

# Signaling Protocol Neutral Architectures

**INSE 7110 – Winter 2007**

**Value Added Services Engineering in Next Generation Networks  
Week #7, Lecture 6**

## Definition ...

### Signaling protocol neutral architecture

- Service architecture applicable to networks using any signalling protocol
  - Circuit switched telephony signalling protocol (I.e. SS7/ISUP/INAP)
  - Next Generation signalling protocols
    - H.323
    - SIP
    - Megaco
- Applicable to both circuit switched telephony and next generation networks

# Today's signaling protocol neutral architectures ...

## JAIN JCC/JCAT

- JAIN community product
  - Applicable to SS7/ISUP/TCAP, SIP and H.323
  - Has lost momentum to Parlay

## Parlay

- Discussed in in this course

## Call Processing Language (CPL)

- Discussed in this course

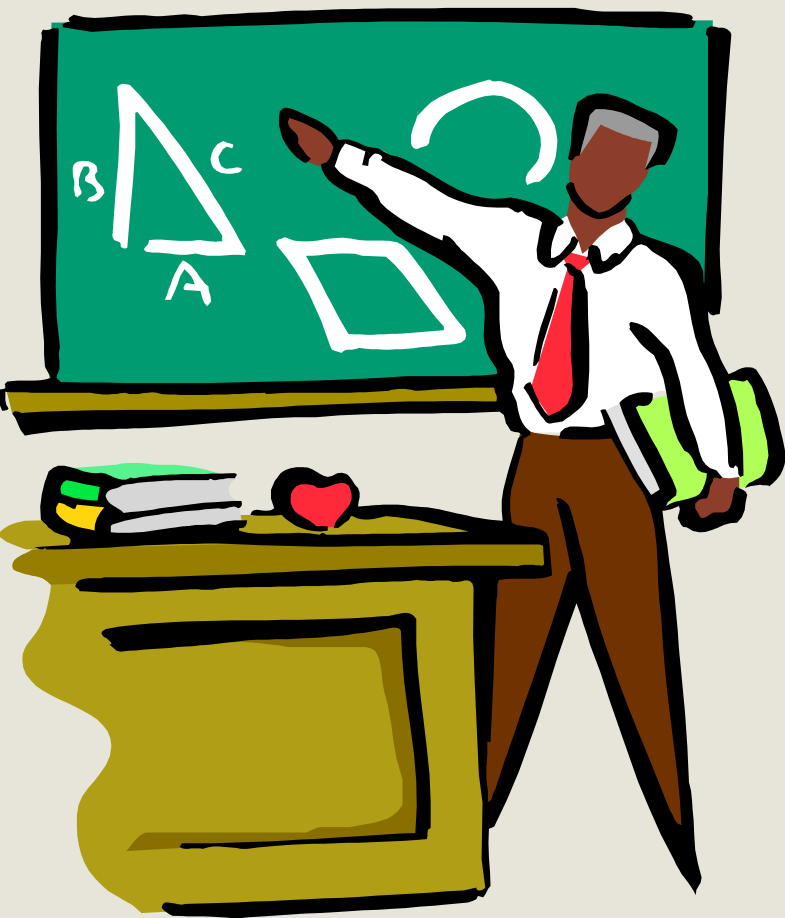
# Signaling protocol neutral architectures ...



1. Parlay

2. CPL

# OSA/PARLAY



1. Introduction
2. Business model
3. Interactions
4. APIs
5. Case Study
6. Pros and cons

# Introduction

## PARLAY forum

- Created in 1998 as close forum
- Open since 2000
- Include most major players from telecommunications and computer industries (e.g. Ericsson, Lucent, Siemens, IBM)
- Fourth release of specifications recently released

## Relationship of Parlay specifications to 3GPP specifications

- API called Open Service Access (OSA) in 3GPP
  - Thus Parlay/OSA
  - Joint development

# Introduction

## OSA a tool kit of Virtual Home Environment (VHE)

- VHE
  - 3GPP concept for service mobility
    - Access to services from any location and with any terminal (within the limit of the terminal capabilities)
    - Include several tool kits:

## OSA allow third party to access 3GPP next generation networks

- OSA application servers
  - reside in third party domains
  - Access 3GPP network functionality via service capability servers (SCS) (i.e. gateways)

# Introduction

## PARLAY main goal: Open up telecommunication networks

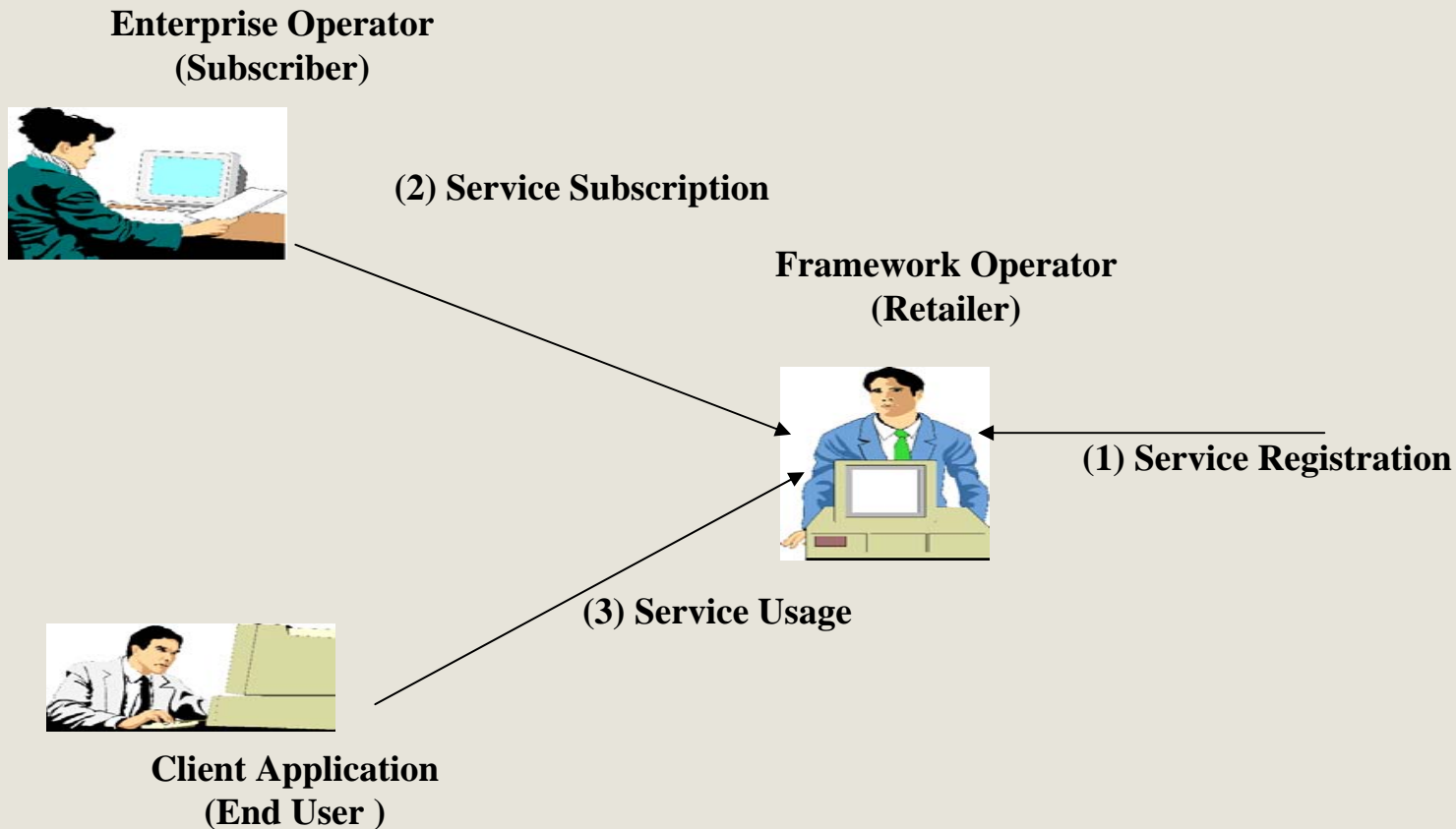
- Enable new business models
- Use open information technology middleware
- Make telecommunication network capabilities available for application development
  - Two types of APIs
    - Services APIs
      - Expose the network capabilities (e.g. call control, presence)
    - Framework APIs
      - Make the use of the service APIs secure, accountable and resilient (e.g. security, registration, authentication)



