Signaling Protocol Neutral Architectures

INSE 7110 – Winter 2004
Value Added Services Engineering in Next Generation Networks
Week #8

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)

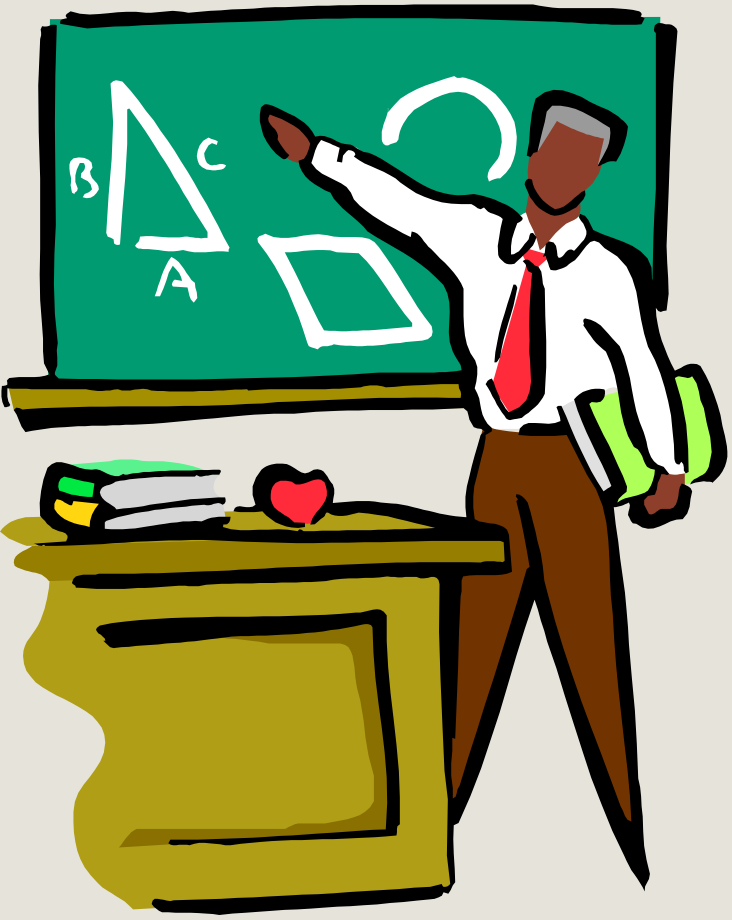
- Discussed in this course

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

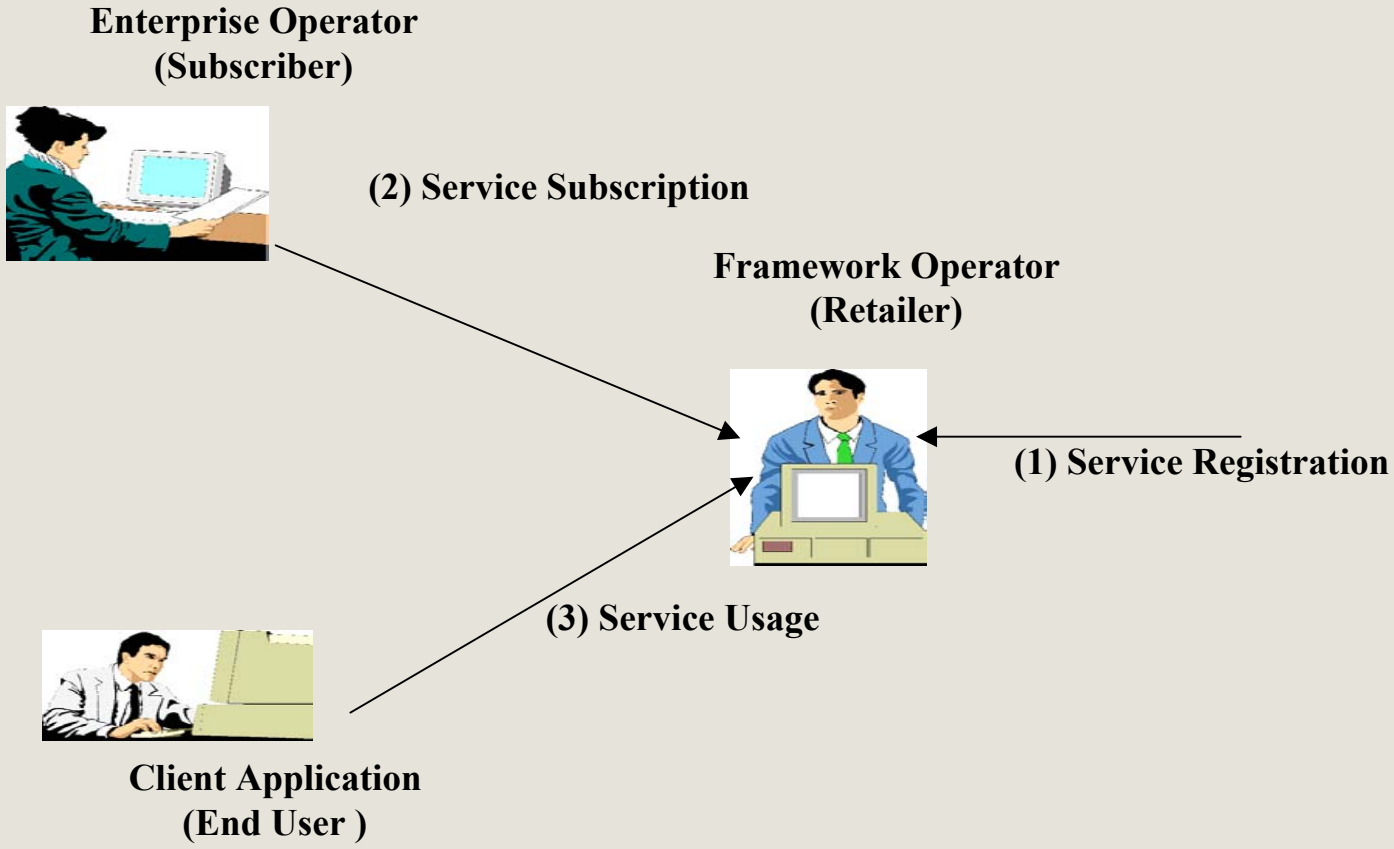
PARLAY main goal: Open up telecommunication networks

- 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)

