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

- Global Internet Environment

  - Example: Presence Using Electonic 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

Source: Singh and Schulzrinne, 2005

- 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

# 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

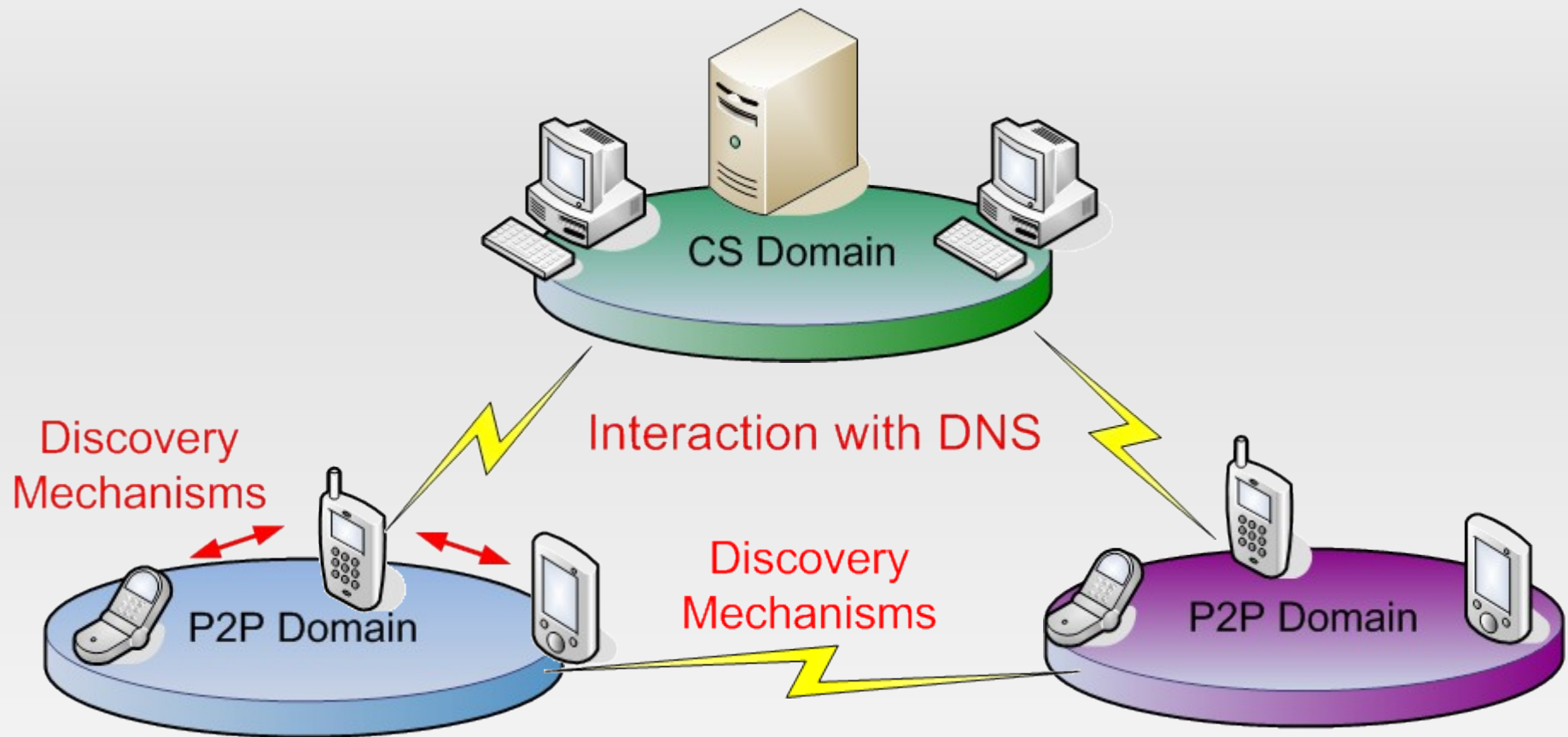- Incorporation into conventional SIP client

