Peer-to-Peer Technology in Corporate and Operator Networks

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Problem statement and background

- Peer-to-peer is said to be here to stay but
  - where is the technology at the moment
  - what is going to be its future direction particularly from business and corporate viewpoints

- focus kept on applications that can be used in enterprise networks
  - ISP and regulatory viewpoints covered

- "mapping" the current state of the P2P field

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Overview of P2P

- Historical perspective
  - Old idea and historical architecture which was later discarded
  - Development towards client/server architecture
    - firewalls, dynamic IPs, NATs, ...

- Why is P2P interesting again:
  - Critical mass of computers and users with anywhere and anytime access to the network
  - Increased bandwidths
  - Advanced computers with great computing power and storage capacity
  - Average users became familiar with available functionalities
  - Development of complementary technologies

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Overview of P2P

- State of the art from business perspectives
  - according to different studies as much as 60-80 % of the traffic over the last mile is P2P
    - Legal and illegal use…
    - Mostly consumer generated
      - → technology itself has great potential
  - several software companies advertising P2P terms in their materials are announcing to have big corporate customers
  - number of enterprise P2P clients is estimated to rise heavily
    - Also revenue estimates published by market research companies are impressive

- However, P2P is not a business model but just an architecture !

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Definition

- Definition of P2P for this study:
  - Application or system that is safely, securely and redundantly operating outside of DNS, with or without co-operation of central servers, and having its clients work as servers and clients in order to provide collaboration services for users with different authorization levels, is called P2P software.

- In order for an application to be P2P, it has to be able to allow variable connectivity and temporary network addresses
- P2P applications are giving addresses also to things that are not machines
  - E.g. content or human beings

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Application areas

- Technology provides so large scale of features that it can be exploited in several application areas
  - Real life applications overlapping and blurring in different areas

- Examples of some well known areas:
  - Content sharing
    - Text, music, video, graphics, documents, software
  - Distributed computing
    - Dividable problems for High Throughput Systems
  - Collaboration
    - voice and text chat, discussion forums, persistent journaling of work and discussions, file sharing, picture and media sharing, calendaring, presence information, sketching

  - Applications for mobile environments

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Drivers of P2P

- From central servers to the edges of the network:
  - bandwidth savings, scalability, robustness, infrastructure resilience, global availability, performance, access to worthy resources
- For the global telecommunication business a great positive economical impact through:
  - cost savings
  - new business opportunities
  - new users
  - increased collaboration
  - growing attractiveness of new terminals and collaborative applications
  - increased online communications in all societal areas

- This requires strong technology ground with cohesive standardization and advanced knowledge of combining technologies on top of P2P architectures

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Challenges of P2P

- Many problems and limitations are caused by otherwise widely accepted and utilized technologies

- Technical issues like
  – Performance
  – Security
  – Trust
  – Accessibility
  – Resource management
  – Network control and cost sharing,
- Legal issues
- Standardization is currently incomplete and inadequate

- Enterprise environments always somehow restricted
  – makes things often easier

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Application feature frameworks

- Five existing applications selected as a control group
  - clarifying the differences in the implementations
  - pinpointing what characteristics are most relevant in different P2P application areas and use environments

- General level feature framework table was formed based on the comparison of the existing applications
  - clarifies the requirements for enterprise P2P applications compared to consumer applications
  - clarifies the requirements set by different environments and use cases to the software
  - makes it easier to categorize the current P2P field and existing and emerging applications

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Application feature frameworks

- Based on several criteria the following applications were selected a control group:
  - Groove Networks – Groove
  - Avaki Corporation – Avaki
  - Glue Technology, Inc. – Glueware
  - United Devices, Inc. - Grid MP
  - 1stworks Corporation – hotComm

Groove Networks; Groove (After April 2005 the company is wholly owned subsidiary of Microsoft)	Avaki Corporation Avaki (Sybase acquired the company in May 2005)	Glue Technology, Inc. / Glueware (Generic Language Universal Environment = Glue)	United Devices, Inc. Grid MP	1stworks Corporation; hotComm
Groove enables real-time, small group interaction and collaboration across and between organizations.\n\nIt effortlessly brings together team members from both inside and outside your company, allows organic and quick conversation and collaboration, brings relevant information together for everyone in the team to see. It allows person to work with the same information whether the person is online, offline or on low bandwidth connections	The goal of Avaki is to enable all forms of P2P computing. The product is designed for enterprises.	Glueware seamlessly links disparate applications and systems within the enterprise and between customers, partners, and suppliers for an end-to-end B2B integration solution. The suite is an end-to-end e-business solution, encompassing business-to-business (B2B) integration, application-to-application (A2A) connectivity, peer-to-peer (P2P) communications, Web services, and mobile extensions.	Grid MP™ from United Devices is the leading infrastructure solution for implementing and managing complex enterprise grids. From single cluster management implementations to large-scale multi-resource grids, Grid MP deployments are proven to virtualize business, operational and HPC applications throughout your enterprise for maximum productivity, efficiency and performance.	Designed to leverage the 1stWorks Network, a powerful, scalable and secure peer networking architecture, hotComm is a suite of desktop applications and products that allow PC users to access and control the services provided by the 1st Works On-Demand Network.\n\nhotComm iprovides fast, efficient, private interactive access or exchange of text, voice, video, data and applications between participating hotComm users on the Web

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Application feature frameworks

- General feature framework:
  - takes into account different usage environments and users
    - users basically enterprise users or consumers
    - environment is either the Internet, enterprise network with both Internet and intranet combined, or finally just the corporate intranet alone
  - does not concern content as a variable
  - mobile P2P and ISP P2P solutions had to be excluded

- Results in general clearly state that the demands for business environment applications are much stricter compared to consumer applications
  - the only true exception for this is scalability
  - Also corporate LANs where the device base and network infrastructure can be more easily controlled and more homogenous have some exceptions

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Future of P2P

- As promising as the technology is with several convincing boosters (technical, social, business)…

BUT:

- Research and studies needed in order to gather the wide-spread knowledge around P2P into some kind of understandable whole
  - Overcoming IT decision makers' prejudices with incoherent and confusing terms and marketing materials will not work..
- A widely standardized collection of protocols and best practices is needed in order for companies around the world to co-operate and develop interoperable systems
  - Credibility and acceptance missing

- However, there are no insuperable (technical) problems in sight

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Future of P2P

- Operator's perspective
  - Variety of choices to react to P2P usage:
    - Extreme ends: Do-nothing / enhance / fight against
  - Finding out new revenue models
  - Difficult position between powerful suppliers and demanding customers

- Users' social behavior is changing and so is networks' behavior from technical, operational and topological viewpoints
  - Challenge but also a great opportunity to implement new earning possibilities

- Legal position? Censoring obligations? Trust issues?

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Conclusions

- Concept is used confusingly
  - All that sounds or claims to be P2P is not
- Business models for P2P services are in an emerging state
- Feature framework tables provide a tool for recognizing boundary requirements for P2P applications in different use environments
- Lack of information publicly available about real-life use cases or reliable and detailed reference cases leaves a picture of a fragmented technology sector which is spreading fast in uncontrolled way

- Future studies:
  - Expanding the feature framework discussion to cover new arising perspectives of each application area by using content as a variable
  - mobile and ISP P2P areas
  - Corporate IT decision makers' role in the adoption of P2P
  - Using corporate devices over the Internet without intranet

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…thanks !

Questions ?