MP2P topic descriptions,

1. Architecture and Analysis of MP2P

Description: With the development of the mobile communication technology and P2P, a combination of mobile computing and P2P, MP2P, has revealed its attractions, on which very little academic effort has been put. In this topic, we would like to apply P2P applications in mobile cellular environment, in particular 3G networks based on IMS and SIP protocol. The appropriate mathematical analysis for the architecture will be needed.

Prerequisites: Basic understanding of P2P, SIP, IMS and Mobile Cellular Systems.

Difficulties: How to create the architecture? How to evaluate it by mathematical analysis?

Sources: (1) Xiaole Bai, Shuping Liu, Peng Zhang, Raimo Kantola, "ICN: Interest-based Clustering Network", P2P'04.
  (2) http://www.cs.columbia.edu/sip/
  (3) Theodore S. Rappaport: Wireless communications, Principles & practice USA 1996, IEEE Press, 641 pp.

2. Group Management and Communication in MP2P

Description: Let us image the following scenario. In a rainy evening Laura feels sad and boring. The only good thing that comes to her mind is the last party at Peter's place. She takes her mobile phone and checks the photos she has taken during the party. Unfortunately there is only one photo – bad luck? Not exactly! She thinks, maybe someone else has some. Using the peer-to-peer content sharing application installed on her mobile phone she sends a query concerning other photos or video files. The query goes to one (or many in multicast case) of her group mate's mobiles. She makes it. During the process, Group Management and Communication will be important, such as how new member joins in or the old member quits the group? And how do they communication exactly?

Prerequisites: Basic understanding of group management and communication, P2P, Mobile Cellular System.

Difficulties: How to manage the group members and how to communicate among the group members?

Sources: (1) Wanjiun Liao; De-Nian Yang, **"**Receiver-initiated group membership protocol (RGMP): a new group management protocol for IP multicasting", Broadcasting, IEEE Transactions on Volume 50, Issue 3, Sept. 2004 Page(s):279 – 288.

(2) Marossy, K.; Csucs, G.; Bakos, B.; Farkas, L.; Nurminen, J.K., "Peer-to-peer content sharing in wireless networks", PIMRC 2004.

(3) http://www.networksorcery.com/enp/protocol/igmp.htm

(4) http://www.cachelogic.com/p2p/p2poverview.php

(5) Theodore S. Rappaport: Wireless communications, Principles & practice USA 1996, IEEE Press, 641 pp.

3. Presence Services in MP2P

Description: In the MP2P system, some of the entities are permanent and available for use as long as the system is running, such as BS and Server. But others may be transient and mobile, such as mobile phone. In order to guarantee the MP2P network works correctly, it is necessary for the system to monitor all the entities and sense the presence of the entities, such as person presence, application presence, device presence and service presence etc. This topic will deal with the presence services in MP2P.

Prerequisites: Basic understanding of Presence Service, P2P, Mobile Cellular System.

Difficulties: How to manage the Presence service in the system?

Sources: (1) Faure, C., "Presence service in 3G networks", 3G Mobile CommunicationTechnologies, 2002.

(2)   Kanamaru, A.; Tsuchiya, Y.; Fujisaki, T.; Takahashi, K., " Fieldcast2: flexible P2P architecture for presence information sharing", Pervasive Computing and Communications Workshops, 2004.

(3) Nakajima, T., "A Presence Service Architecture for SupportingSpontaneous Interaction", WORDS 2003 Fall.

(4)   http://www.cachelogic.com/p2p/p2poverview.php

(5)   Theodore S. Rappaport: Wireless communications, Principles & practice USA 1996, IEEE Press, 641 pp.

4. Security and Privacy in MP2P

Description: If it is business information or private information to be transmitted, instead of photo, in the above scenario in topic 2, then we will consider seriously the security and privacy issue during the transmission. How to guarantee them in the MP2P system will be studied in this topic.

Prerequisites: Basic understanding of Security and Privacy, P2P, Mobile Cellular System.

Difficulties: What is algorithm for or how to guarantee the security and privacy in the system?

Sources: (1)   Jinsong Han; Yanmin Zhu; Yunhao Liu; Jianfeng Cai; Lei Hu, "Provide

privacy for mobile P2P systems**"**, Distributed Computing Systems Workshops, 2005.

(2) Geetha Ramachandran, Delbert Hart, "Security: A P2P intrusion detection system based on mobile agents", Proceedings of the 42nd annual Southeast regional conference, 2004.

(3) http://www.cachelogic.com/p2p/p2poverview.php

(4) Theodore S. Rappaport: Wireless communications, Principles & practice USA 1996, IEEE Press, 641 pp.

5. Interruption handling in MP2P transmission

Description: Let us consider another scenario. Peter is downloading an interesting film from the IMS server by his mobile phone at home. During the download process, John comes and invites him to play basketball. Wa! Great! You know, Peter loves playing basketball. So he decides to go and want to continue to download the film when he comes back. Of course, there is the same problem in uploading the files. This topic will deal with the handling of transmission interruption in MP2P system.

Prerequisites: Basic understanding of P2P, Mobile Cellular System.

Difficulties: What is algorithm for or how to handle the transmission interruption in the system?

Sources: (1) Nakashima, K.; Kusakabe, S.; Taniguchi, H.; Amamiya, M.," Design and implementation of interrupt packaging mechanism", Innovative Architecture for Future Generation High-Performance Processors and Systems, 2002.

(2) Fawaz, A.; Varaiya, P.; Walrand, J., "Analysis of interrupt handling schemes in real-time systems", Computers and Communications, 1989.

(3) http://www.cachelogic.com/p2p/p2poverview.php

(4) Theodore S. Rappaport: Wireless communications, Principles & practice USA 1996, IEEE Press, 641 pp.

6. Queuing in MP2P system

Description: In the case of topic 5 above, when there are several users are downloading or uploading multimedia information at the same time, maybe we will deal with the situation by queuing knowledge.

Prerequisites: Basic understanding of queuing theory, P2P, Mobile Cellular System.

Difficulties: What is algorithm for or how to handle the problem when several users are downloading or uploading simultaneously?

Sources: (1) http://www.netlab.hut.fi/opetus/s383143/2005/english.shtml

(2)   Theodore S. Rappaport: Wireless communications, Principles & practice
      USA 1996, IEEE Press, 641 pp.

   (3)   http://www.cachelogic.com/p2p/p2poverview.php