

# 13. ComNets-Workshop 2006

## P2P Mobile Web Service Provisioning using SIP

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# Overview

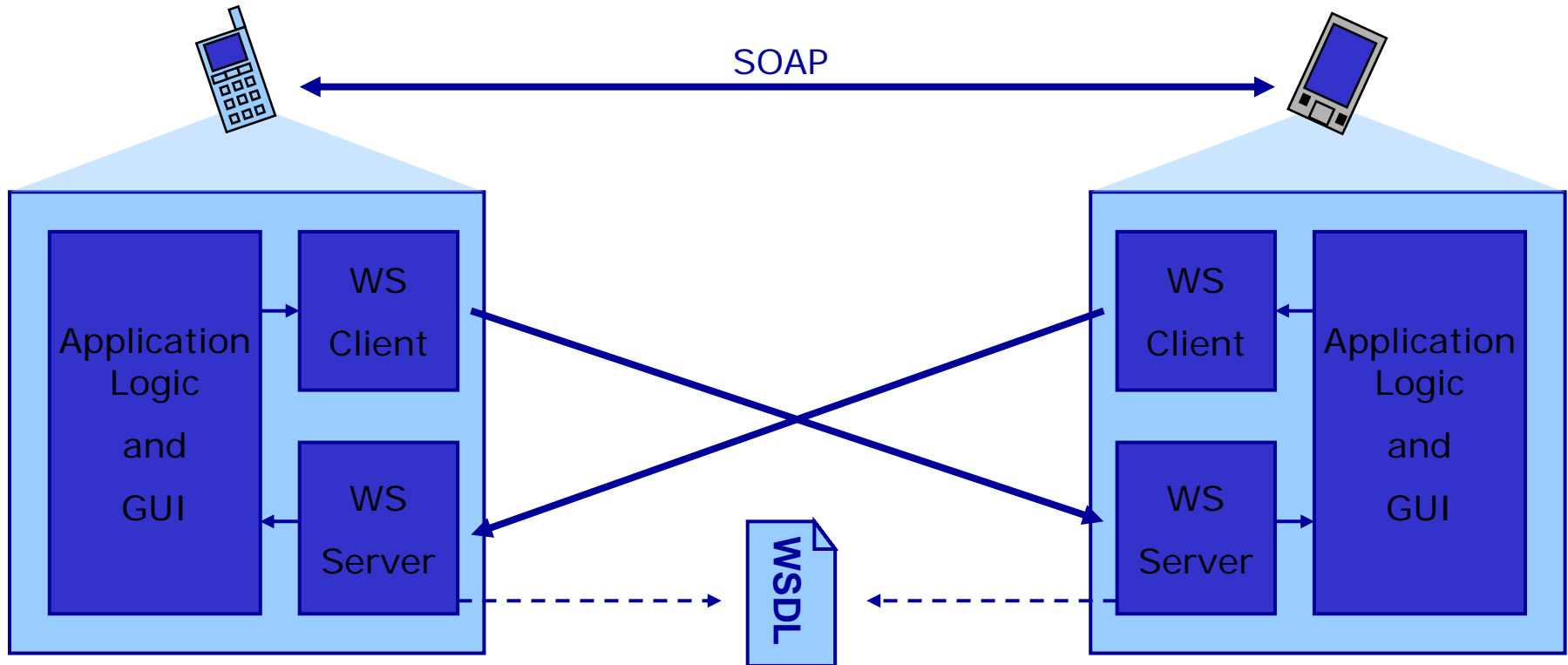
- Introduction
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- Mobile P2P Web Services
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- Service Creation
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# Motivation/Problem/Solution

- Motivation
  - Realization and Provisioning of Mobile Peer-to-Peer (P2P) applications under the control of the IMS
- Problem
  - Implementation of various application layer protocols is time- and cost-intensive
  - Mobility support of P2P applications
  - Charging of P2P applications
- Solution
  - P2P Mobile Web Services (Client and Server on the mobile terminal)
  - Session Initiation Protocol (SIP) for Mobility, Presence, and Session Management
    - Integration in the IMS

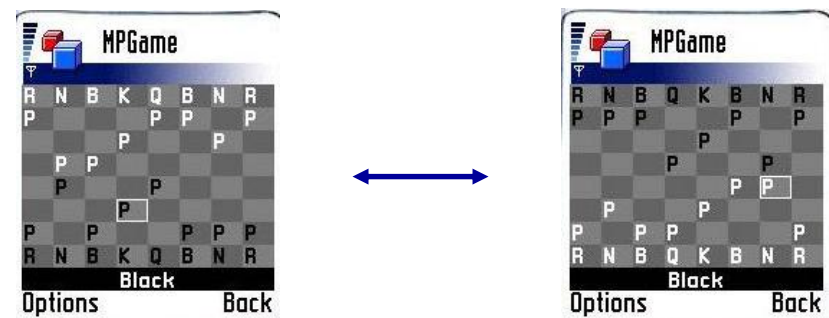
# Mobile P2P Web Services

- Sharing arbitrary applications by providing a Web Service interface
  - P2P → Mobiles are Web Service clients and servers at the same time