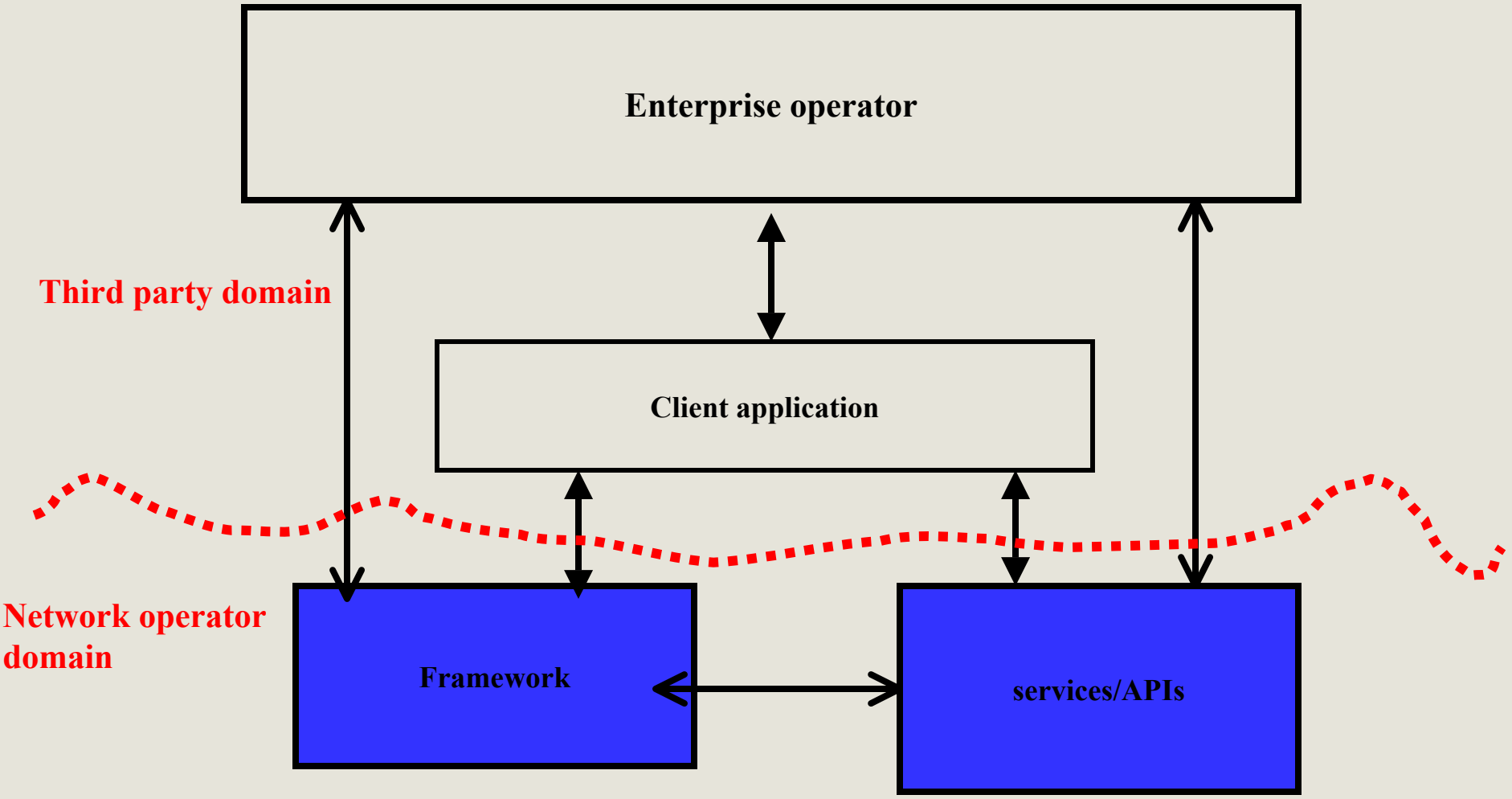
The business model

- 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