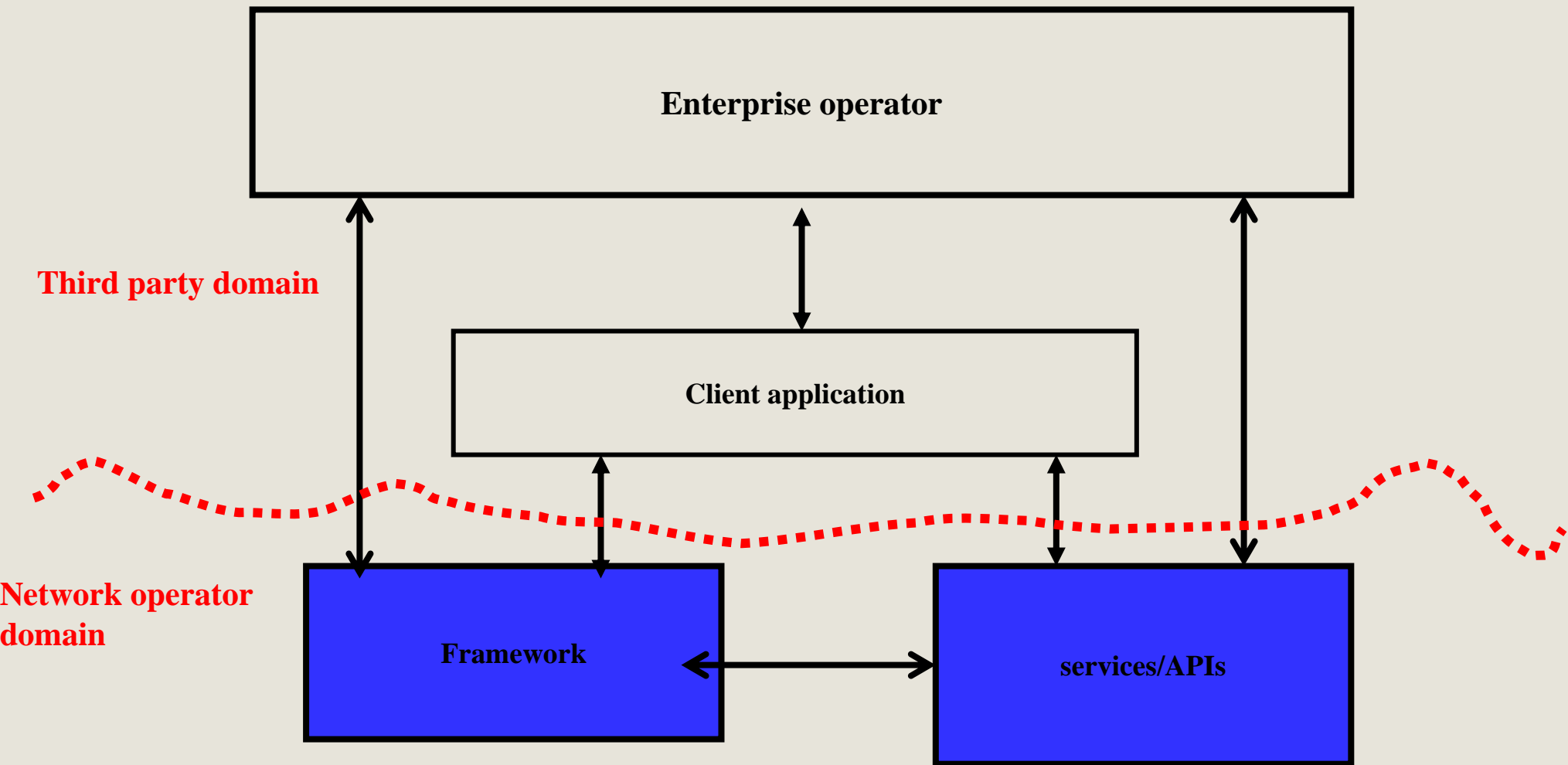
# The business model

- Introduction
  - TINA-C inspired business model
  - Terminology: Services mean network capabilities
- Roles
  - Client application
    - Consume/use the services (e.g. network capabilities)
    - Equivalent to end users in TINA-C.
  - Enterprise operator
    - The entity that subscribes to the services
    - Subscriber in TINA-C
  - Framework operator
    - Entity that handles the subscriptions
    - Equivalent to the retailer in TINA-C

# General model



# Commonly deployed model ...



# Interactions

## Application and framework

### Authentication

- Peer to peer model
- Allow framework to check that application is “who” it claims to be and application to check that framework is “who” it claims to be
- Usually used in only one direction (I.e. framework checking).