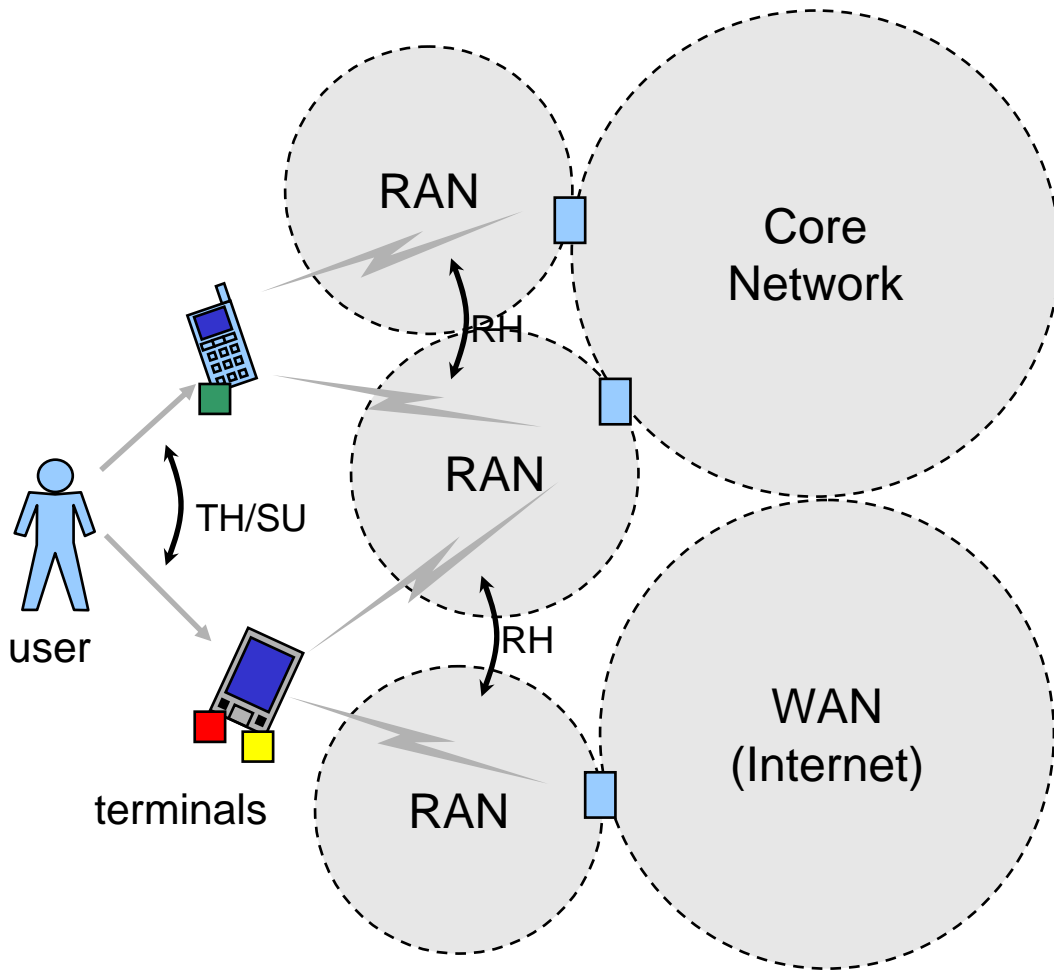


# Mobile P2P Web Service Examples

- GPS Location Web Service
  - Locate a person of your contact list
- Cooperate Working
  - Share a application/document to work jointly with your colleagues
- Share your Blogs
  - Share your mobile Blog (diary) with your friends
- Play a Mobile P2P Game
  - Invite a contact to a P2P game



