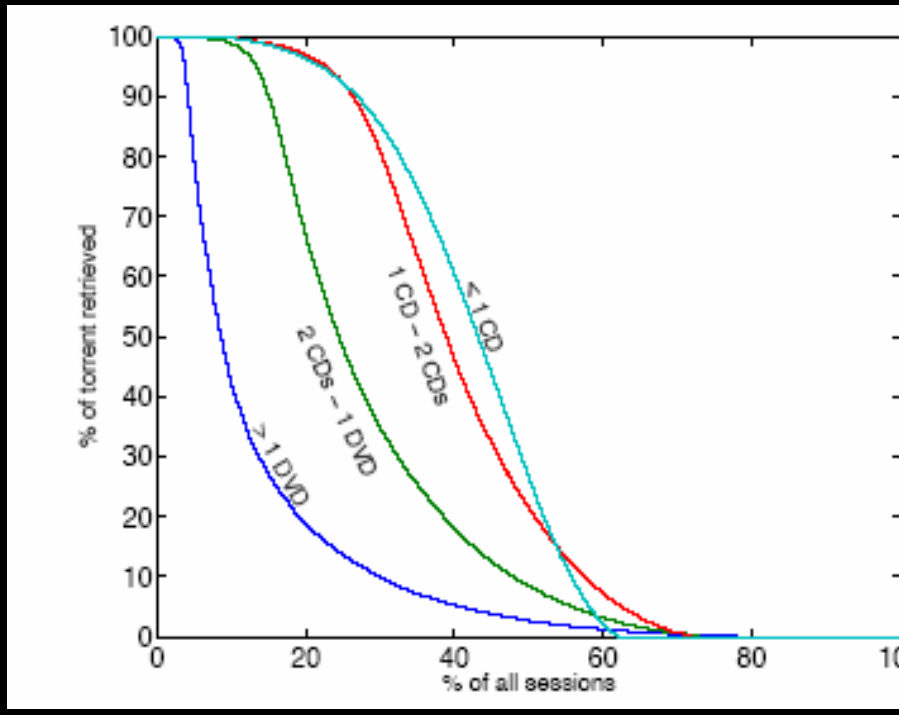
- Peer Leaving



BT User behavior(3)

