

# PIC – a Peer-to-Peer Protocol for Mobile Devices

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In wireless and especially mobile communications the bandwidth and the amount of transferred data become key aspects. Due to the bandwidth limitations wireless devices may join P2P (Peer-to-Peer) content sharing networks only for a limited time period. Enhancements and possibly new protocols are necessary for wireless peer-to-peer applications.

Introducing intelligent search/indexing techniques with the additional cost of implementation complexity we can reduce the amount of traffic in the network and balance user load. The Parallel Index Cluster (PIC) approach is proposed as an efficient candidate, as it is expected a reduction with at least one order of magnitude compared to basic and enhanced Gnutella networks [1].

An important dimension in content sharing is the user group. PIC networks proposed to be used primarily in the closed group scenario, where registered users form communities around topics of interest. The structure of the network topology could be adjusted to match the size of the user group. In a closed user group the goal is to find all content matching search criteria. This allows searching for unique and more rare content that may be necessary e.g. for many business applications. This makes it necessary to adopt a different approach from the case of open user groups, when virtually everybody can become member of the network, like in the case of Gnutella [1].

Practical applications of content sharing could be groups of small (up to 100) or moderately large (up to 10000) size that share various type of contents, like mp3 music, photos taken with mobile devices, text documents or video clips.

In this article a new modeling of P2P systems, the SIL (Search Index Link) [2] method is described, and based on this a new P2P protocol is introduced, which is suitable for mobile devices. For this new protocol (PIC) different cluster topologies are analyzed. To produce minimal network traffic, simulation results and mathematical analysis is given to optimize the cluster sizes in the network.

## References

- [1] G. Csúcs, J.K. Nurminen, B. Bakos, L. Farkas: Peer-to-peer Protocol Evaluation in Topologies Resembling Wireless Networks. An Experiment with Gnutella Query Engine, ICON 2003
- [2] B. F. Cooper, H. Garcia-Molina: Modeling and Measuring Scalable Peer-to-peer Search Networks, Proc. SIGCOMM 2002