Designing the P2P layer – Node level
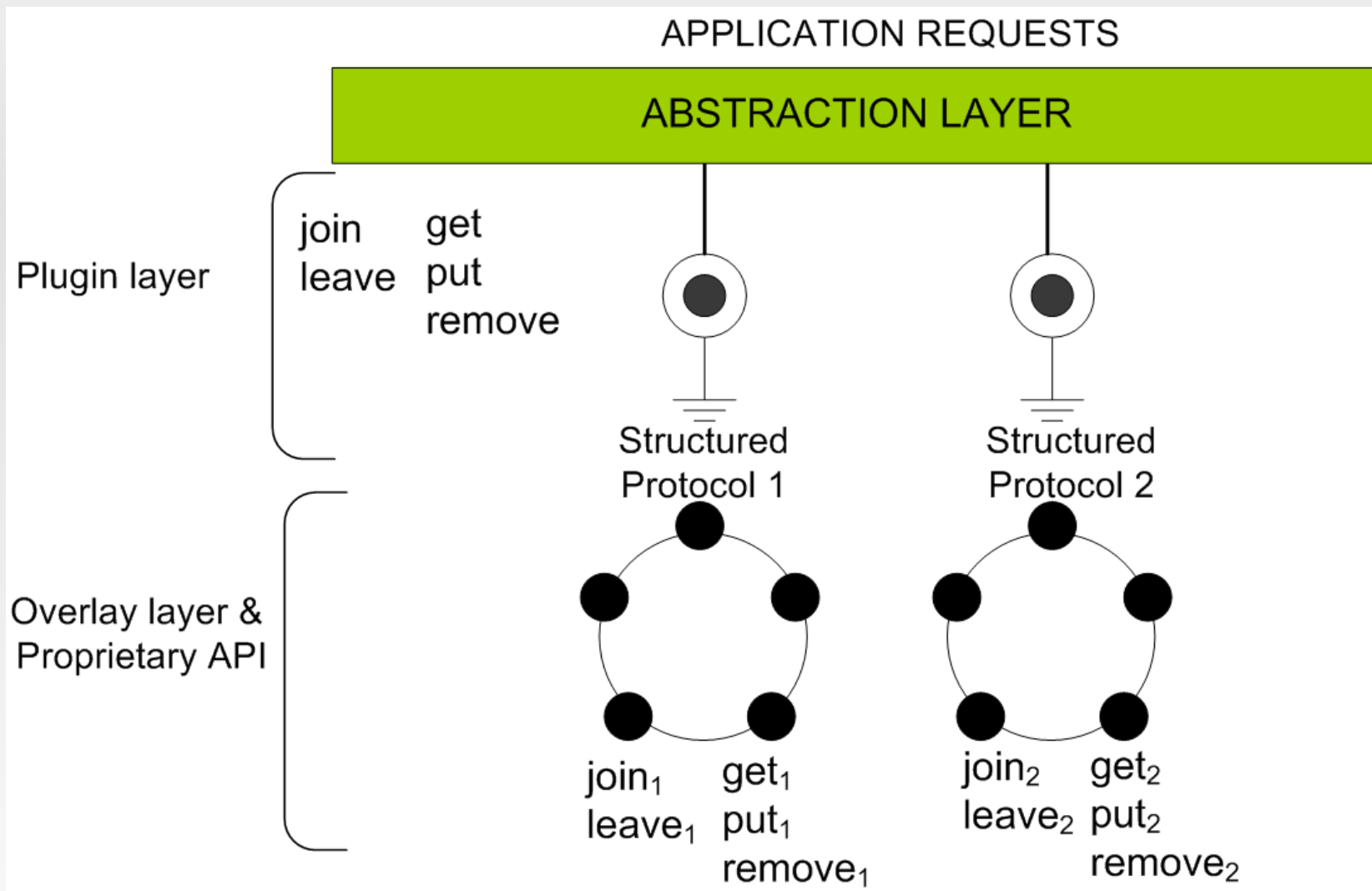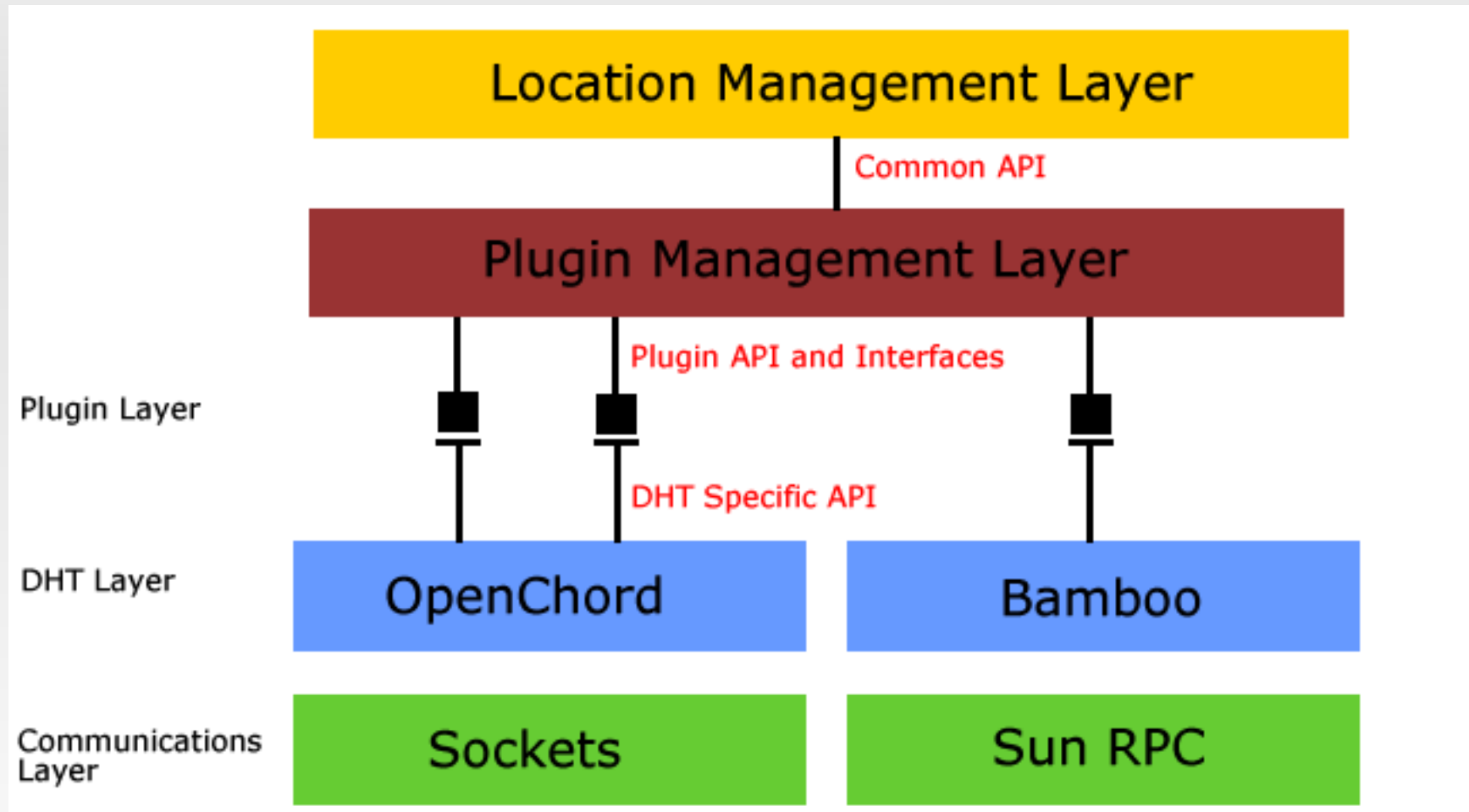