### Authorisation

- Determination of what the application can do once authenticated

### Discovery

- Once authenticated applications can get info on available APIs

### Establishment of service level agreement

- . Usually done off-line

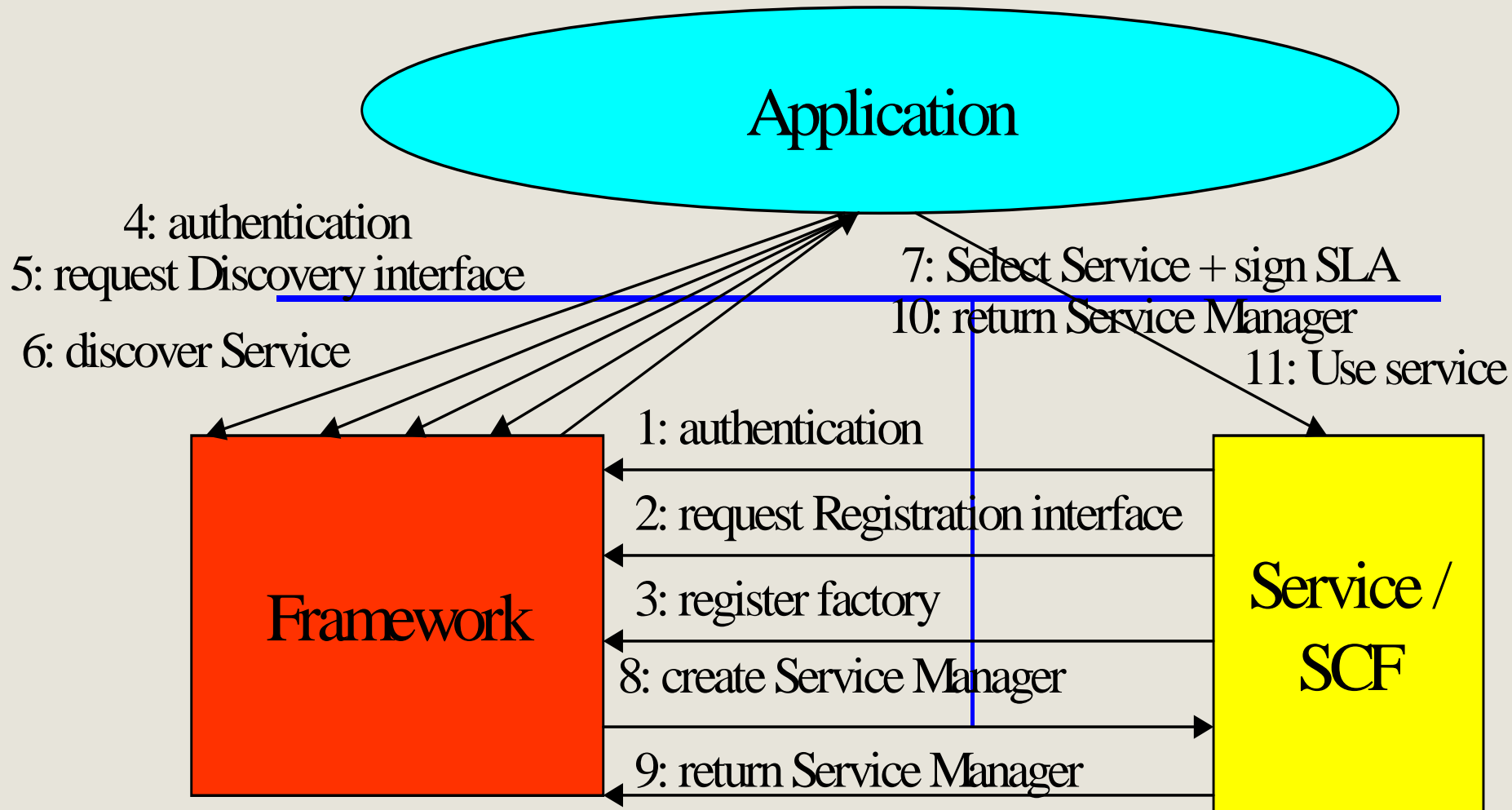
# Interactions

**Services/APIs and framework**

**Registration / De-registration**

- Allow services to register/de-register to/from the framework

# Interactions (Taken from reference [2])



1 – 3 registration/discovery, 4-11 run time communications establishment ....

# The APIs

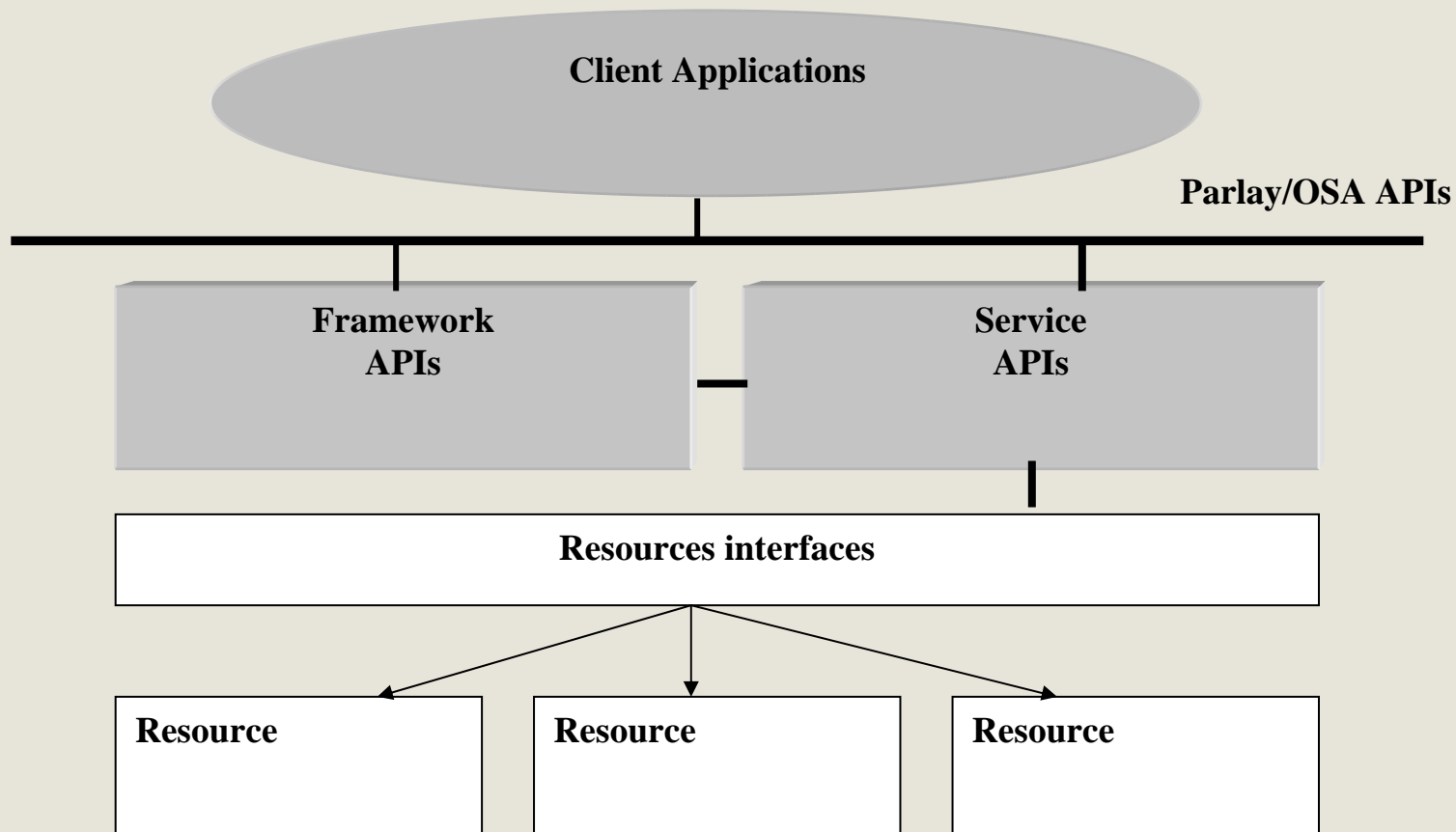


Figure 2 Parlay APIs interfaces

# The APIs

## Some common characteristics

Specifications include

- High level specification in UML (Universal Modelling Language)
- API specifications for several IT technologies
  - CORBA IDL
  - WSDL
  - Java

