



# Peer-to-Peer Networks

## 16 P2P in the Wild

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1999

2006

- File sharing & transmission
  - Bittorrent, eMule, FastTrack, DirectConnect, Gnutella, Skype, Maidsafe
- Chat
  - Skype, Tonic, OMessenger, PoPNote, LAN Messenger, WireNote, Mossawir LAN Messenger, Squiggle, CDMessenger, Softros LAN Messenger, ...
- VoIP, Video-Chat
  - Skype, Zello, Brosix, Google Hangout
- Synchronization & backup
  - Bittorrent Sync, SyncThing
- Money
  - Bitcoin, Maissafe
- 📦 Software distribution & update
  - Windows 10 updates, Stream
- Anonymize
  - I2P, Freenet, TorChat, Tribler, Bitmessage, DigitalNote XDN, Osiris, Syndle, Perfect Dark, Netsukuku, DigitalNote XDN, Tahoe-LAFS iTOR
- Media Streaming
  - Vuze, Tribler, Miro Media Player, PPLive
- 📦 Programming platforms, Frameworks
  - JXTA, GNUNet, Windows Peer Networking
- Web search
  - Yacy, Faroo

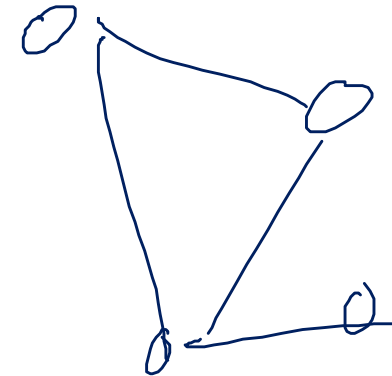
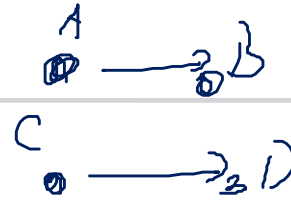
# Synchronization & Backup

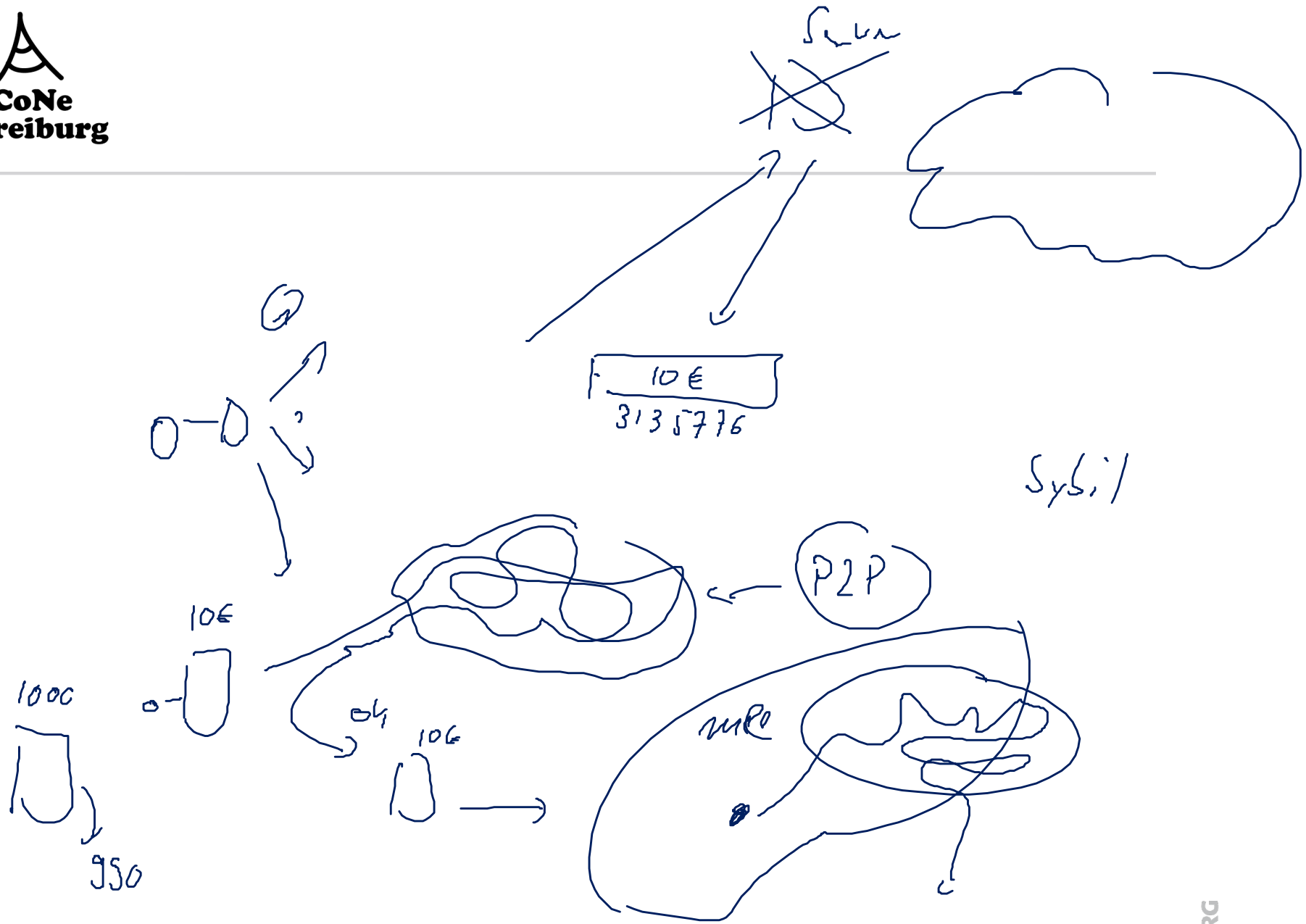
- Problem
  - Synchronize two file systems
  - Differential backups
- Standard solutions
  - rsync
    - network protocol and tool
    - transmits only the differences of files
    - for upholding copies of file systems
    - no versioning
  - Cloud services
    - e.g. Google drive, Dropbox, BWsync&share, etc
    - synchronizes directories to server
    - only differential update
    - versioning