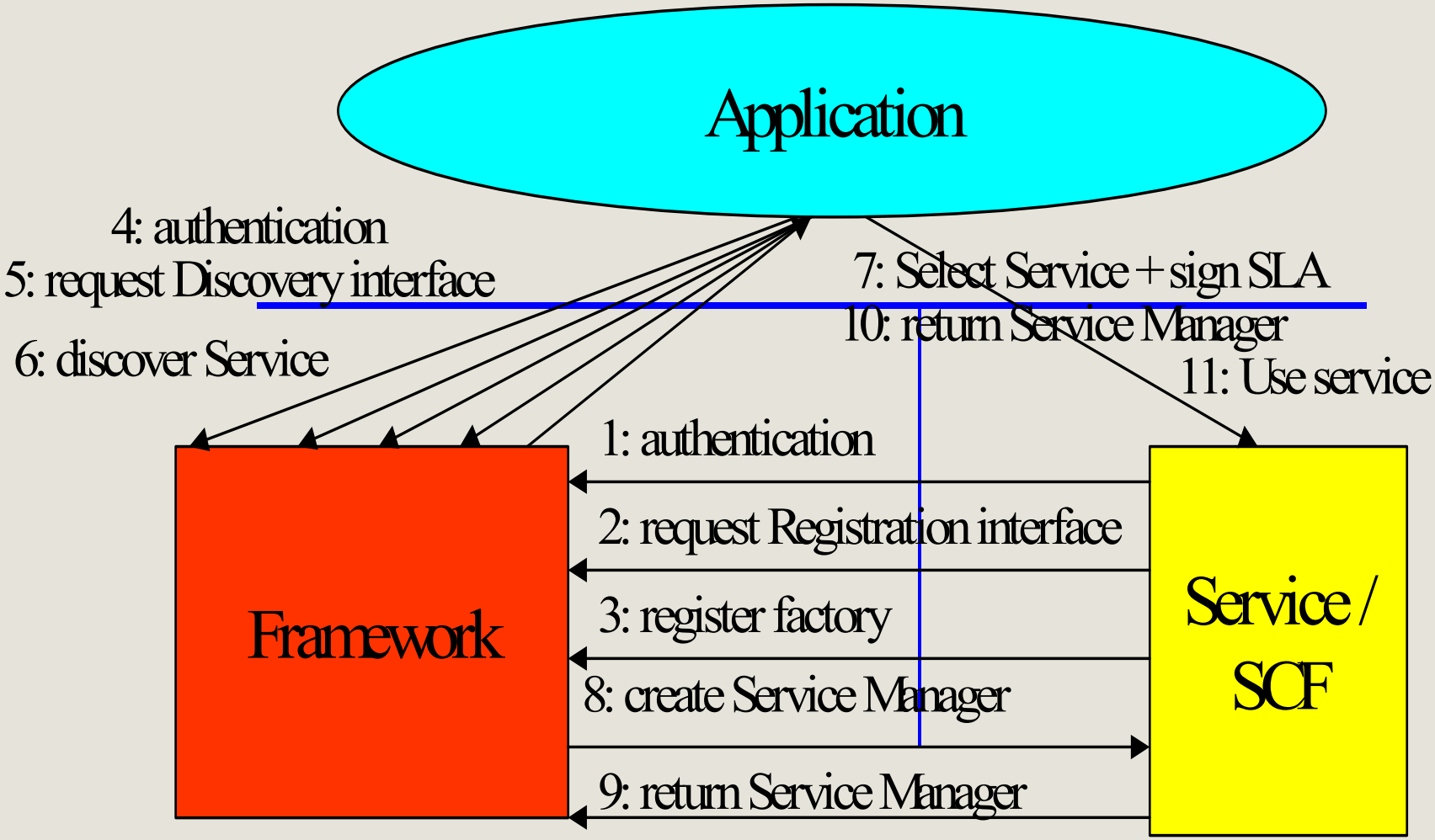
Interactions

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