Two modes of communications

- Synchronous
- Asynchronous



# Framework API: Make the use of the service APIs secure and resilient

Trust and security management

Event notification

Service discovery

Service registration

Integrity management (e.g. load management)

Service agreement

## Framework API: Make the use of the service APIs secure and resilient

Trust and security management – Examples of method

AbortAuthentication ()

AuthenticationSucceeded ()

Challenge ()

TerminateAccess ()

InitiateAuthenticationWithVersion ()

## **Service API: Give access to network capabilities**

**Call control**

**User interactions**

**Generic messaging**

**Mobility**

**Terminal capabilities**

**Connectivity management**

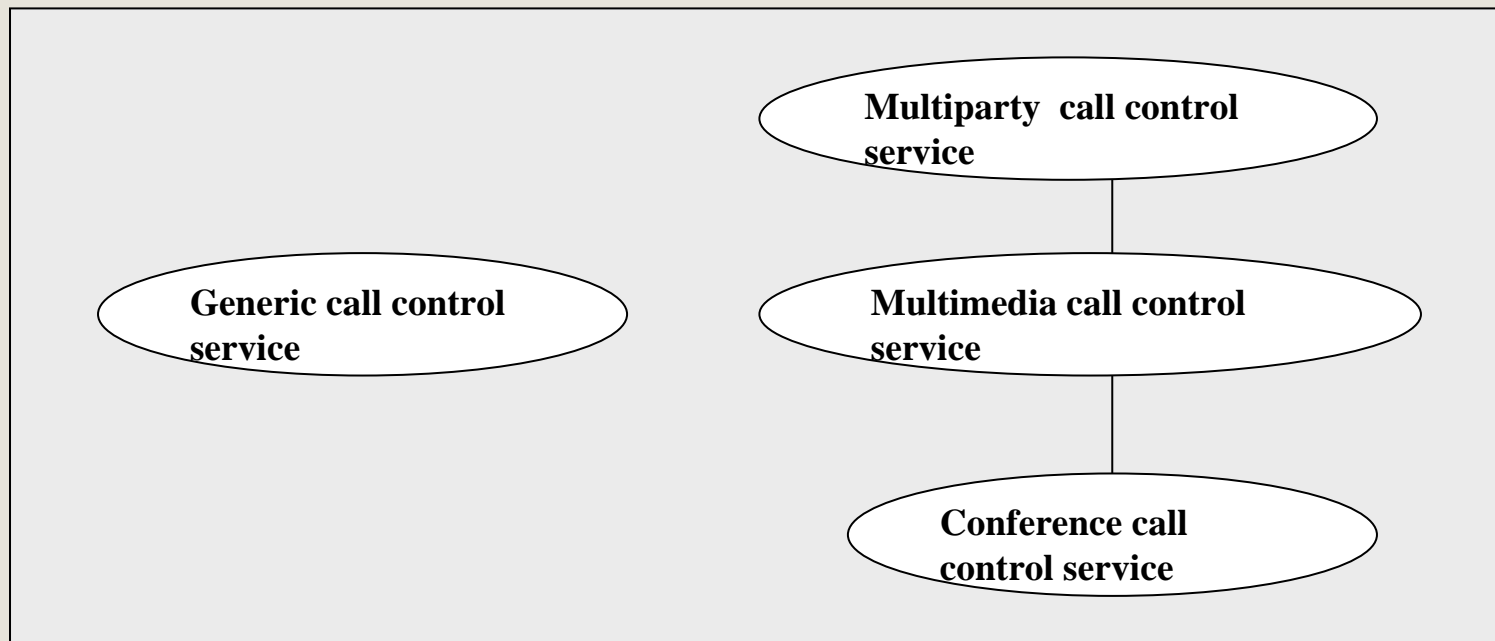
**Account management**

**Charging service**

**Data session control**

**Presence and availability management**

## An example of Service API: Call control



# The call control API

## Call model

- Terminal
  - End point (Not covered in the current specifications)
- Address
  - Represents a party in a call (E.164 number, IP address)
- Call
  - Abstraction of the physical call that occurs in a network
- Call leg
  - Logical association between a call and a party involved in a call

# The call control API

## Generic call control

- Two party voice call only
- Remain in Parlay for historical reasons

## Multiparty call control

- Establishment of calls with any given number of users
- Root of the inheritance tree

## Multimedia call control

- Add multimedia (e.g. media negotiation) capabilities

## Conference call control

- Add conferencing capabilities

# Conferencing / multiparty sessions

## Basis of a wide range of applications

- Voice/videoconferencing
- Multiparty gaming
- Distance learning
- And more ...

## Categorization schemes

- With / without sub-conferences
- Pre-arranged vs. ad hoc
- With / without floor control
  - Floor control: Who can be heard /seen
- Where the media is mixed (e.g Centralized vs. decentralized)
- Dial-in (Meet-me) vs. dial-out

# Conferencing with Parlay ....

## Examples of methods ...

- CreateConference ()
  - Parameters include the number of sub-conferences
- CheckResource ()
- ReserveResources ()
- FreeResources ()
- PartyJoined ()
- SplitSubconference ()
- MergeSubconference ()
- FloorRequest ()



## A case study on PARLAY/OSA and SIP: Run For Your Life game (Described in detail in reference [3])



- 1 - Introduction
- 2 - Game
- 3 - Architecture
- 4 - Mapping

## Introduction ...

### Run-For-Your-Life

- Built from scratch in Ericsson Research lab in Montreal Canada
- Demonstrated at several trade shows (e.g. ICIN 2001, Parlay Munich meeting, Parlay Hong Kong meeting)
- Objectives assigned to the game design
  - Extensive usage of call control capabilities
  - Have fun ...

# Introduction ...

## Objective of the case study ...

Aim at helping in tackling two issues:

### 1. PARLAY Call Control APIs that cannot be mapped onto SIP

- What are they?
- What is the impact on service creation?

### 1. SIP semantics that are not visible in PARLAY APIs as per today's specification

- What are they?
- What is the impact on service creation?

