

Peer-to-Peer Networks 01: Organization and Introduction

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- Web page
 - <u>http://cone.informatik.uni-freiburg.de/cone_teach/</u> <u>cone_teach_current/p2p-WS12</u>
- Lecture
 - Monday, 10am-12pm, 106-00-007
 - Wednesday, 10am-11am, 106-00-007
- Exercise classes
 - Christian Ortolf
 - Wednesday, 11am-12pm, building 101, 106-00-007





- Exercise class
 - Wednesday, 11am-12pm, building 101, 106-00-007
 - start: 31.11.2012
- Exercises
 - appear every Wednesay on the web-page
 - should be solved by students
 - are the basis for the oral exam
 - solutions of the exercises are discussed in the following week



- Oral exam
 - based on the lecture and the exercises
 - register online for the exam
 - Mandatory registration



Materials CoNe Freiburg

- Slides
 - appear before the lecture on the webpage
- Book
 - at least 70% of the lecture can be found in *Mahlmann, Schindelhauer, Peer-to-Peer-Netzwerke* — *Methoden und Algorithmen, Springer* 2007
- Further Literature
 - Research papers will be presented during the lecture on the slides and on the web-page











Global Internet Traffic Shares 1993-2004



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P2P and Filesharing Traffic



Source: Ipoque 2007



A P2P Systems Germany 2007 **CoNe Freiburg** by Volume



What Germans Download 2007 **CoNe Freiburg** by Volume





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Global Internet Traffic 2007

- Ellacoya report (June 2007)
 - worldwide
 HTTP traffic
 volume
 overtakes P2P
 after four years
 continues
 record
- Main reason: Youtube.com



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Internet Traffic 2010

- Cisco Visual Networking Index Usage
- contains data of 20 anonymous service providers









Internet Traffic of a German ISP August 2009

• HTTP most traffic

• BitTorrent most upload





BitTorrent User Behavior of a German ISP August 2009



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BitTorrent User Behavior of a German ISP August 2009

- Fourier analysis shows 12h and 24h peak
- 24h periodicity roughly resembles sin curve



Source: Alsbih, Janson, S. Analysis of Peer-to-Peer Traffic and User Behaviour ITA 2011

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Milestones P2P Systems

- Napster (1st version: 1999-2000)
- Gnutella (2000), Gnutella-2 (2002)
- Edonkey (2000)
 - later: Overnet usese Kademlia
- FreeNet (2000)
 - Anonymized download
- JXTA (2001)
 - Open source P2P network platform
- FastTrack (2001)
 - known from KaZaa, Morpheus, Grokster
- Bittorrent (2001)
 - only download, no search
- Skype (2003)
 - VoIP (voice over IP), Chat, Video



- Distributed Hash-Tables (DHT) (1997)
 - introduced for load balancing between web-servers
- CAN (2001)
 - efficient distributed DHT data structure for P2P networks
- Chord (2001)
 - efficient distributed P2P network with logarithmic search time
- Pastry/Tapestry (2001)
 - efficient distributed P2P network using Plaxton routing
- Kademlia (2002)
 - P2P-Lookup based on XOr-Metrik
- Many more exciting approaches
 - Viceroy, Distance-Halving, Koorde, Skip-Net, P-Grid, ...
- Recent developments
 - Network Coding for P2P
 - Game theory in P2P
 - Anonymity, Security



A What is a P2P Network? Freiburg

- What is P2P NOT?
 - a peer-to-peer network is not a client-server network
- Etymology: peer
 - from latin par = equal
 - one that is of equal standing with another
 - P2P, Peer-to-Peer: a relationship between equal partners
- Definition
 - a Peer-to-Peer Network is a communication network between computers in the Internet
 - without central control
 - and without reliable partners
- Observation
 - the Internet can be seen as a large P2P network



- Short history
- First Peer-to-Peer Networks
 - Napster
 - Gnutella
- CAN
- Chord
- Pastry und Tapestry
- Game theory
- P2P traffic
- Codes
- P2P in the real world





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