Prototyping a P2PSIP user agent with support for multiple overlays

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Presentation Outline

- Introduction and Motivation
  - Use Cases for P2P SIP | Requirements | Objectives
- Designing a P2P Layer for SIP
  - Node design | Networking protocols
- Overcord – an overlay agnostic framework for P2P SIP
  - Phase 1 | Phase 2
  - Comparison with current P2P SIP proposal
- Incorporation into conventional SIP client and testing
  - JAIN SIP | JAIN SIP Applet Phone | Screenshots
Introduction - Motivation

Source: D Bryan et al, 2005

- Global Internet Environment
  - Example: Presence Using Electronic Devices
- Security Demanding Environments
  - Example: Impeded Access
- Environments with Limited Connectivity to the Internet or Infrastructure
  - Example: Deployments in Developed World
- Managed Private Network Environments
  - Example: Failover for Centralised Systems
Introduction – Core Requirements

- Location service
  - i.e. SIP URI to Contact URI mappings
- Reuse of existing protocols
  - i.e. SIP
- DHT Changeability
  - i.e. Chord, CAN, Pastry
- NAT/firewall traversal
- Suitable for adhoc environments

Source: Singh and Schulzrinne, 2005
Introduction - Objectives

- Investigate the use of P2P, especially DHTs for SIP
- A DHT-agnostic layer for pluggable P2P modules
- Interoperating between heterogeneous overlays
- Interoperating with C/S SIP systems
Introduction and Motivation

Designing a P2P Layer for SIP

OverCord – an overlay agnostic framework for P2P SIP

Incorporation into conventional SIP client
Designing the P2P layer – Node level

Diagram:
- **APPLICATION REQUESTS**
- **ABSTRACTION LAYER**
- **Structured Protocol 1**
  - join<sub>1</sub>
  - leave<sub>1</sub>
  - get<sub>1</sub>
  - put<sub>1</sub>
  - remove<sub>1</sub>
- **Structured Protocol 2**
  - join<sub>2</sub>
  - leave<sub>2</sub>
  - get<sub>2</sub>
  - put<sub>2</sub>
  - remove<sub>2</sub>
Designing the P2P layer – Node level

- Plugin layer:
  - join
  - leave
  - get
  - put
  - remove

- Overlay layer & Proprietary API:
  - Structured Protocol 1
  - Structured Protocol 2

- APPLICATION REQUESTS
  - ABSTRACTION_LAYER

- Multicast
- Flooding
- Service Location Protocol
- Cached Addresses
- DNS Lookup
Designing the P2P layer - Interop

- Leverage structured protocols using discovery mechanisms
- Interoperate CS and P2P overlays
Introduction and Motivation

Designing a P2P Layer for SIP

Overcord – an overlay agnostic framework for P2P SIP

Incorporation into conventional SIP client
Design of Overcord – Phase 1

Source: Tsietsi et al, SATNAC '06, September 2006
Testing of the P2P Plugins

Results obtained: January, 2007
Description: Two overlays are created with 1000 keys in each. A single standalone client issues requests for key mappings in each overlay.

Number of nodes: 50
LAN speed: 100Mbps
Platform: Fedora Core 5
Specifications: 2GB RAM, 1.8GHz Dual Core
Design of Overcord – Phase 2

Design of Overcord – Phase 2

Adapted from: Singh and Schulzrinne, 2006

XML code:

```xml
<?xml version="1.0" encoding="UTF-8"?>
<key>sip:mtsietsi@p2psip.org.za</key>
<value expires="2006-12-31T18:00:00Z" nonce="82771583614">
  <contacts xmlns="urn:ietf:params:xml:ns:p2p-sip">
    <contact displayName="Mosiuoa T." expires="2006-12-31T19:00:00Z">
      sip:mtsietsi@192.1.2.3:5060</contact>
    <contact displayName="Mos at home" expires="2006-12-31T20:00:00Z">
      sip:mtsietsi@192.1.2.4:5060</contact>
  </contacts>
</value>
...
Overcord vs P2PP

Source: Baset and Schulzrinne, July 2007

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Introduction and Motivation

Designing a P2P Layer for SIP

OverCord – an overlay agnostic framework for P2P SIP

Incorporation into conventional SIP client
A standardised Java interface to SIP

Defined by JSR 32 through the JCP

JAIN SIP enables transaction stateless, transaction stateful and dialog stateful control over the protocol
JAIN SIP Applet Phone

- User agent with messaging, presence and audio support

- Project owners:
  - Jean Deruelle - visiting lecturer, NIST
  - Mosiuoa Tsietsi – Rhodes University
Inter and Intra overlay presence

Model:

Interoperation is supported by decentralised discovery protocols such as multicast.
Model:

Interoperation is supported by P2PSIP proxies which update domain bindings using dynamic updates, and can route traffic on behalf of the network.
Future Work

- Test Overcord in a larger, global environment
- Investigate suitability of Overcord to provide more advanced SIP based services such as offline voicemail and multi-party conferencing
- Sign records in the database, or make them immutable
- Incorporate NAT/firewall traversal mechanisms
- Evaluate suitability of Overcord for other services beyond SIP
Thank You!

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