## The game ...

### A multiparty cooperative game

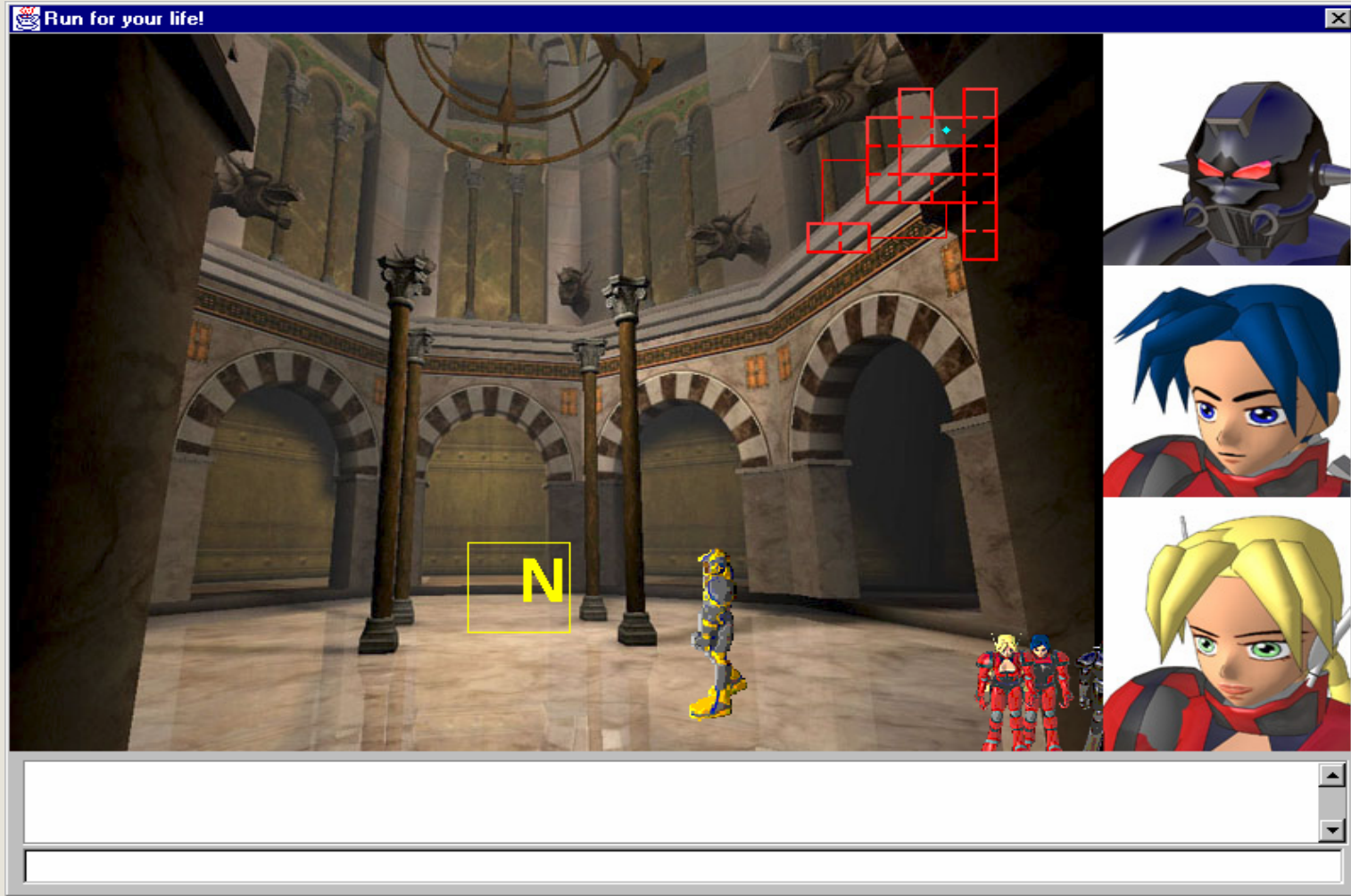
- Group of people trapped in a house with several rooms set to burn/explode in a given time
- Can escape only if password is found
- Letters making the password scattered in selected rooms of the house
- People ending up in the same room can exchange hints about the password via audio and chat
- Game can be assimilated to a conference with as sub-conference people ending up in a same room