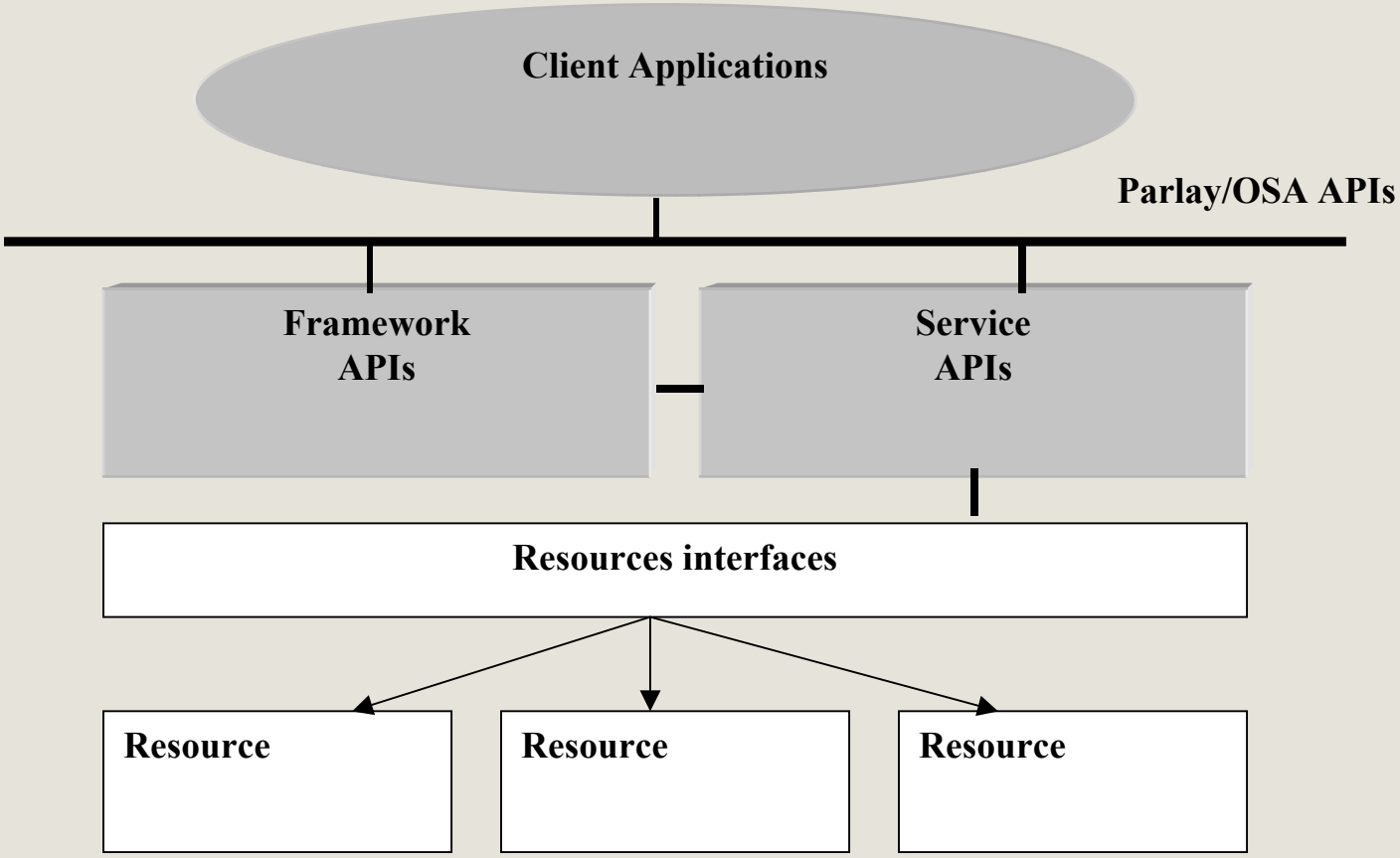


Figure 2 Parlay APIs interfaces