# Initial State

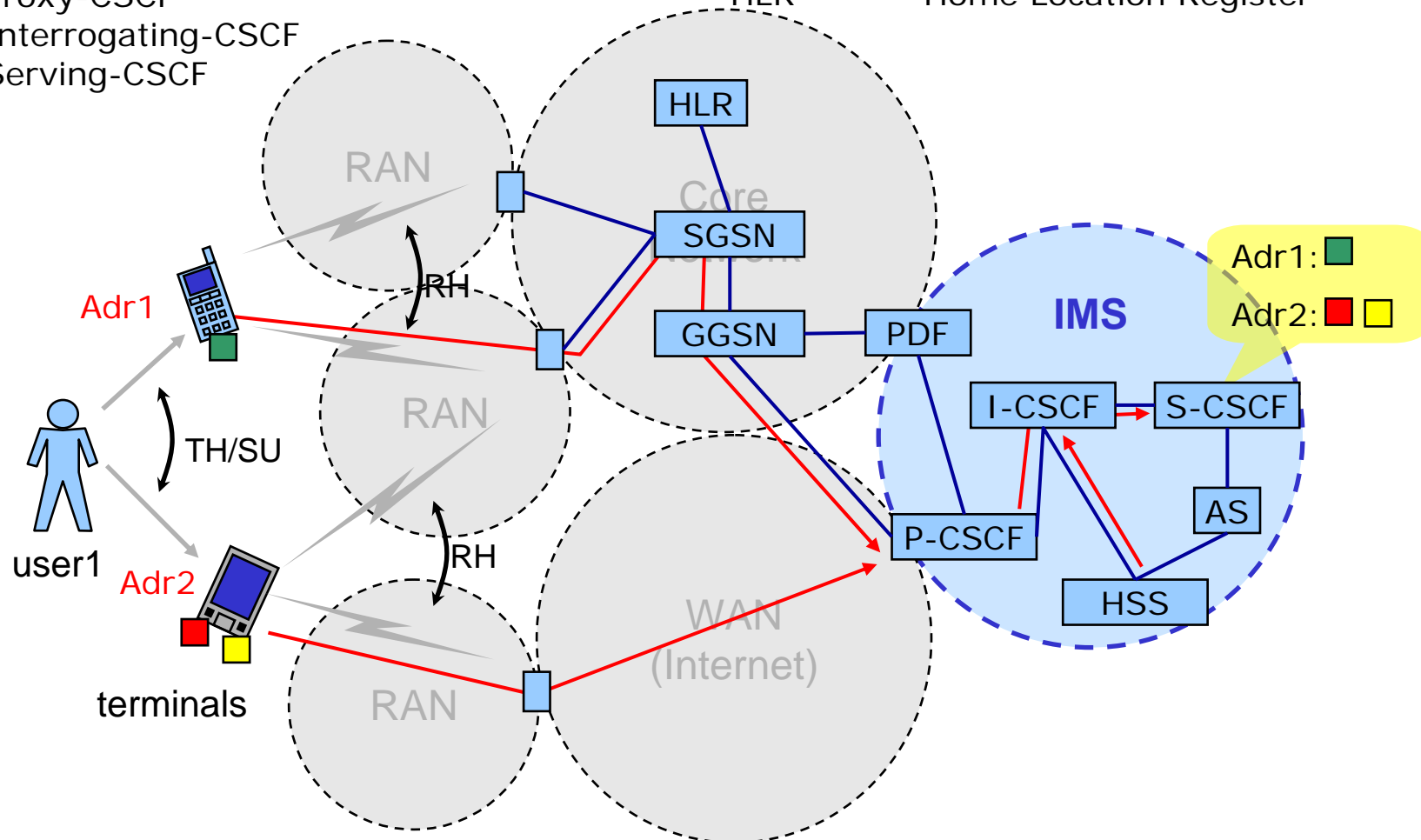


- User with **different mobiles** connected to **various Radio Access Networks (RANs)** providing **different services**
- Events
  - Terminal Handover or simultaneous use (TH/SU)
  - Radio Access Network Handover (RH)
  - Service state ■ ■ ■ changes

→ Using the IP Multimedia Subsystem with Web Services

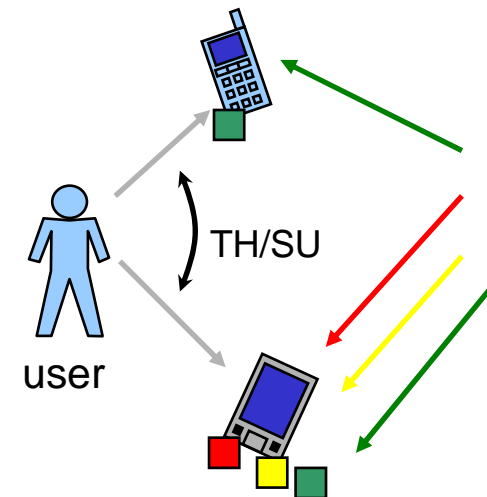
# Support of the IP Multimedia Subsystem (IMS)

- |        |                                 |      |                                 |
|--------|---------------------------------|------|---------------------------------|
| PDF    | - Policy Decision Function      | SGSN | - Serving GPRS Support Node     |
| HSS    | - Home Subscriber Server        | GGSN | - Gateway GPRS Support Node     |
| CSCF   | - Call Session Control Function | CSCF | - Call Session Control Function |
| P-CSCF | - Proxy-CSCF                    | HLR  | - Home Location Register        |
| I-CSCF | - Interrogating-CSCF            |      |                                 |
| S-CSCF | - Serving-CSCF                  |      |                                 |