### Requiring a set of well defined conferencing functionality

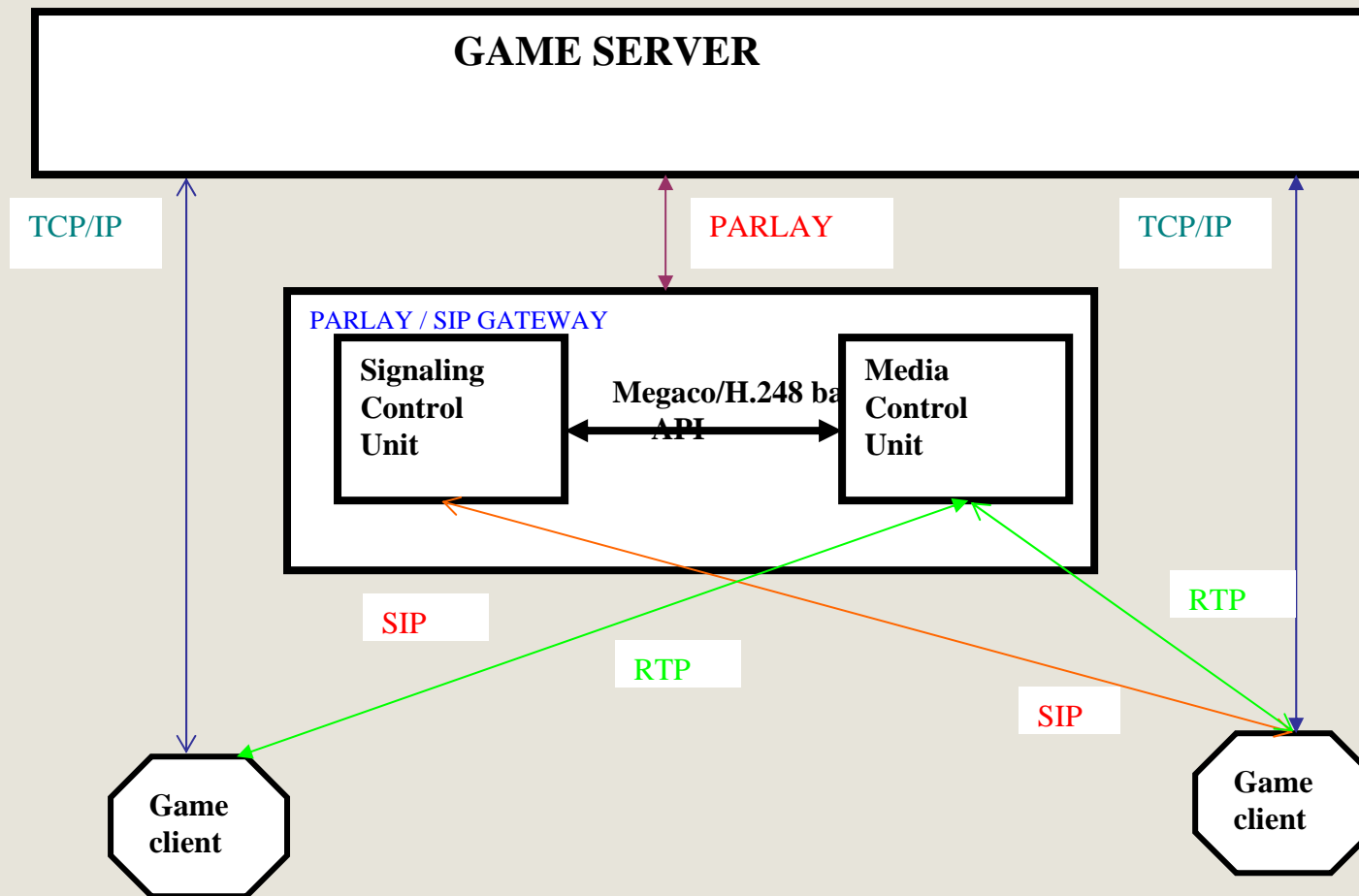
- Conferencing
- Sub-conferencing

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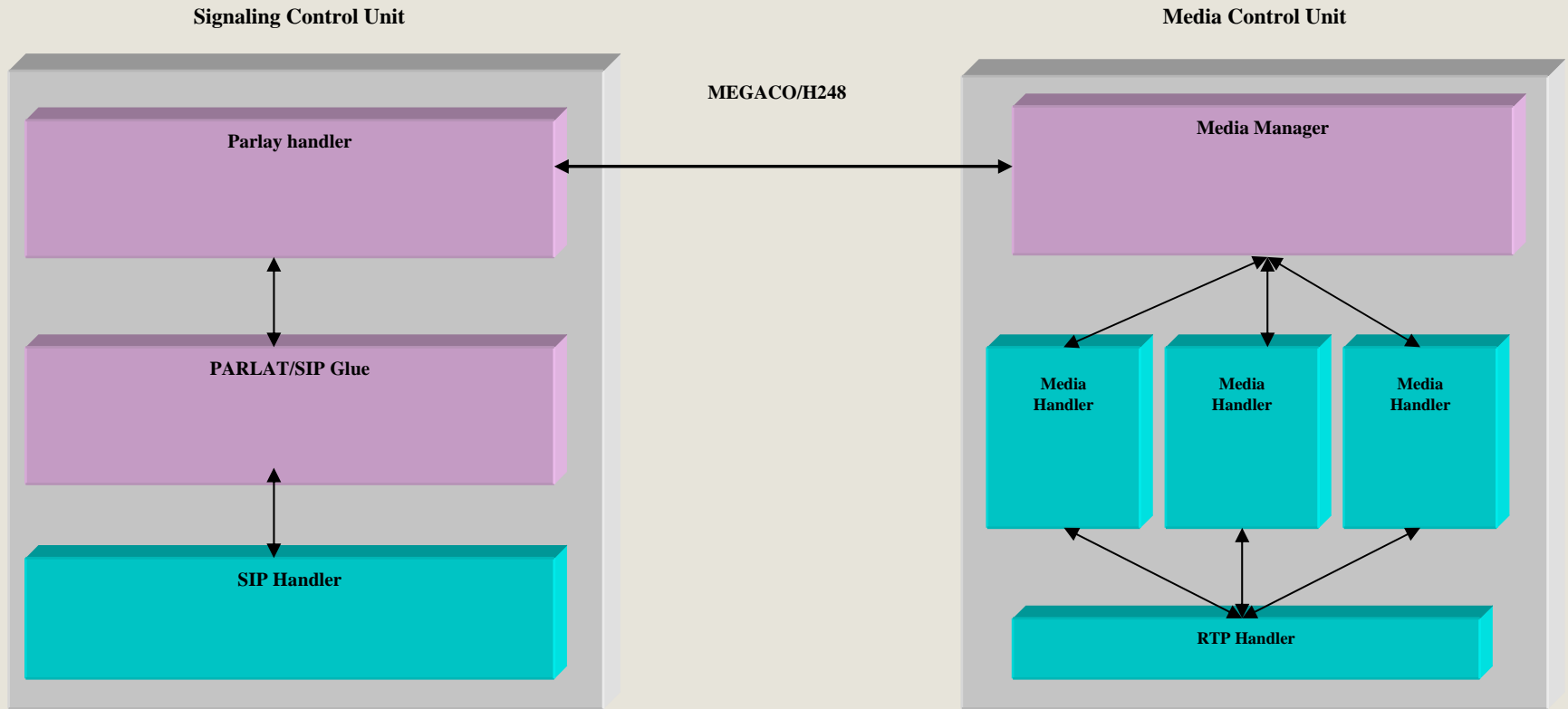
# The game ...