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 ()

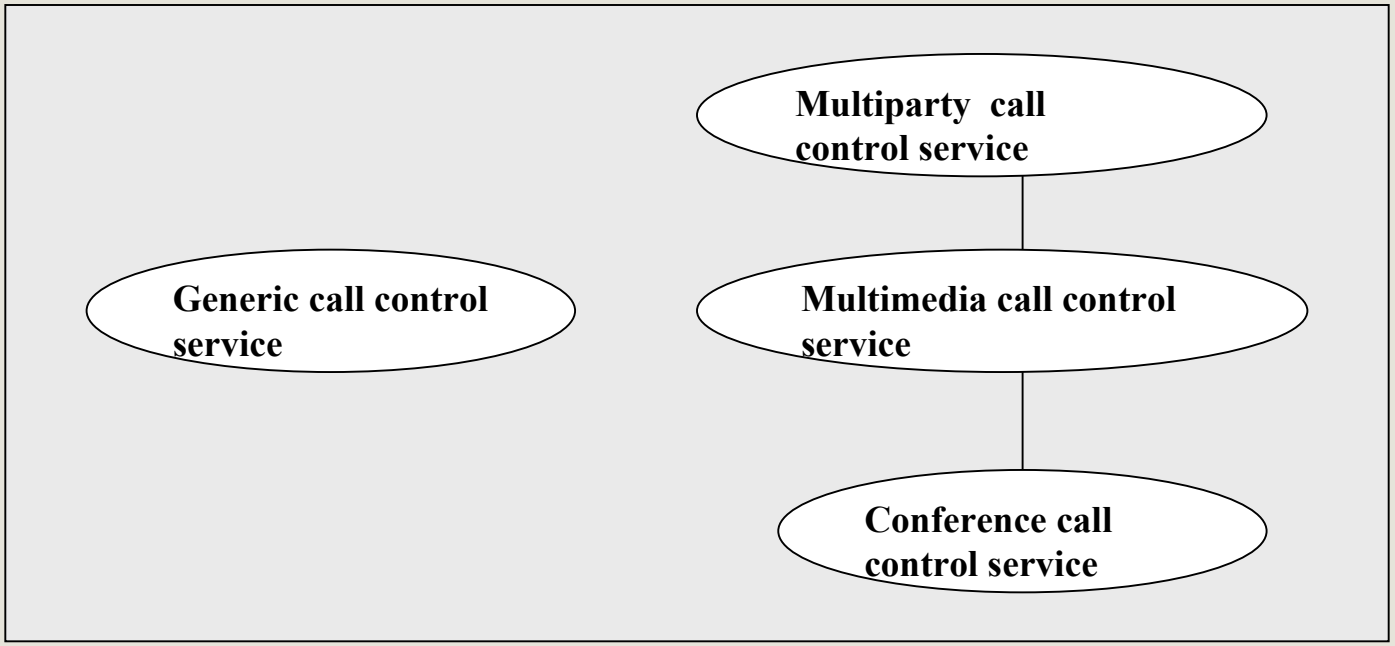
TerminateAccess ()