Designing the P2P layer – Node level
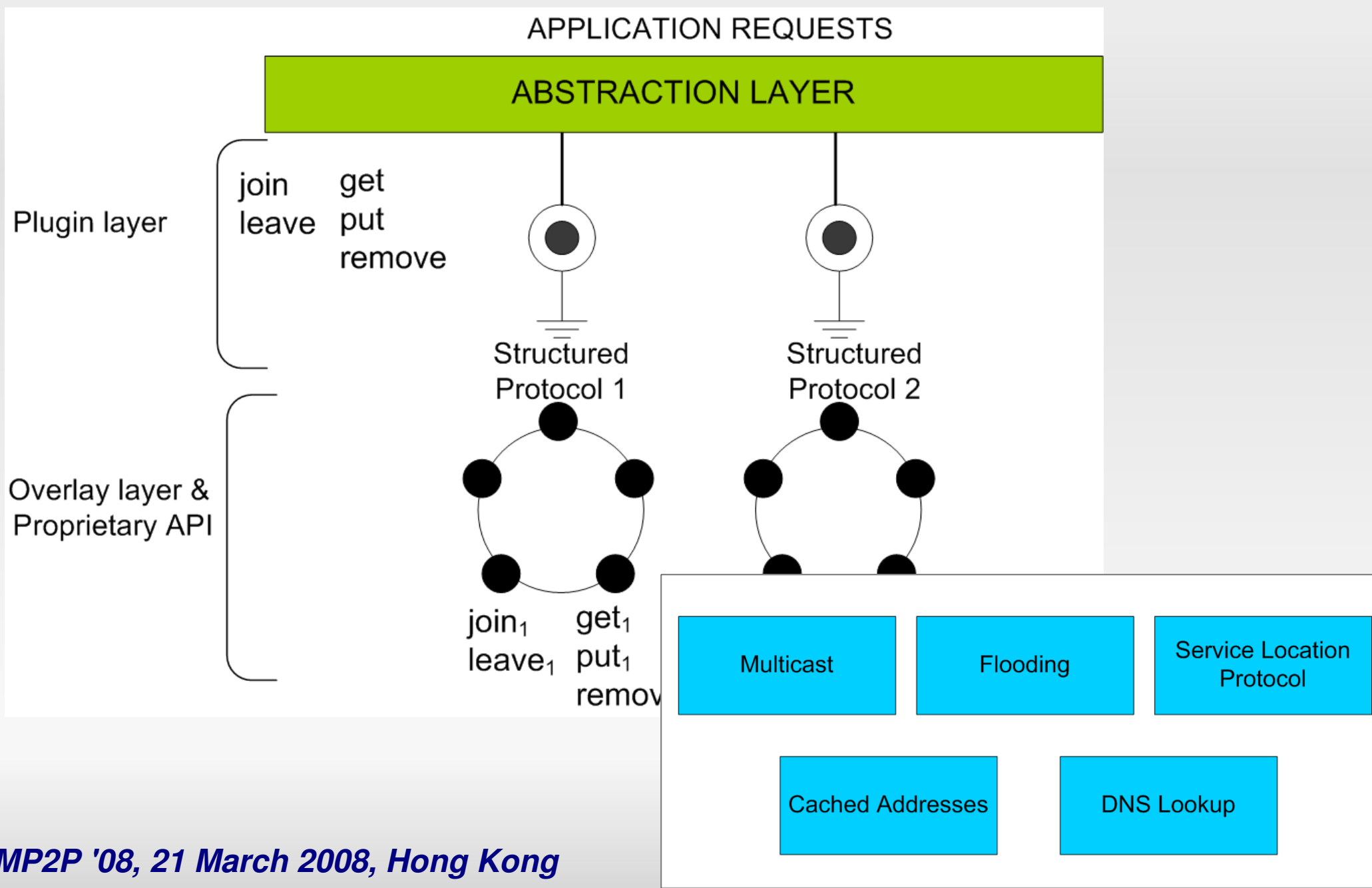
Designing the P2P layer - Interop