# Terminal Handover/Simultaneous Use

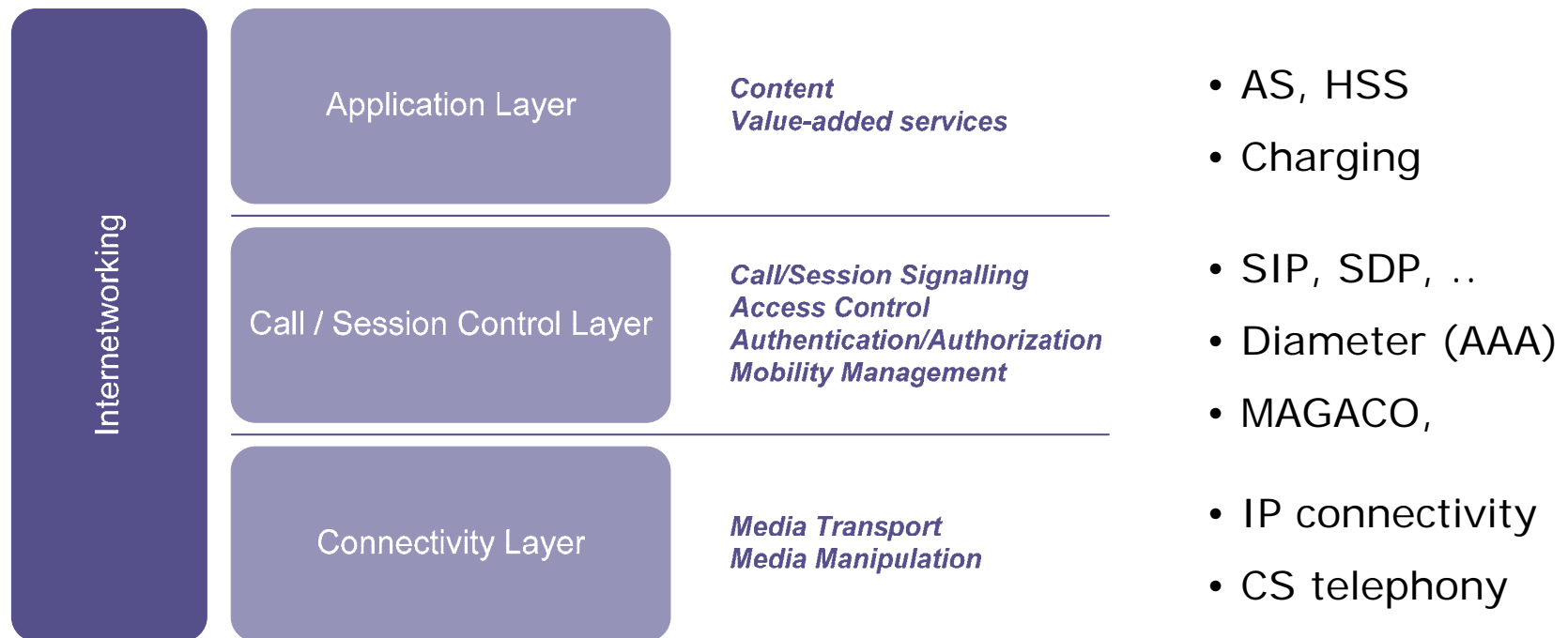
- Sharing a single user identity between multiple terminals
  - IMS Rel. 6 allows to register with same public UID from a number of terminals
  - S-CSCF may perform forking
    - Sequential forking
    - Parallel forking



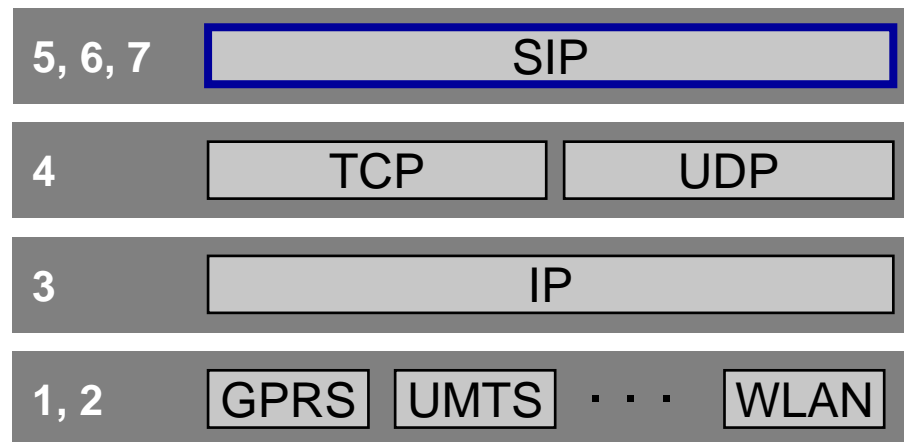


# IP Multimedia Subsystem (IMS) - Overview

- IMS is an architecture to offer data services on the packet domain
- IMS is a standardized SIP-based overlay network
- IMS is access agnostic, integrates with existing voice and data networks
- IMS is a service enabler, not a service provider



# Session Initiation Protocol (SIP)



## Main Methods:

REGISTER, INVITE, BYE, CANCEL,  
ACK, OPTIONS, ...

## Extension Methods:

SUBSCRIBE, NOTIFY, MESSAGE, ...

```
INVITE sip:jiplet@comnets.rwth-aachen.de SIP 2.0
```

```
Max-Forwards: 70
```

```
To: <sip:user1@comnets.rwth-aachen.de>
```

```
From: Jiplet <sip:jiplet@comnets.rwth-aachen.de>
```

```
Call-ID: SID007
```

```
CSeq: 1 INVITE
```

```
Subject: MPBlogger
```