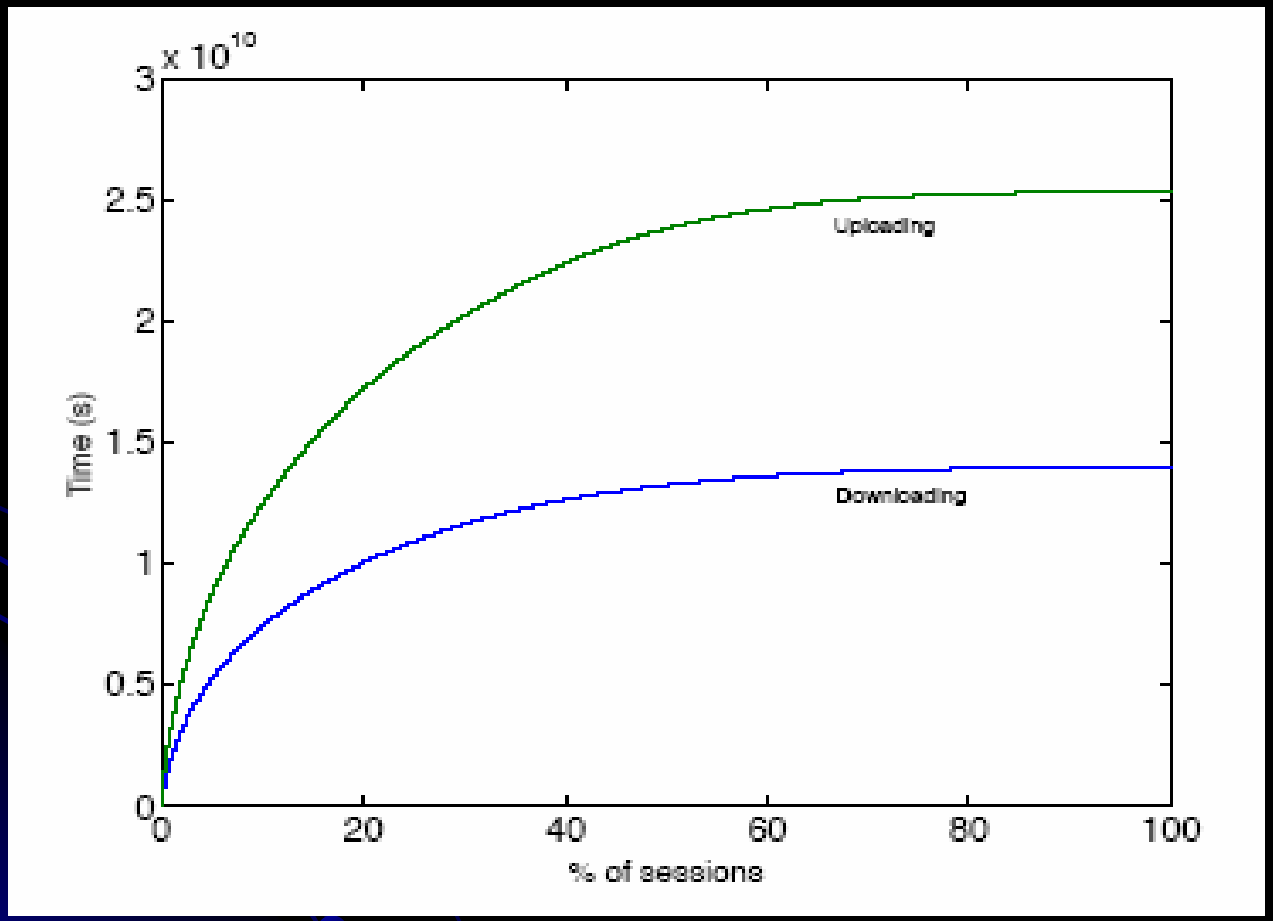
- During One Session File size





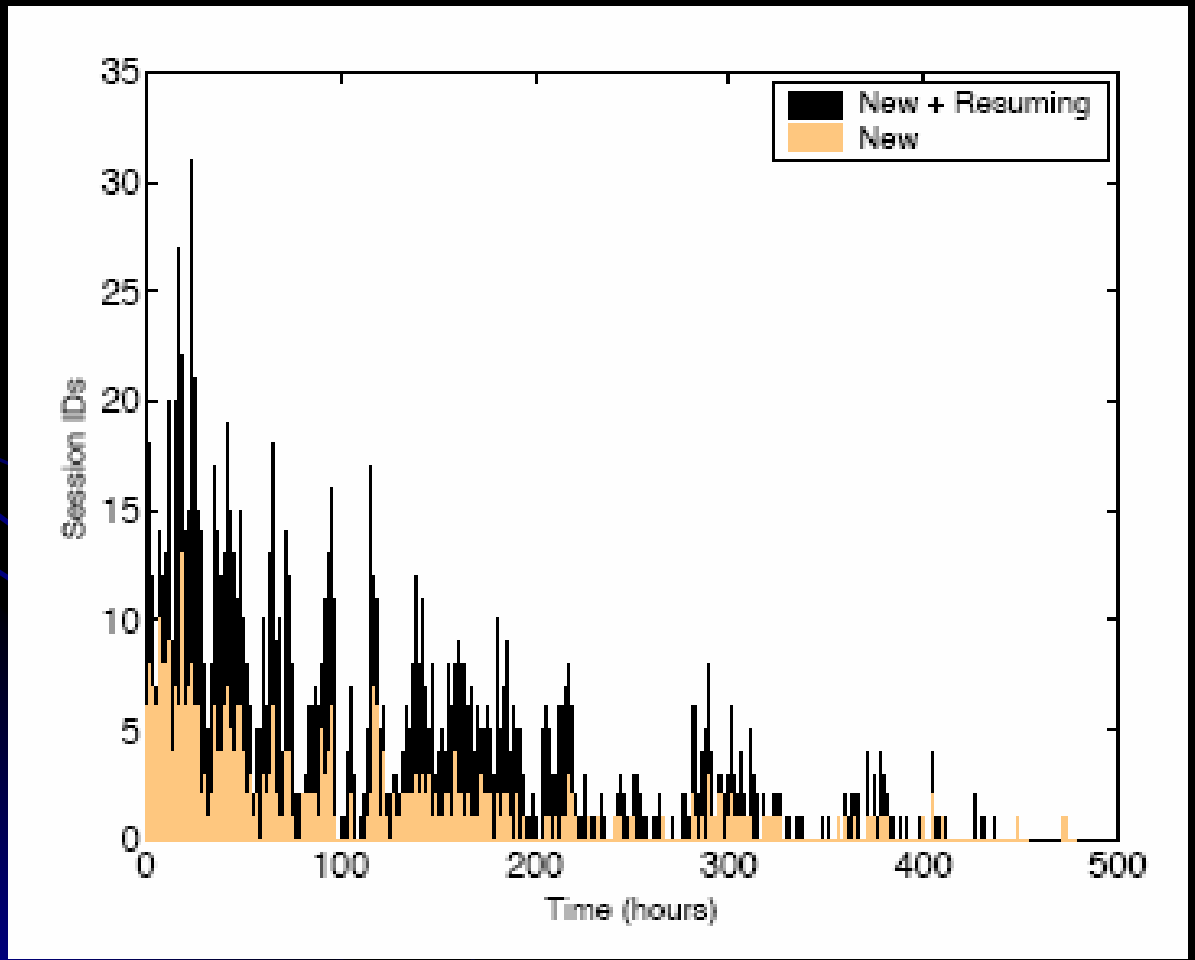
BT User behavior(4)

- Compare Upload / Download time



BT User behavior(5)

- Flash Crowd



BT File content

- .torrent file
  - 2 torrent file
- Log file (2004/11/6~2004/11/24)
  - What information inside?

Conclusions

- Why BT fast?
  - Software cooperation
  - Algorithm
  - User behavior
- Problem
  - Search
  - Duplicate file

Future work

- Analyze log files
  - Download rate <=> Upload time
  - Peers communication (“What I have”) overhead?
- Static Media file sharing with BT
  - Algorithm will differ
- Tracker cooperation

Reference

- **Incentives Build Robustness in BitTorrent**
  http://bittorrent.com/bittorrentecon.pdf
  http://bittorrent.com/
- Exploring the Use of BitTorrent as the Basis for a Large Trace Repository
  http://lass.cs.umass.edu/~lass/papers/pdf/TR04-41.pdf
- The BitTorrent Protocol
  http://www.lugatgt.org/articles/bittorrent/index.pdf
- BitComet
  http://www.bitcomet.com/
- EMule
  http://www.emule-project.net/
- http://bt.21dx.com/