- 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

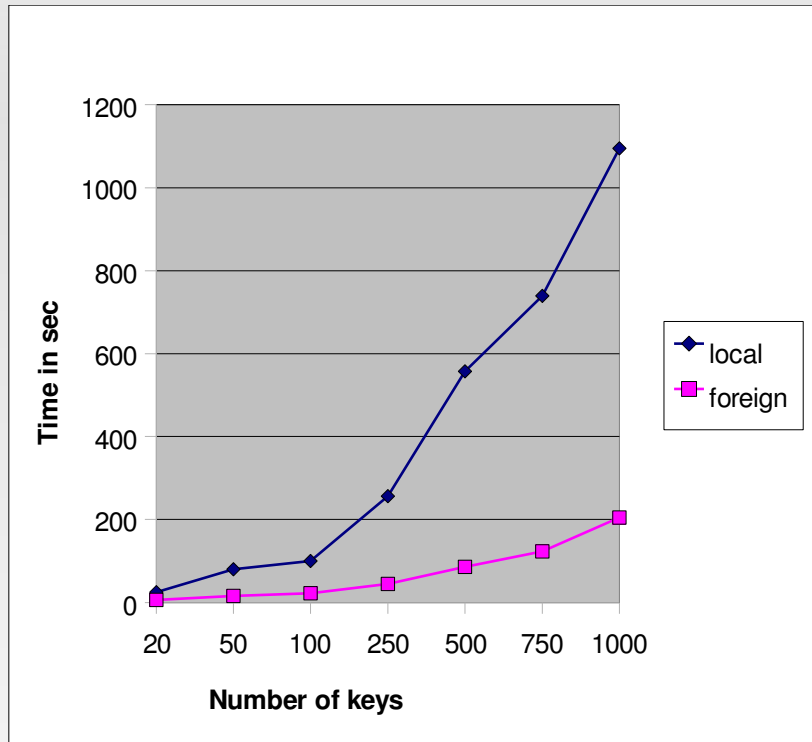- Incorporation into conventional SIP client

Design of Overcord – Phase 1

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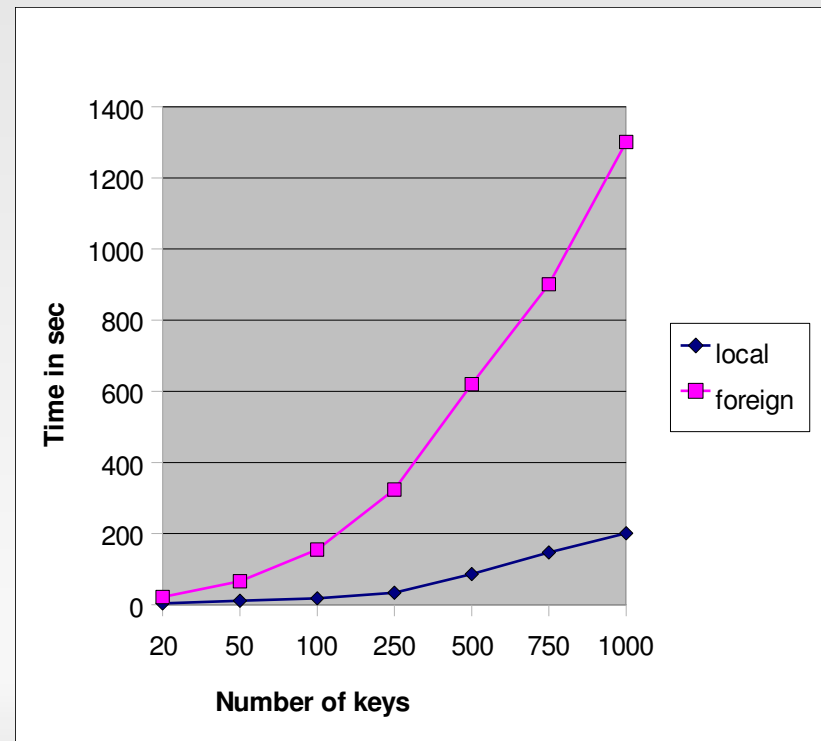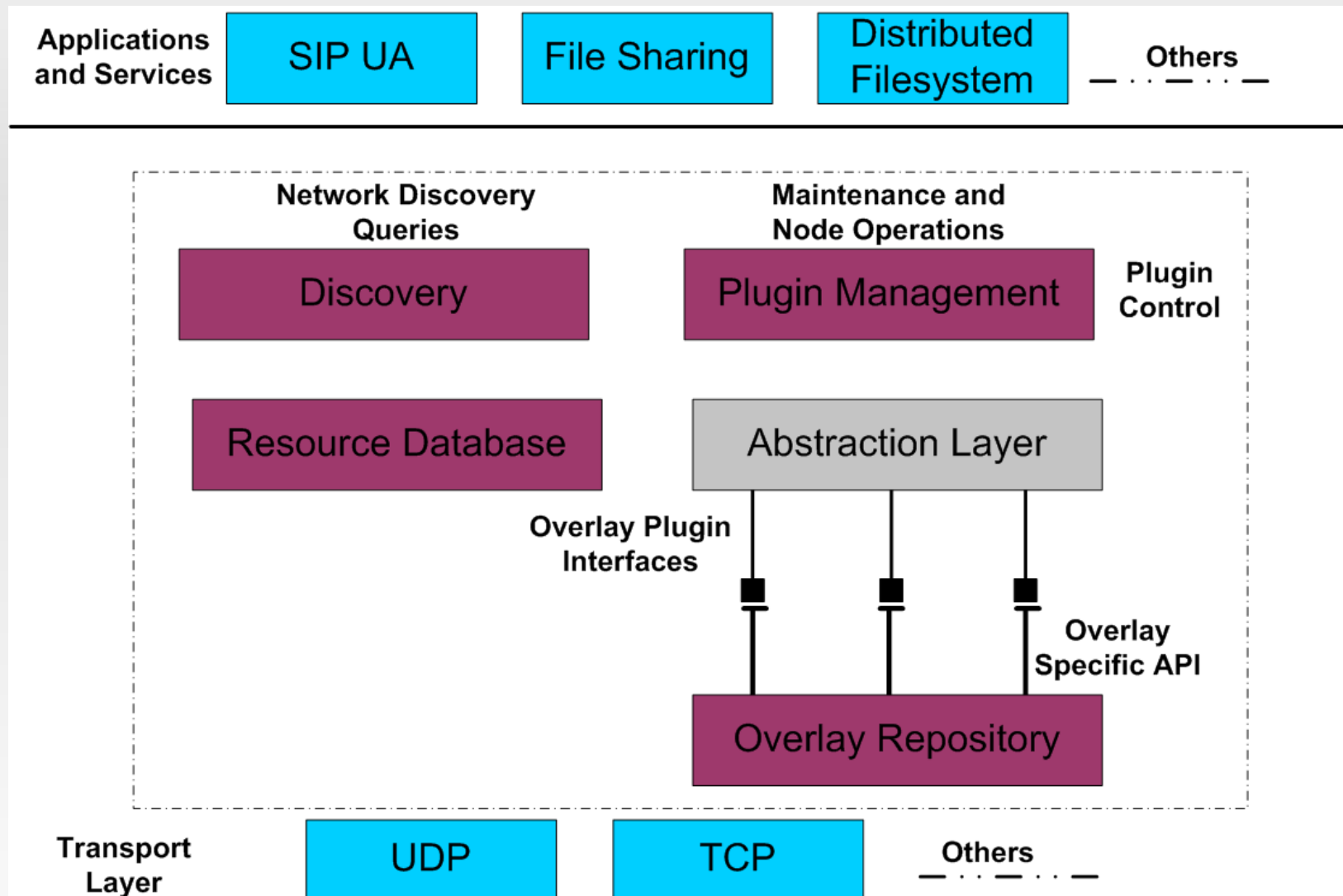
Testing of the P2P Plugins