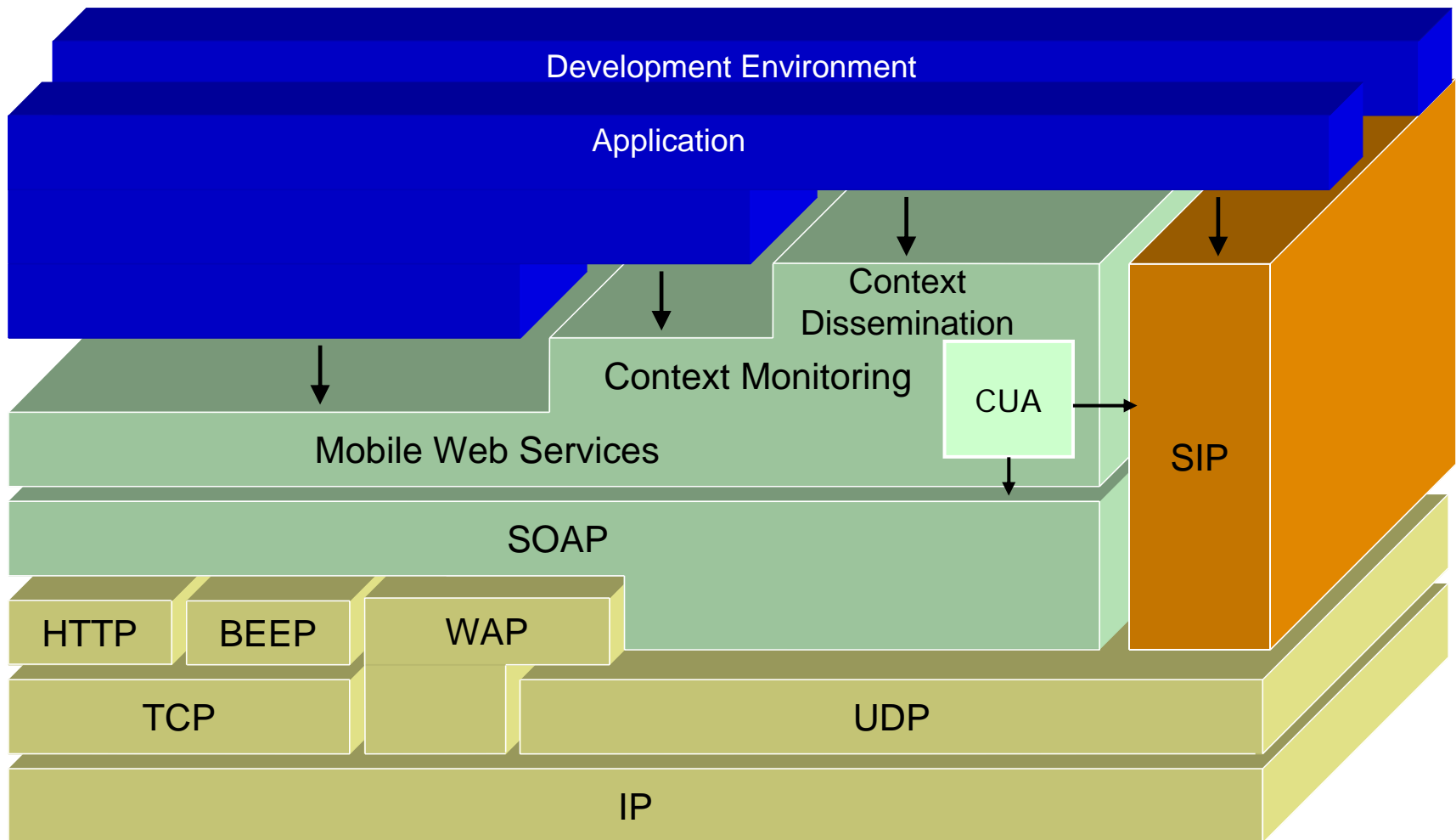
```
Contact: sip:137.226.4.40:5060
```

```
Content-Type: application/sdp
```

```
Content-Length: 150
```

```
<<sdp information as body>>
```

# Protocol/Middleware Architecture



CUA – Context User Agent (Extension of the SIP Presence User Agent)

# Service Creation Process

A)

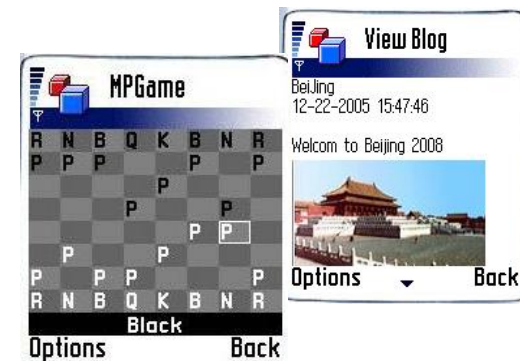
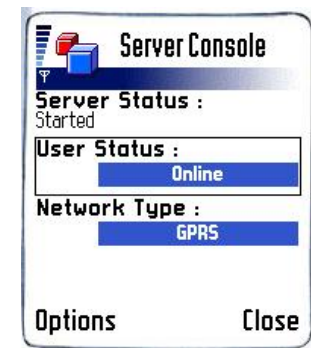
- Application already exists
- Exposing Programming Interface as Web Service
- Generate and Publish WSDL
- Register Service with a IMS Service ID

B)

