MPSS: A Multi-agents Based P2P-SIP Real Time Stream Sharing System

Journal Club 2007-08
   Session 1
   Victor Pascual Ávila
   victor.pascuala@upf.edu
   Feb, 8th 2008

Universitat Pompeu Fabra (UPF)

NeTS research group

Network Technologies and Strategies

Article Reference

Title: **MPSS: A Multi-agents Based P2P-SIP Real Time Stream Sharing System**

Author: Yang, D. Wang, H. Wang, C. Gao, Y.

Journal title: LECTURE NOTES IN COMPUTER SCIENCE

Bibliographic details: **2006**, NUMB 4088, pages 398-408

Publisher: SPRINGER-VERLAG

Country of publication: Germany

ISBN: ISSN 0302-9743

Outline

- Introduction

- Background and Related Work

- MPSS System Design

- The Multi-Agents Design

- Results and Analysis

- Conclusion and Future Work

- Comments

Introduction

- P2P

  - scalability, robustness and fault tolerance

  - unstructured (mesh) vs structured (overlay, Chord)

  - ordinary P2P not suitable for real time applications

    - not optimal pieces selection
    - throughout limitation to prevent free-riders
    - peer bw utilization rate is reduced

  - Les Trois Mousquetaires: "**Loss, Delay and Jitter**"

- SIP

  - Signaling protocol for **real time** communications

  - IETF Family, Client-Server architecture (not scalable)

- P2P and SIP for real time streaming media (NOT live streaming)

  - i.e. pre-stored content

Background and Related Work

- P2P and SIP

  - SIP: initiation, modification and termination of sessions

  - SIP + SIMPLE extensions for presence and IM

  - It makes use of SIP + SIMPLE + DHT

- Distributed Hash Table (DHT) Systems: Chord

  - Ring-type structure

  - Every Node is responsible for **storing** all resources that have Resource-ID near the node's Node-ID

  - Search: send messages to the known node that is closest to the destination address (recursive **routing**)

- Real-Time Media Streaming Transport

  - the system should guarantee every peer can get the needed media file time

MPSS System Design

- Node Structure

  - Chord-based DHT

  - All messages are SIP(new headers) + SDP(media file information)

  - REGISTER to maintain the overlay

  - INVITE(+SDP) to request information and media pieces

- File Publishing and Pieces Distribution

  - Publishing by hashing (ID) file information

  - ID-responsbile receives queries from all downloaders and give them back a list of peers

  - A receiver can download blocks within the same piece within the same file from multiple peers simultaneously

- Peer Strategy and Piece Selection: choose the appropiate piece from the appropiate peer

  - establish socket connections with several peers considering measured value parameter p=f(delay,available bw)

  - determine which pieces to download from which peers
    OTS: optimized media data assignement algorithm

The Multi-agents Design

- More peers who attend the same file, more availability

- Instant '0' -> bottleneck

  - every node requests file pieces from the seed peer

- Agent servers mechanism (Caching)

  - special peers which take the policy of 'rarest resource first'
  - download & store
  - replacing parameter Q= f(extinguity extent, popularity)

Simulations, Results and Analysis

- Contrast (bw utilization) with the pure BitTorrent

  - 3 different networks, i.e. 3 degrees of heterogeneity (up/down link)

Group	Uplink Bandwidth	Downlink bandwidth	Percentage of nodes
1.1	384Kbps	1500Kbps	100%
2.1	128Kbps	768Kbps	50%
2.2	640Kbps	2232Kpbs	50%
3.1	64Kbps	512Kbps	50%
3.2	384Kbps	1500Kbps	40%
3.3	1984Kbps	6440Kbps	10%

- Verify the the validity piece selection in the decrease media transport latency time