BAMBOO

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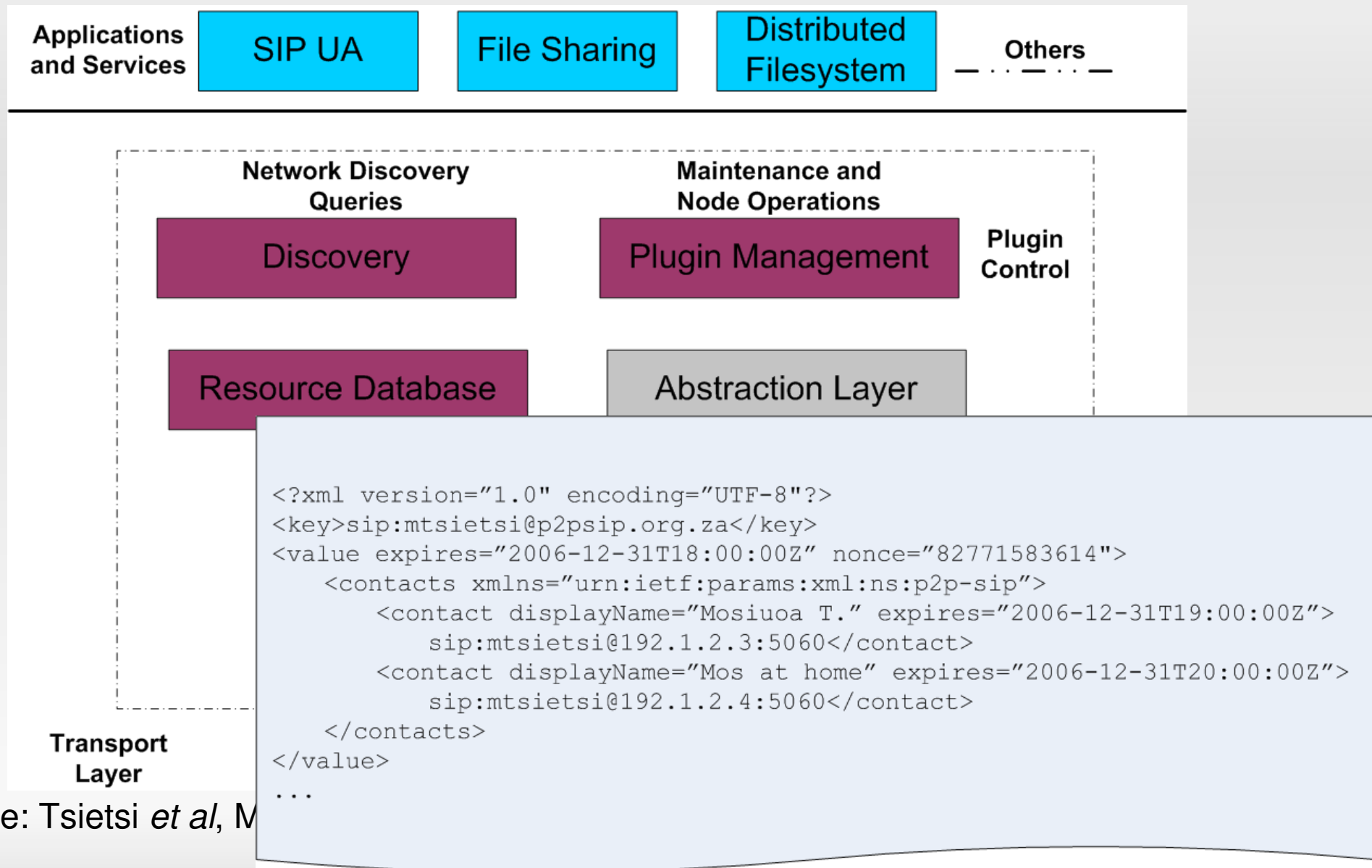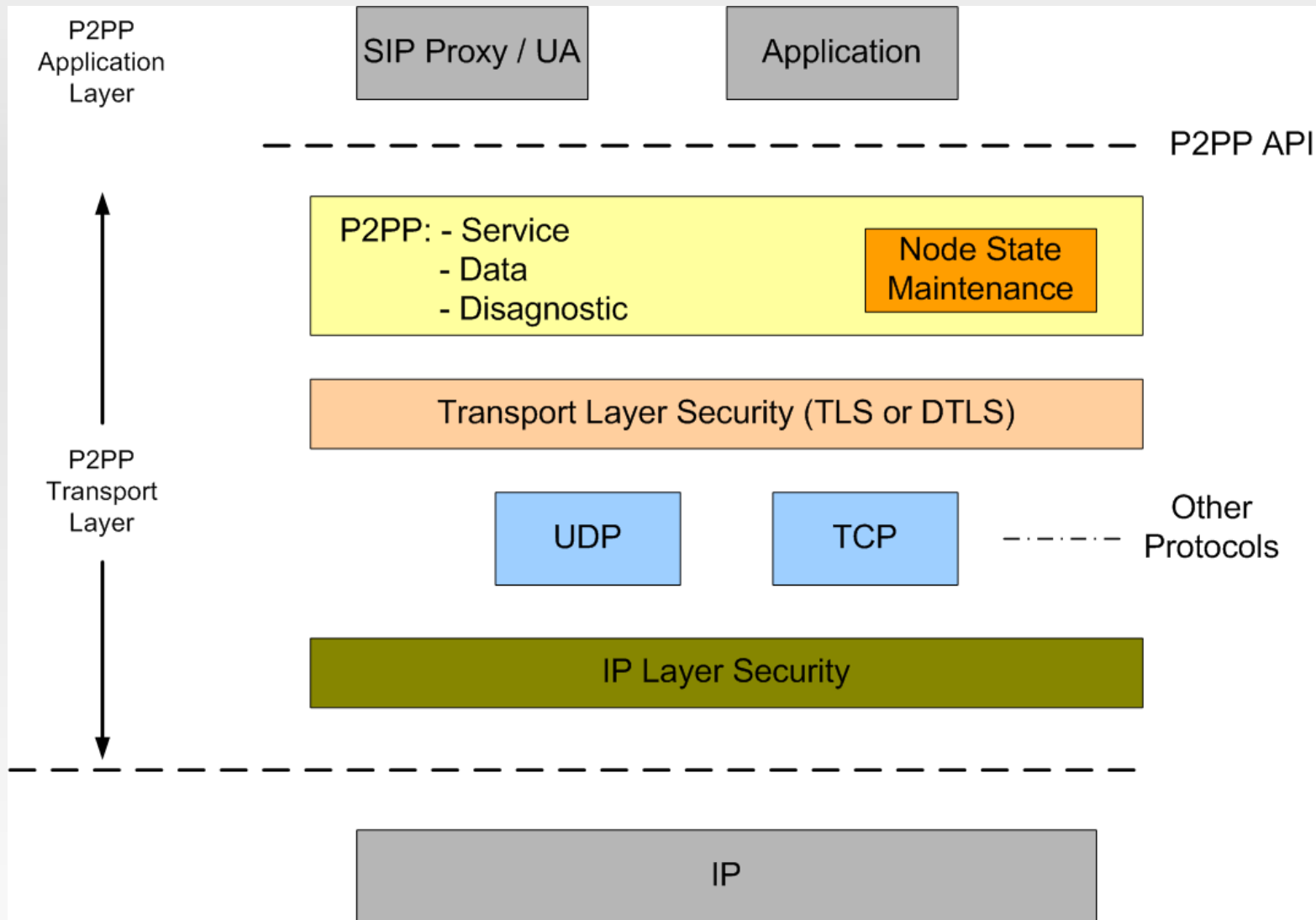each overlay.

OPENCHORD

Number of nodes: 50

LAN speed: 100Mbps

Platform: Fedora Core 5

Specifications: 2GB RAM, 1.8GHz Dual Core

Design of Overcord – Phase 2

Source: Tsietsi *et al*, Master's Thesis, December 2007

Design of Overcord – Phase 2

Applications and Services: **SIP UA** | **File Sharing** | **Distributed Filesystem** | Others — · · — · · —

Network Discovery Queries | Maintenance and Node Operations

Discovery | **Plugin Management** | Plugin Control

Resource Database | **Abstraction Layer**

```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>
...
```