# Architecture ...



# Architecture ...



# Dial in ...

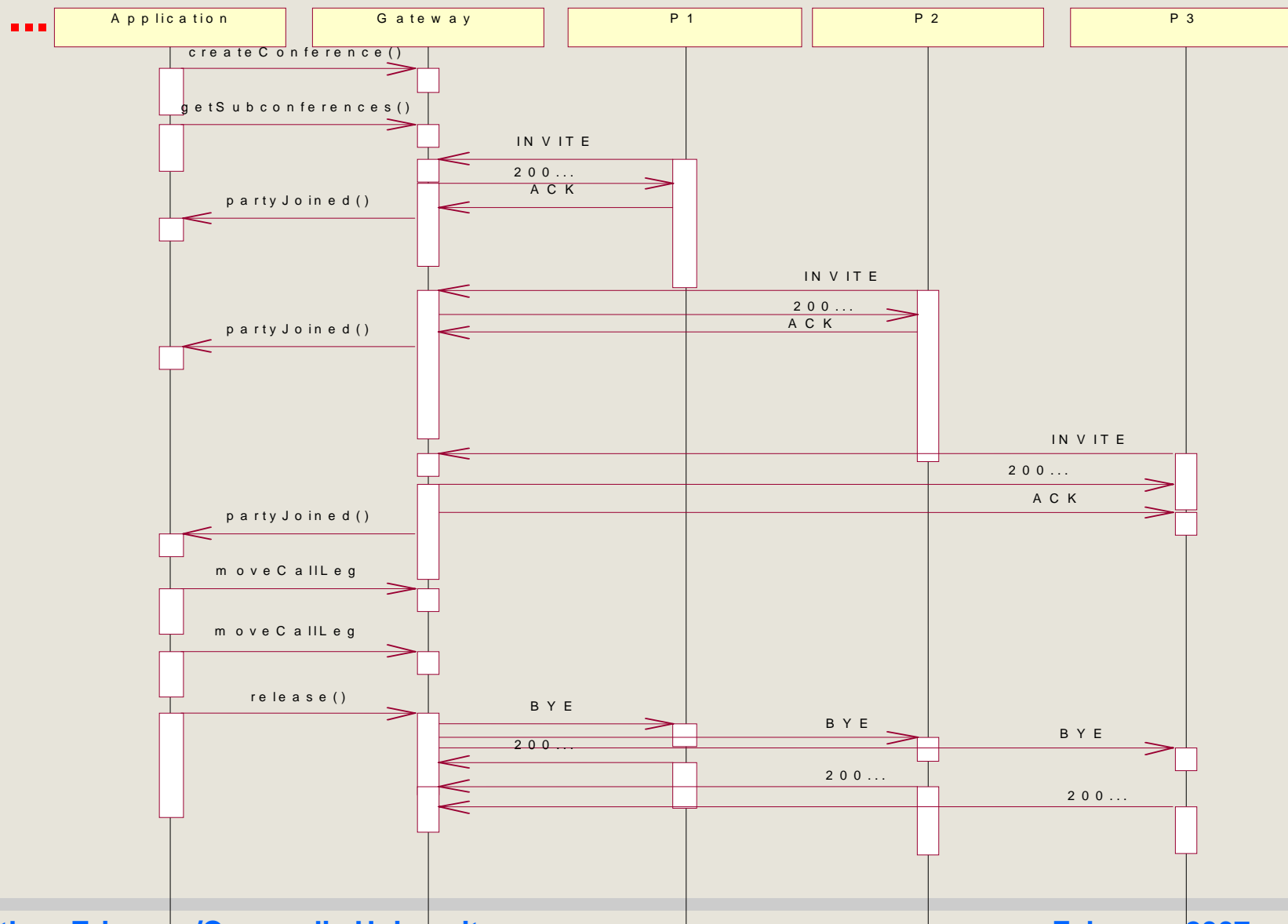
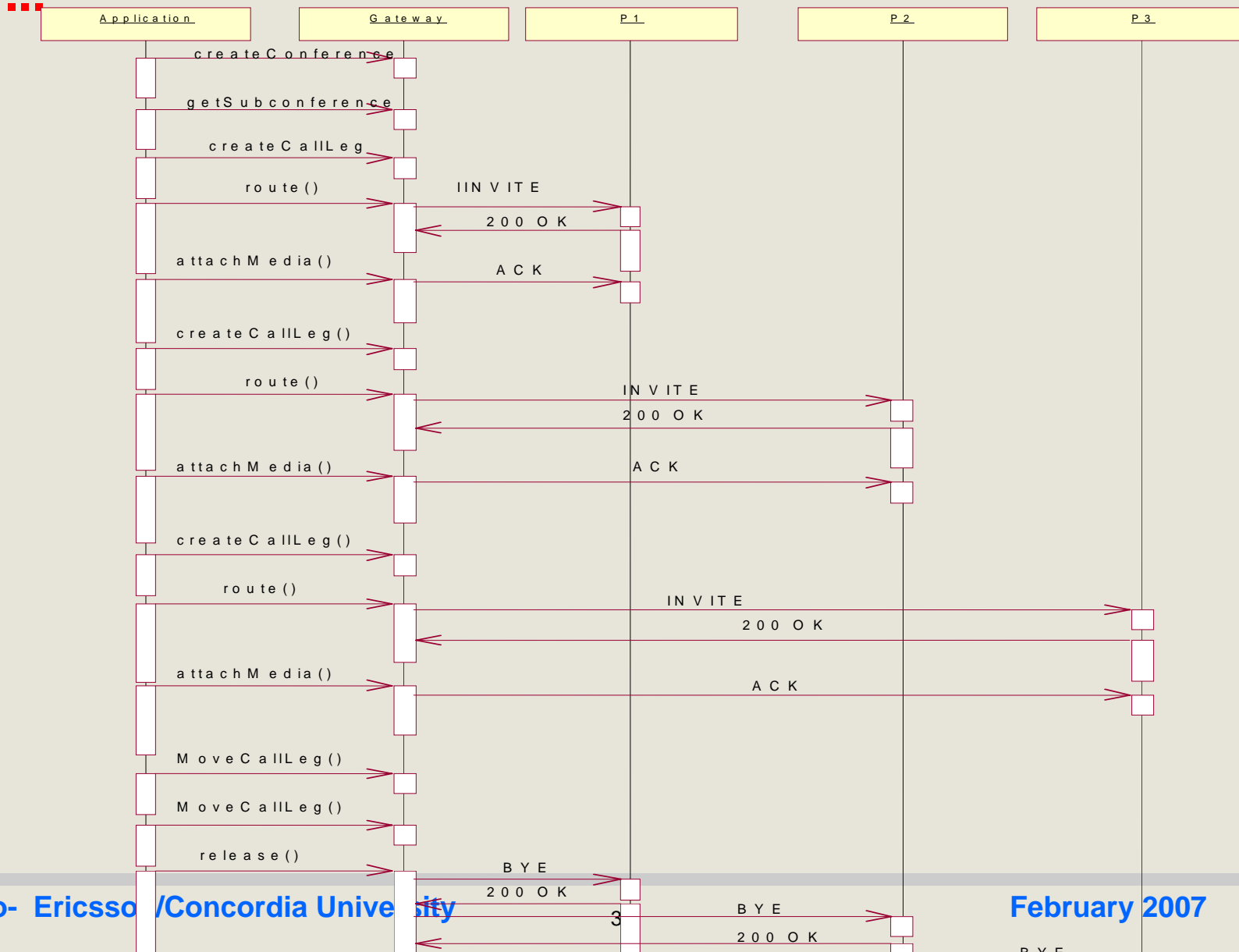


Figure 5 - Mapping for dial-in



# Dial out



## The mapping ...

### **PARLAY Call Control Services that cannot be mapped onto SIP**

- There seems to be none
- However the mapping can be done in several ways in some cases

### **SIP semantics that are not visible in PARLAY APIs as per today's specification**

- There exist a few (e.g. Possibility of a caller to state for instance that the call should not forwarded)
- PARLAY may be extended to cater to these features

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## Pros and cons ...

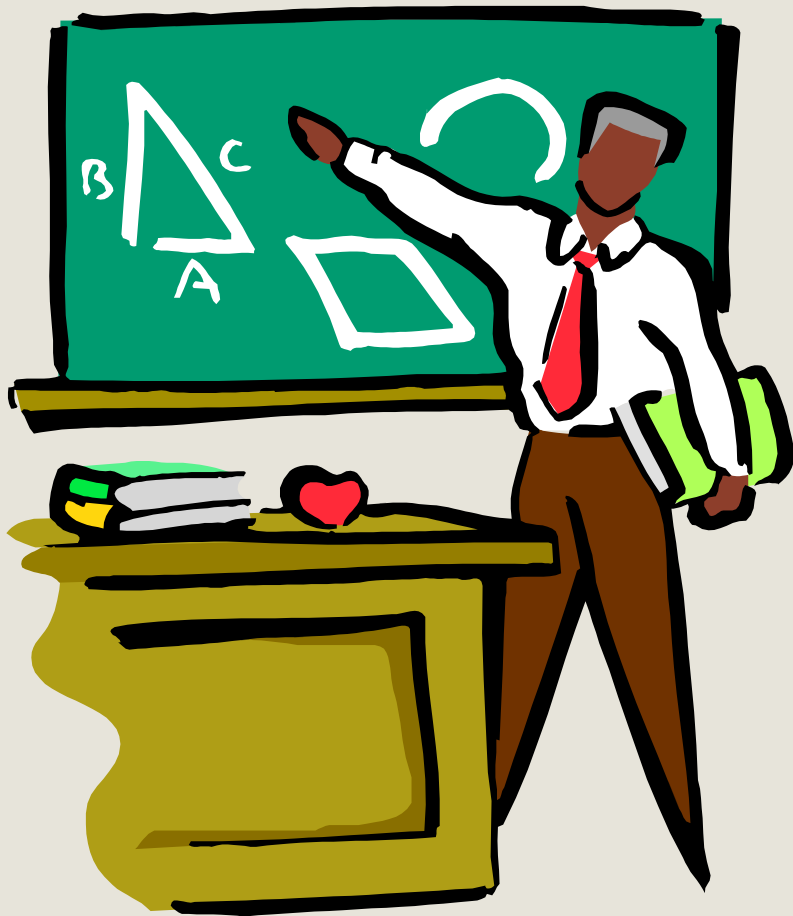
### Pros

- PARLAY/OSA allows the creation of a wide range of services including services that combine different types of network capabilities (e.g. call control, mobility, presence)
- Parlay allow the creation of services that span several network technologies (e.g. Sip, H.323, 3GPP, soft-switches)