- Contrast the result with media proxy and non-media proxy

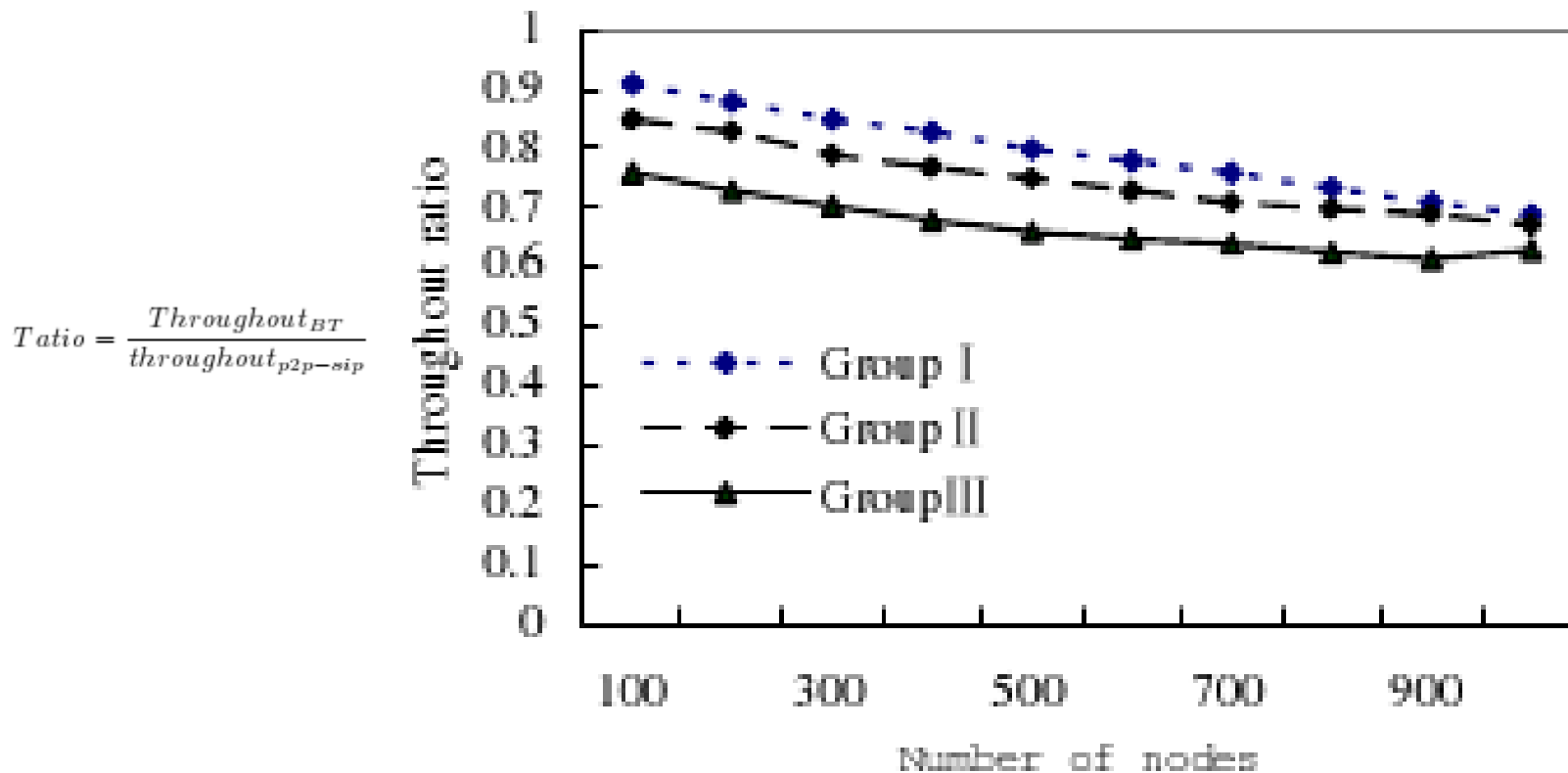# Overall throughout of MPSS is higher than that of BitTorrent

$$Tatio = \frac{Throughout_{BT}}{throughout_{p2p-sip}}$$

Figure: Overall throughout ratio change between BitTorrent and MPSS with the number of node changing in three different Networks