Transport Layer

Source: Tsietsi *et al*, M

Overcord vs P2PP

Source: Baset and Schulzrinne, July 2007

- Introduction and Motivation

- Designing a P2P Layer for SIP

- OverCord – an overlay agnostic framework for P2P SIP

- **Incorporation into conventional SIP client**

JAIN SIP

- A standardised Java interface to SIP

- Defined by JSR 32 through the JCP

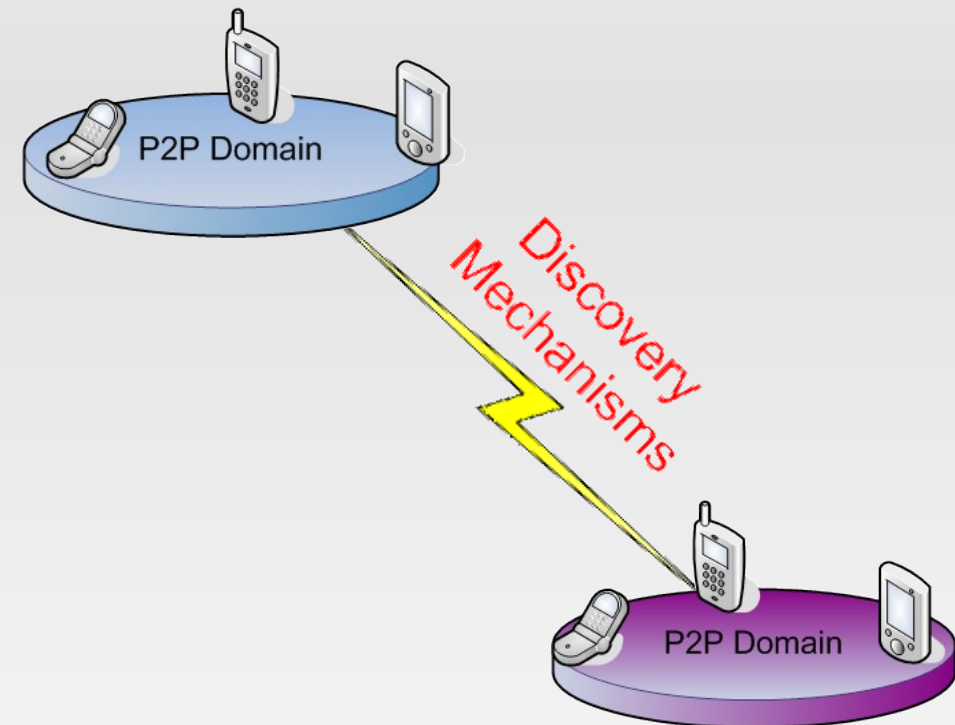- JAIN SIP enables transaction stateless, transaction stateful and dialog stateful control over the protocol

JAIN SIP Applet Phone

- User agent with messaging, presence and audio support

- Project owners:

