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Language: English

Mass content distribution through the internet often occurs in an inefficient and costly manner (Norton, 2007). This is because the internet mostly doesn't offer performant distribution models for content that consumes large amounts of bandwidth. This causes that we still know the internet today to be mainly a medium for texts and images. Nonetheless, several evolutions have emerged throughout the past years, which make that consumers want more than merely texts and images. Users have an increasing amount of resources in supply – such as bandwidth, reliable connections, storage and processing capacity – which causes an increasing demand for multimedia content for instance audio and video. However compression techniques already offer some possibilities, we still notice the multimedia content on the internet to be rather limited and if available, it often turns out to be of poor quality. Content providers are exploring new distribution platforms that offer solutions for the current models because of the widespread penetration of the internet. The success of (illegal) file sharing networks – such as Napster, Gnutella, KaZaA and BitTorrent – demonstrated the potential of these systems for mass content distribution. Milojevic, Kalogeraki, Lukose, Nagaraja, Pruyne, Richard, Rollins & Xu (2002) defined peer-to-peer as: 'The term "peer-to-peer" refers to a class of systems that employ distributed resources to perform a function in a decentralized manner. The resources encompass computing power, data (storage and content), network bandwidth, and presence (computers, human, and other resources)'. These systems turned out to be very scalable and cost efficient in comparison with the more traditional client/server model. This is because peer-to-peer systems make use of the available resources – such as bandwidth – from the users to distribute content. The load of content distribution is being spread throughout the network of peers by using these peers' available resources. In other words, peers should make their resources available, which makes a peer-to-peer system a cooperative model in which content providers try to limit bandwidth costs by utilizing the users' available capacity. Therefore, this research has the objective to explore the opportunities and challenges of these networks in order to have a better understanding of the potential for content distribution.

The available resources – storage capacity, bandwidth, content and etcetera – are being shared, which leads to a huge capacity. Peer-to-peer systems make use of the idle resources that are residing on users' personal computers. On the one hand, in a client/server model, every additional user means additional costs, whereas additional users in peer-to-peer systems provide extra resources. Peer-to-peer systems are characterized as decentralized,

scalable and inexpensive networks that efficiently make use of the available resources so as to be able to limit bandwidth expenses. The most important challenges, peer-to-peer is being confronted with, are: security issues, transient connectivity of peers and lack of control.

Peer-to-peer systems offer more opportunities than purely file sharing. These systems have already proven to be efficient models for communication via the internet such as for Instant Messaging and VoIP (cf. Skype). Sharing of computing power through peer-to-peer systems has also gained much attention mainly because of the SETI@home project in which millions of people freely made their idle computing power available for research purposes. Further, peer-to-peer systems can be used for people that are collaborating on specific tasks. But, the main focus of this research will be the sharing and distribution of content through peer-to-peer networks. We finally have to remark that these different applications areas are often converging.

There are of course several models of peer-to-peer systems that each have their own advantages and disadvantages. It is therefore important to elaborate a classification based on the architecture of these systems and to understand the different characteristics of these different models. On the one hand, we make a division of peer-to-peer systems based on the degree of decentralization because peer-to-peer systems integrate decentralized aspects in different ways in their architecture. The more centralized an architecture is, the more control one has over the network for instance on the level of security. But, these architectures are also less scalable, have more risks for bottlenecks and single points of failure. The more decentralized an architecture is, the more scalable and fault tolerant the system is. Decentralized networks must be able to self organize the network because of a lack of central controlling components. The lack of centralized elements leads to less control in the system which makes them less manageable. On the other hand, we need to make a distinction between the degree of structure in the network while framing a classification. A network is unstructured if the nodes and their resources are being placed at a nearly ad hoc manner in the system which results in an inefficient search method. Conversely, in structured systems, nodes and resources are mapped into a form of address space which makes that there are more efficient search methods to find and retrieve these nodes and resources.

Finally, it is important to provide a state of affairs of the current situation of peer-to-peer networks. Several recent attempts have been started to spread content in a legal way to mass audiences while using peer-to-peer technology. The content these firms are distributing via a peer-to-peer content delivery network, consists mainly of audio, video and film. These companies make use of several important aspects of peer-to-peer, namely: scalability and cost efficiency. It is remarkable to notice that most of these systems are aiming to offer better quality in comparison with the 'traditional' models. It is remarkable as well that centralized components are mostly integrated into these systems to maintain

control so as to illegal activities are avoided as much as possible. Another fact is that these legal applications seldom give users the possibility to upload new content in the network, because they are closed systems. This is more than likely because of security considerations. In other words, primarily the content providers maintain control over the systems to distribute content. On the other hand, we have to remark that several peer-to-peer applications have been introduced that allow and even promote users to upload user generated content.

We can conclude from this analysis that peer-to-peer systems suffer from several drawbacks, but that they nonetheless also have high potential at their disposal to limit the bandwidth costs of content distribution. This first stage of the research has been conducted based on desk research. In the next phase, that attunes the desk research, we will interview content providers and researchers to further elaborate on the general question what the attitude of the industry is towards peer-to-peer as a content distribution model.