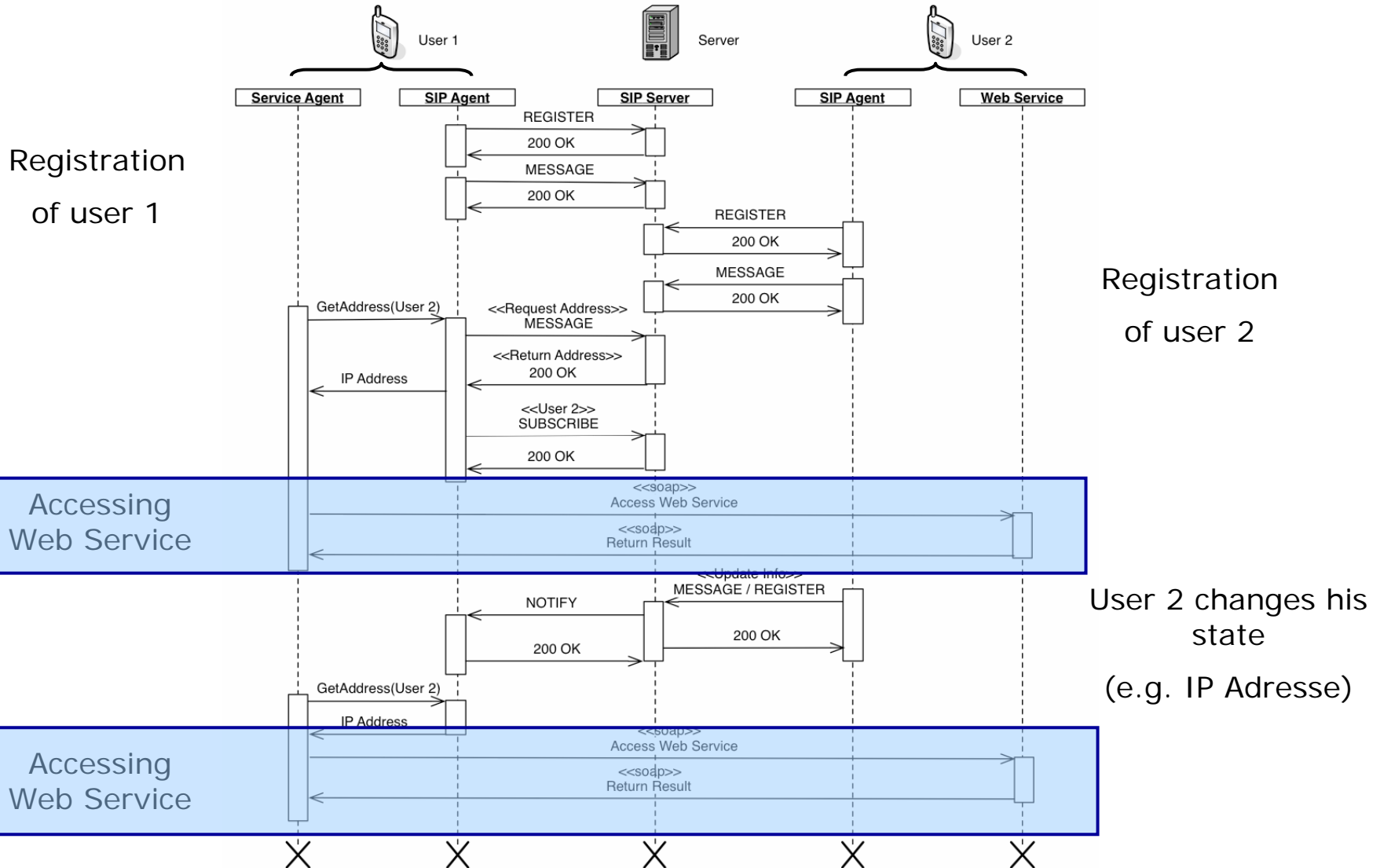
- Define Service Interface (WSDL)
- Publish WSDL (e.g. in UDDI)
- Register Service with a IMS Service ID
- Initiate client development