  - Jean Deruelle - visiting lecturer, NIST

  - <u>Mosiuoa Tsietsi</u> – Rhodes University
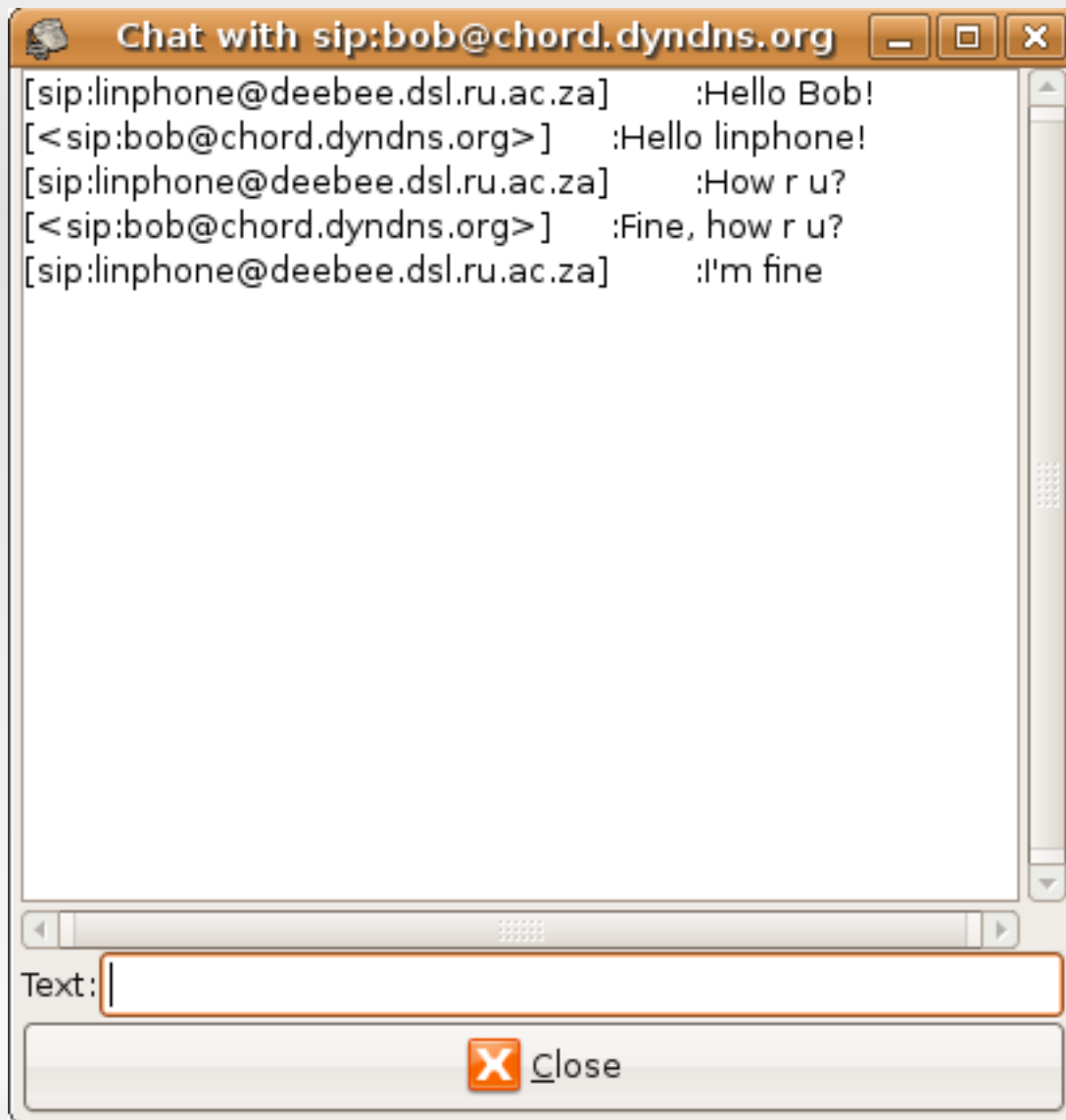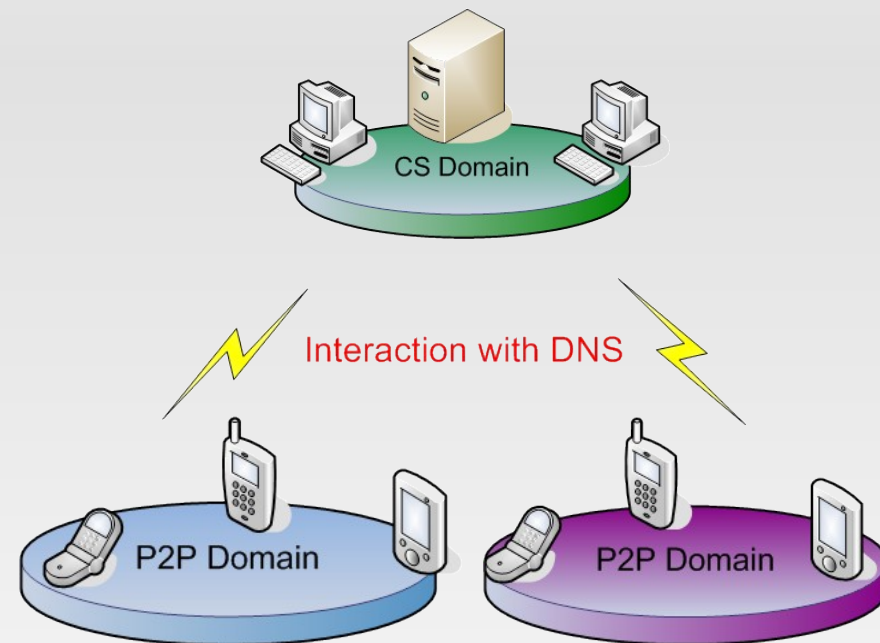
Inter and Intra overlay presence