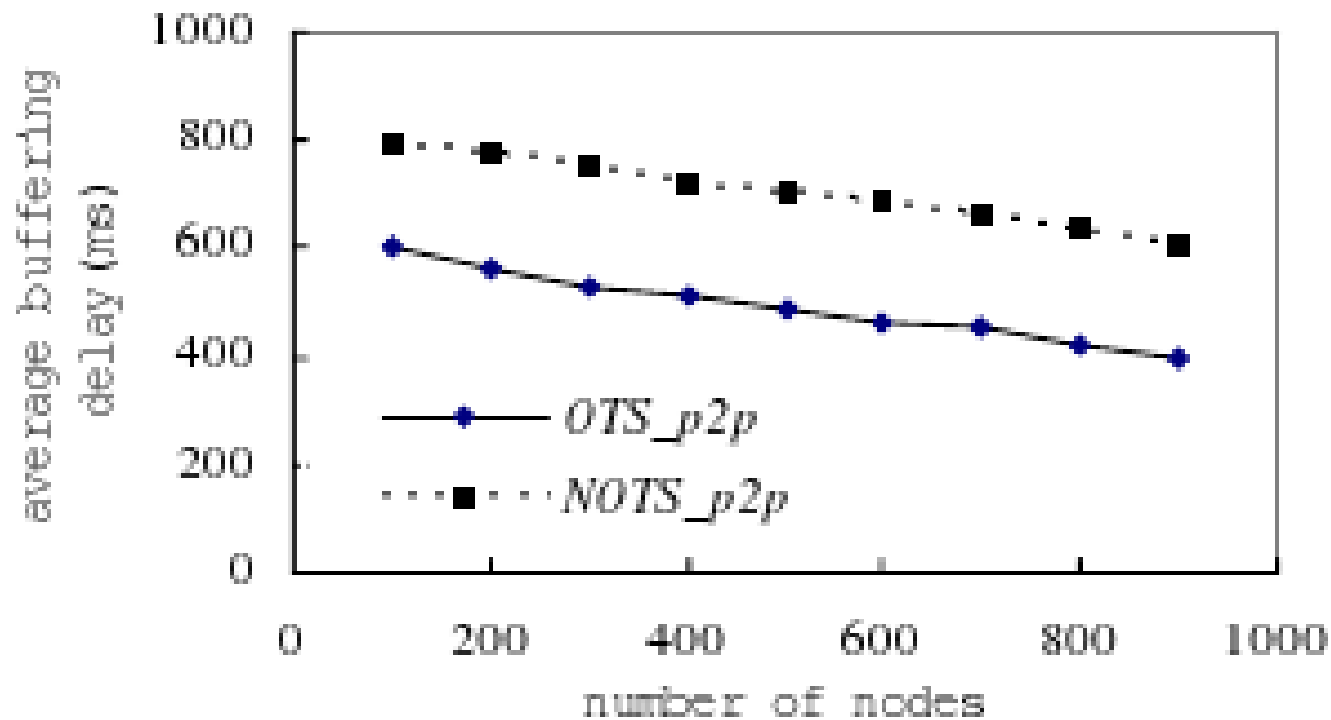# OTS algorithm can compute an optimal media assignment, minimum buffering delay

Figure: Different influence brought by the piece selection

The rate of file integrity is lower without proxy server

Figure: The file integrity rate under the situation of with proxy server and without proxy server