# Prototypical Implementation

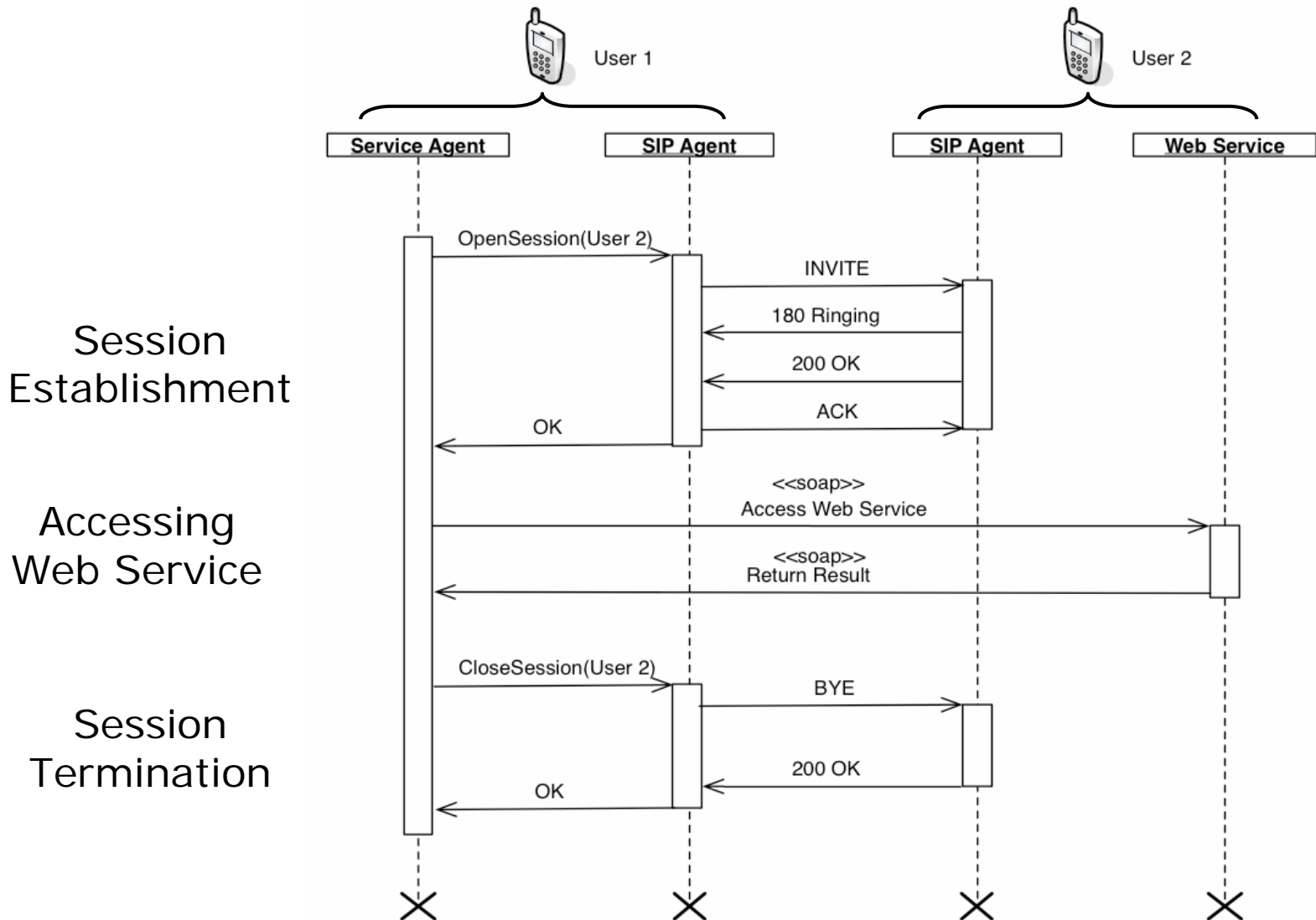
- SIP Application Server
  - Including Call Session Control Functions
  - Presence and Context Management
  - Mobility Support and Session Management
  - Mobile Web Service Management
- J2ME application
  - SIP API (JSR180)
  - Web Service Engine (kSOAP + ComNets Extensions)
    - HTTP Server + SOAP server binding
    - UDP bindings + server
    - WAP binding
  - Example Mobile P2P applications offering Web Services
    - Mobile P2P Blog
    - Mobile P2P Chess



# Mobility Support



# Session Establishment



# Mobile P2P Chess

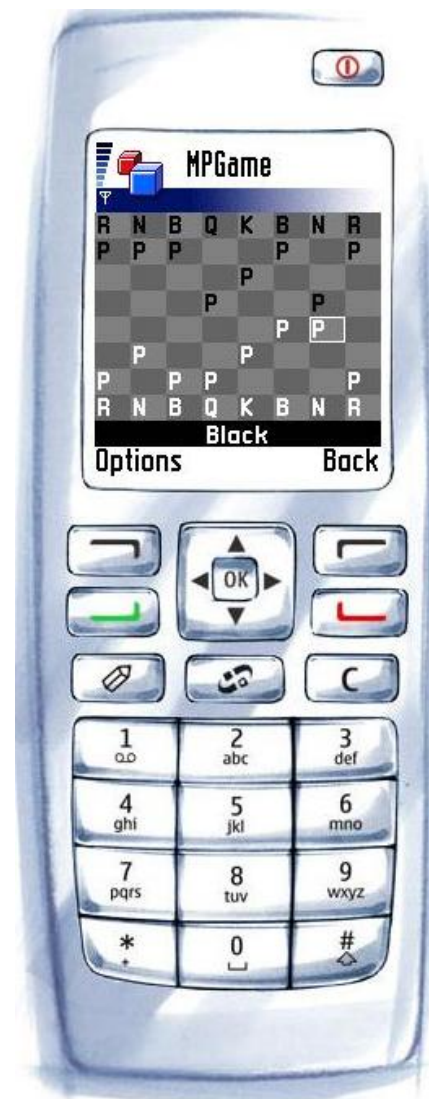
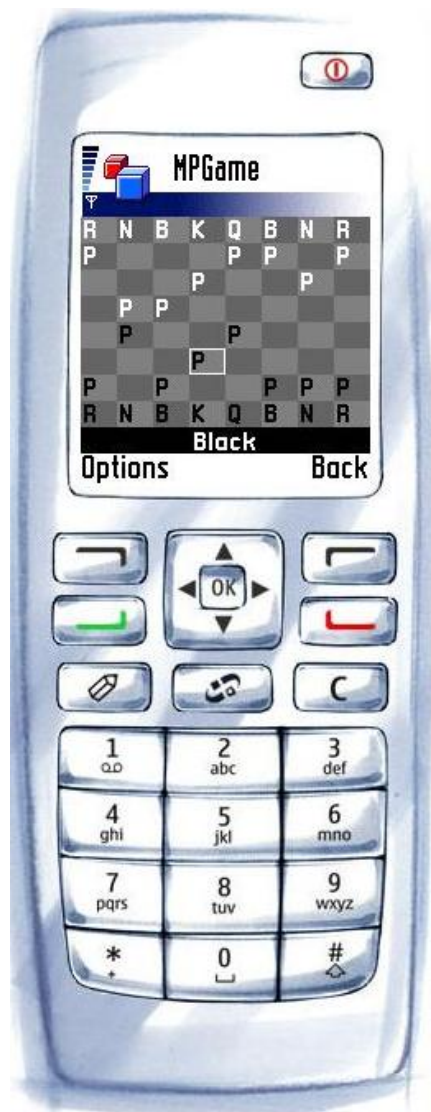