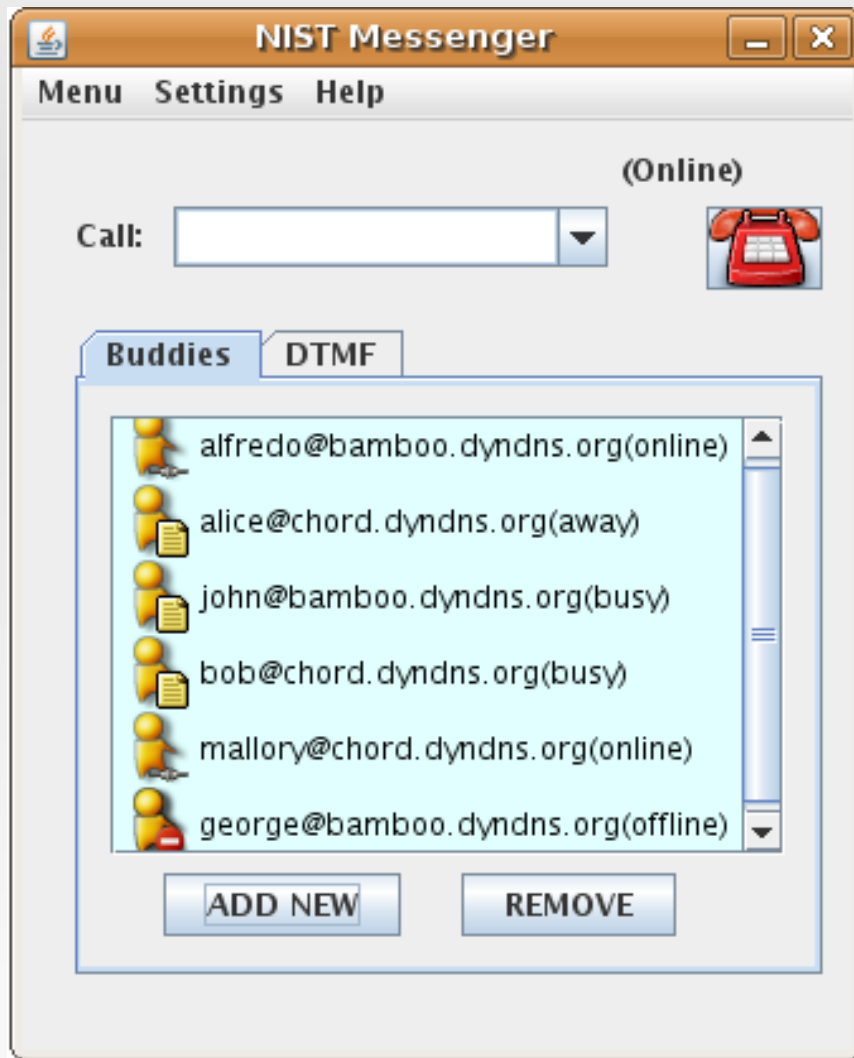
Model:

Interoperation is supported by decentralised discovery protocols such as multicast

P2P to C/S Instant Messaging

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!