### Cons

- The level of abstraction is still low
  - 3N+1 calls were required to create a conference call in older versions of Parlay – The number is now N+1
- Parlay is not easy to grasp by people with no circuit switched telephony/IN background
  - Call leg concept

# The Call Processing Language



1. Introduction
2. Requirements
3. Constructs
4. Example
5. Pros and cons

# Introduction ...

## Specificities:

- Only architecture that aims at service creation by end-users

## Prime target: Un-trusted parties

- Direct use
- Use via a graphical user interface
  - Higher level of abstraction
  - Mapping done by middle ware

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## Introduction ...

### Targeting end-users has a few consequences:

- Stringent language requirements
  
- Need to upload scripts to servers
  - REGISTER has been proposed for SIP
  - No mechanism has been proposed for H.323

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## **Requirements on language (From the RFC).**

**Lightweight, efficient easy to implement**

**Easily verifiable for correctness**

**Executable in a safe manner**

**Easily writeable and parsable**

**Extensible**

**Signaling protocol independence**

# Constructs for an XML Based CPL ...

## Switches

- Choices the script can make
  - Address, string, time, priority

## Signaling operation

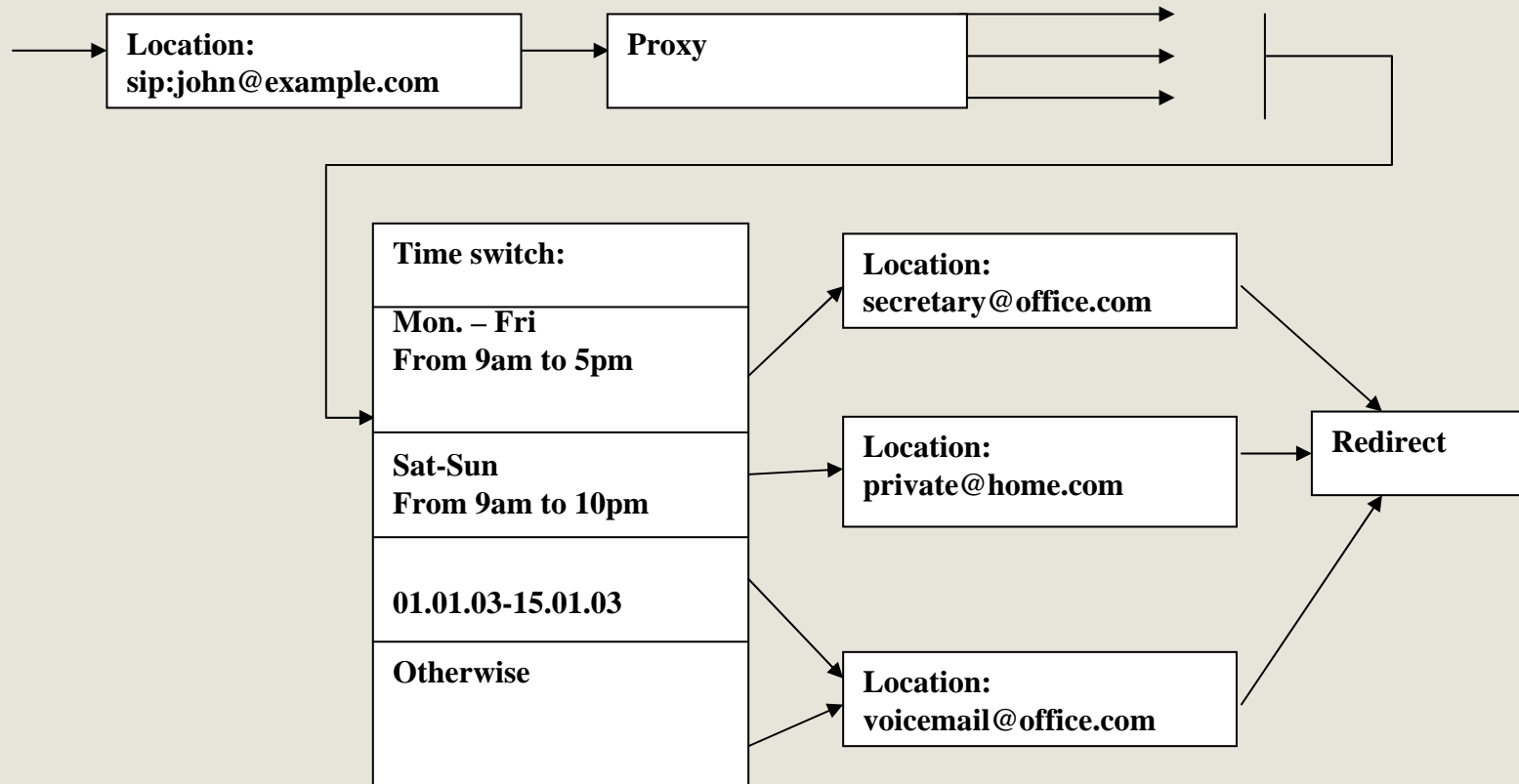
- Cause signalling events in underlying protocol
  - Proxy, redirect, reject

## Location modifier

- Add/remove location



## Simplified example from the RFC ...



## Pros and Cons ...

### Highly suitable for service creation by end-users

- End-users familiar with scripts / XML
- End-users unfamiliar with scripts / XML (via GUI)
- Offer required security

### However:

- Very few end-users are interested in creating service
- CPL is highly unsuitable for service creation by providers / third parties
  - Range of services that can be created is limited
  - More powerful tools exist
- Service logic and service data need to reside in the same script

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## To probe further ...

### PARLAY:

1. PARLAY specifications, <http://www.parlay.org/>
2. A.J. Moerdijk and L. Klostermanns, Opening the networks with Parlay/OSA: Standards and Aspects behind the APIs, IEEE Network Magazine, May/June 2003
3. R. Glitho and K. Sylla, Developing Applications for Internet Telephony: A case Study on the use of Parlay Call Control APIs in SIP Networks, IEEE Network, Forthcoming

### JAIN JCC/JCAT

JSR 00021 <http://www.jcp.org/aboutJava/communityprocess/review/jsr021/>

R. Jain et al. Java Call Control and Session Initiation Protocol (SIP). IEICE Transactions on Communications, December 2001

### CPL

RFCs

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