SIP





# Mobile P2P Chess

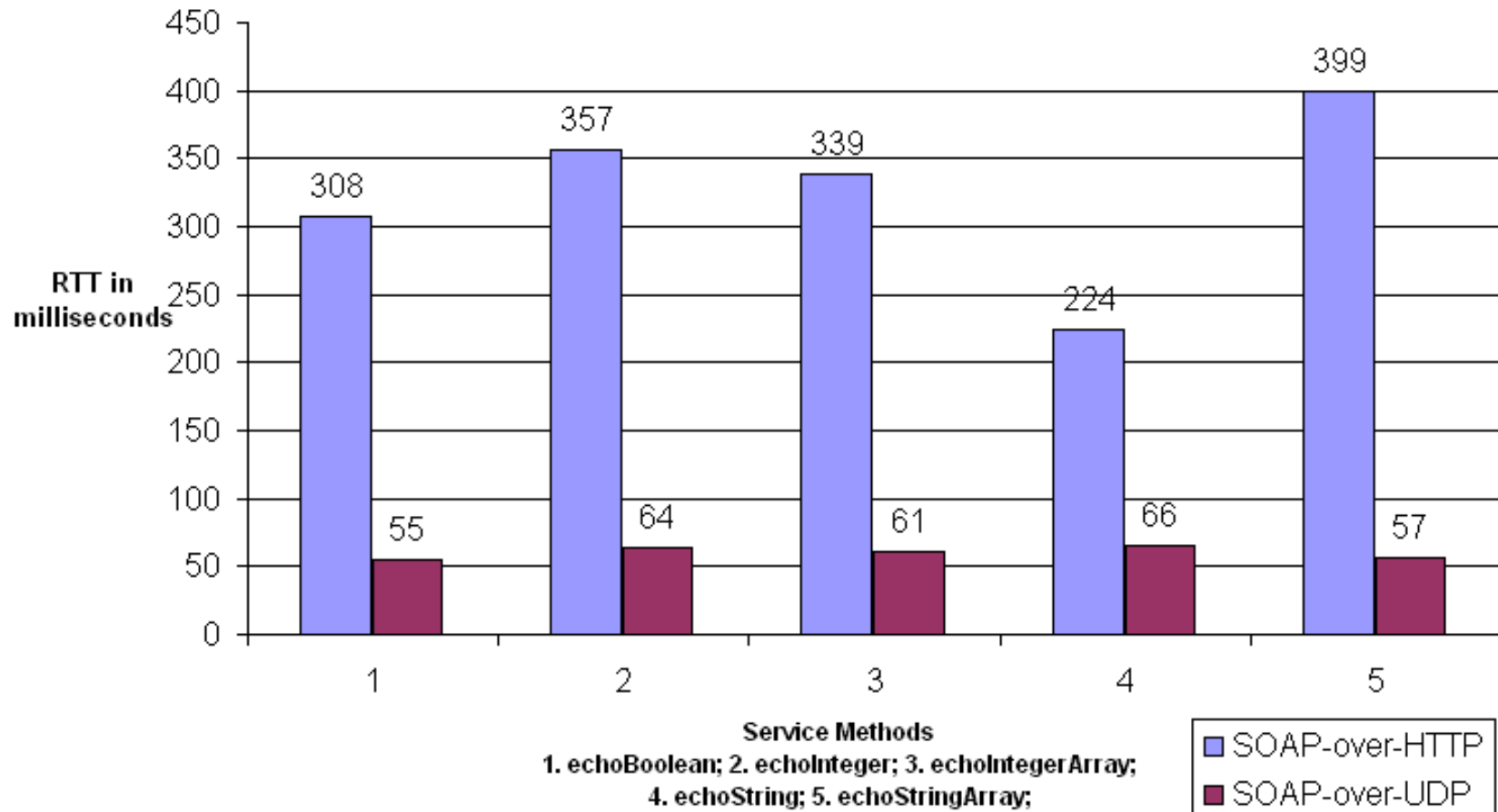


<a href="#">Pawn</a>	P	
<a href="#">Knight</a>	N	
<a href="#">Bishop</a>	B	
<a href="#">Rook</a>	R	
<a href="#">Queen</a>	Q	
<a href="#">King</a>	K	

# Performance Enhancements

## Mean Round Trip Time (RTT) Measurement

Services deployed on ComNets Light-Weight SOAP Server and invoked via HTTP and reliable UDP transports for over 30 execution of each service



- Mobile P2P Web Service architecture based on SIP and IMS
  - Mobility Management
  - Session Management
  - Service Creation
  - Prototypical implementation
  - Performance Enhancements using alternative SOAP bindings

**Thank you for your attention !**

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**Any questions?**

**... See you at the demonstration!**