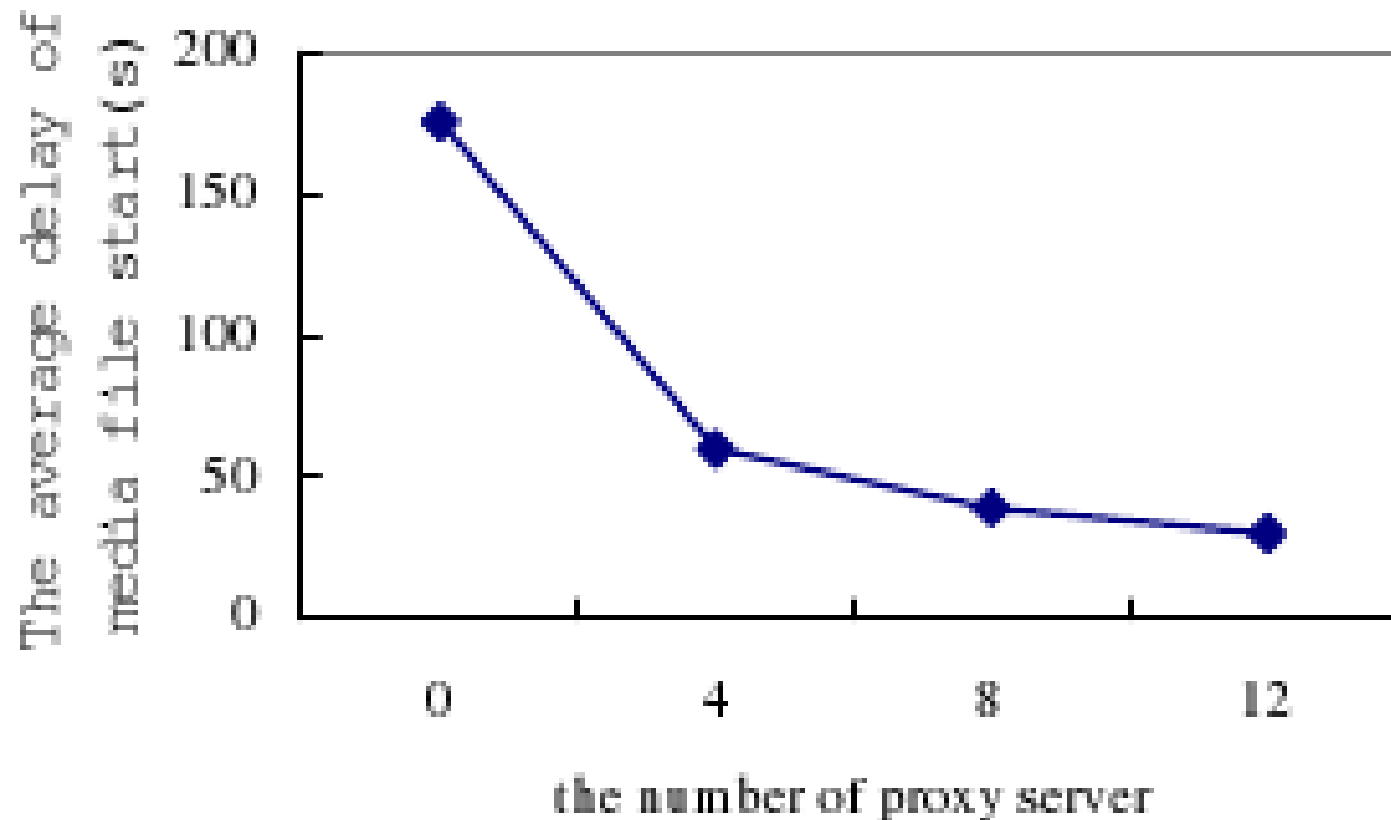# With the proxy server number increasing, the media buffering time is decreased

Figure: The change of start delay brought by media proxy server

Authors Conclusions

- Combine SIP with Self Organizing properties of DHT P2P mechanism

- OTS media assignment algorithm and advanced peer selection mechanism

- Media agent server mechanism: fast capacity amplification and seed related risk reduction

- MPSS does meet the needs for the distributed realtime media communication

- Open issues: Recover the original file and Fairness

Comments (IMHO)

- This is NOT live streaming: pre-stored content

- It is just an enhanced file sharing system

- File sharing and streaming have different requirements

- SIMPLE is NOT used

- Only Peers (neither Clients nor Consumers)

- May Multi-agents be considered to act as Client nodes?

- (Mobile) Device constraints vs Local decision algorithm

- Let's write a paper!

MPSS: A Multi-agents Based P2P-SIP Real Time Stream Sharing System

Journal Club 2007-08
   Session 1
   Victor Pascual Ávila
   victor.pascuala@upf.edu
   Feb, 8th 2008

Universitat Pompeu Fabra (UPF)

NeTSresearch group

Network Technologies and Strategies