# Peer-to-Peer File Synchronization

- Idea
  - rsync but for many peers
- Bittorrent Sync
  - uses Bittorrent for updates
  - closed group of servers
  - symmetric cryptography AES-128
  - versioning
  - no conflict handling
- SyncThing
  - open source
  - secure, authenticated, TLS
  - versioning
  - no conflict handling





- Peer-to-Peer Money transactions
  - open source digital currency
  - decentralized currency
  - Public-key cryptography
  - Digital signatures
  - Anonymity if TOR is used
- Peer-to-Peer network for transactions
  - Distributed computation tasks determine the order of transactions

- Lots of commercial/open software
  - Skype, Tonic, OMessenger, PoPNote, LAN Messenger, WireNote, Mossawir LAN Messenger, Squiggle, CDMessenger, Softros LAN Messenger, ...
- Motivation
  - Harness the power of the Internet for direct communication
- Features
  - often group features
  - secure communication
  - cheap server less solutions

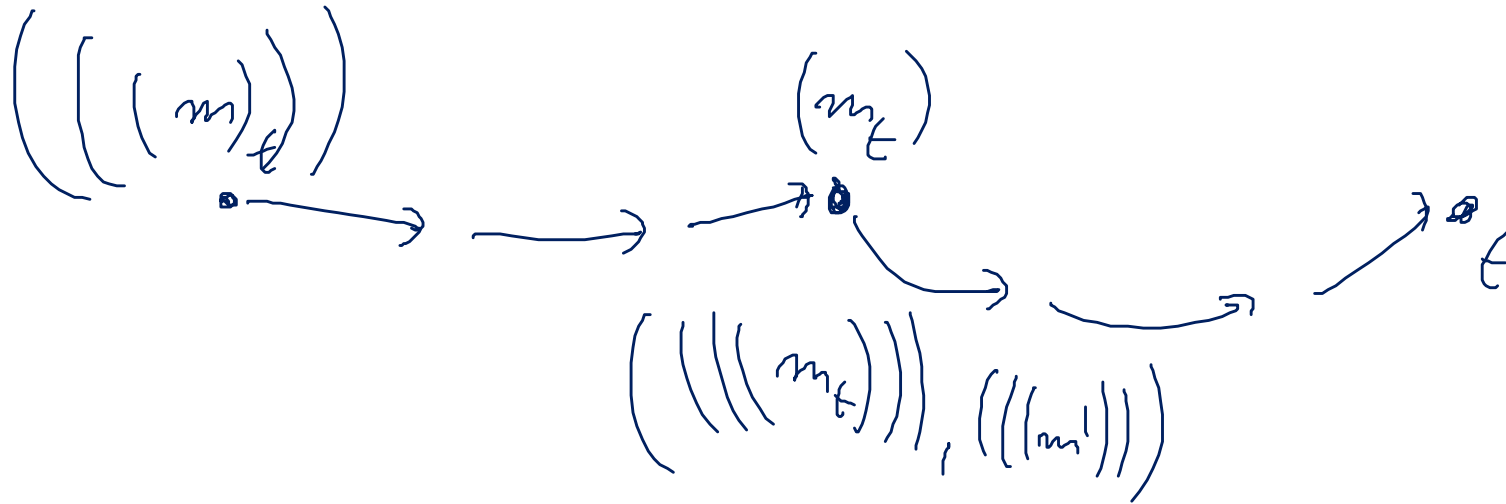
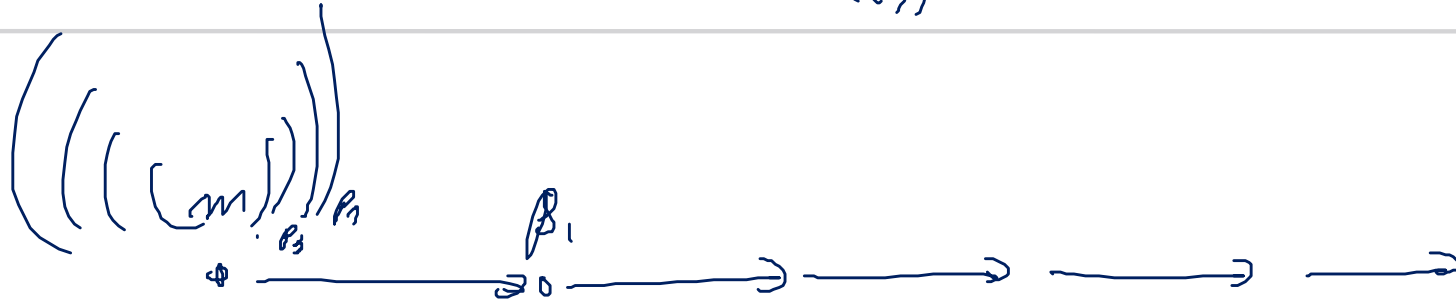


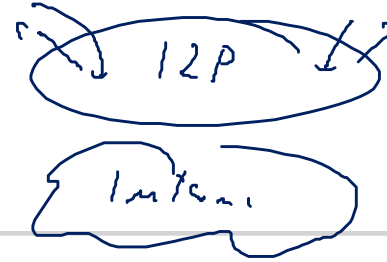


- Bittorrent
  - dominates traffic
  - with DHT or tracker hosts
  - extra infrastructure for search
- eMule, FastTrack, DirectConnect, Gnutella
  - less traffic since 2003
  - security issues
- Other P2P tools like Skype
  - offer also file transmission

- A lot of former P2P Streaming
  - ↳ Peercast, peerstreamer, QQLive, Joost, ~~Zattoo~~,  
Moved to Client-Server
  - Octoshape, Zattoo
- Survivors: *Azores*
  - Bittorrent-related: Vuze, Bittorrent
  - streamer (p2p radio)
- ■ Miro Media Player (malware financed)
- Big in China
  - ↳ ■ PPStream, PPTV, Funshion

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- I2P (Invisible Internet Project)
  - darknet
  - anonymous peer-to-peer distribution communication layer
  - ▪ Garlic routing
    - combining small onions in one message
    - allows any traditional internet application
      - email, IRC, file sharing, web hosting, HTTP
  - File sharing
    - Bittorrent, iMule, I2Phex
  - Email
    - I2P-Bote
  - Instant Messaging
    - I2P-Messenger, I2P-Talk



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