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

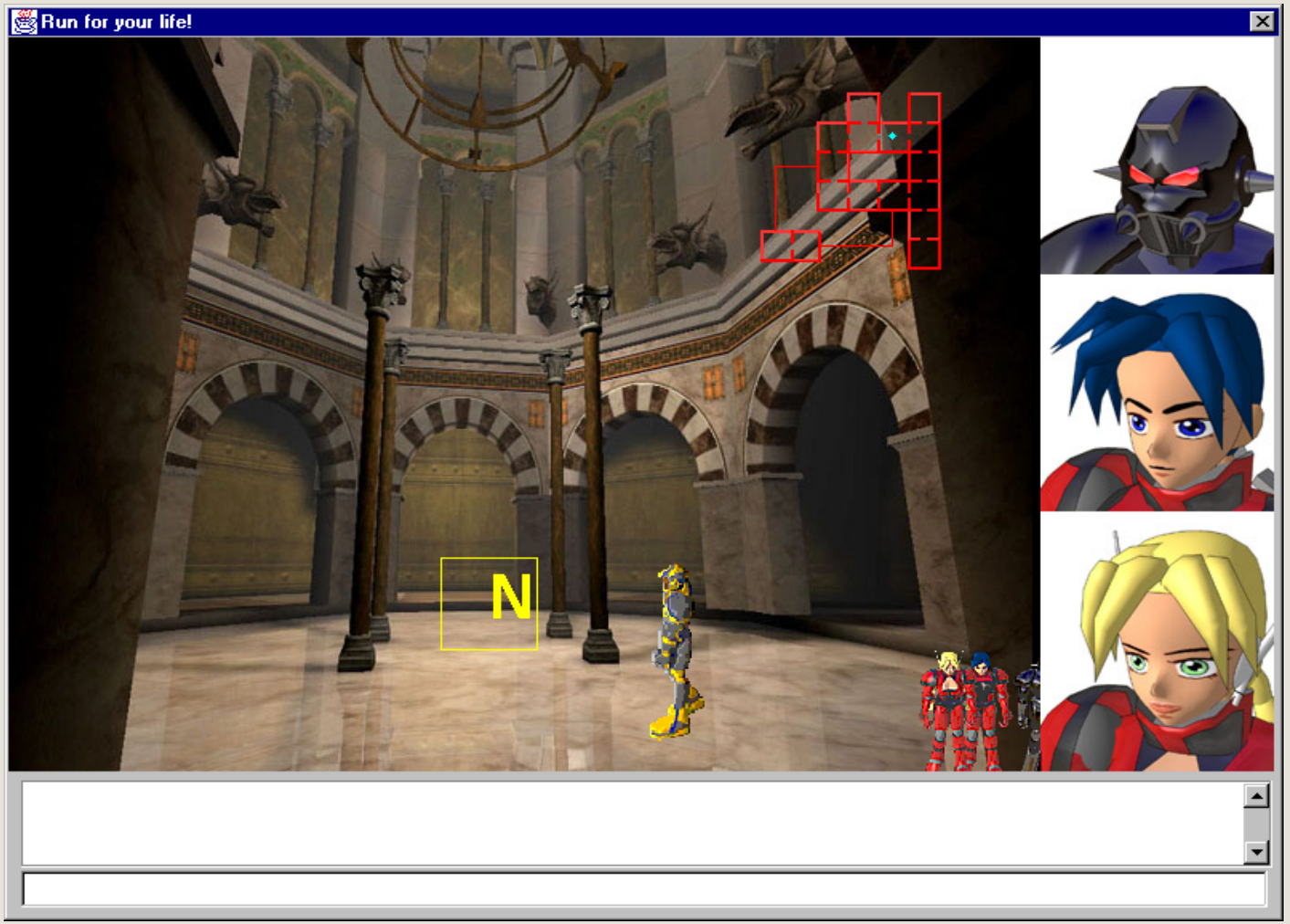
- Group of people trapped in a house with several rooms set to burn/explode in a given time
- Can escape only if password is found
- Letters making the password scattered in selected rooms of the house
- People ending up in the same room can exchange hints about the password via audio and chat
- Game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

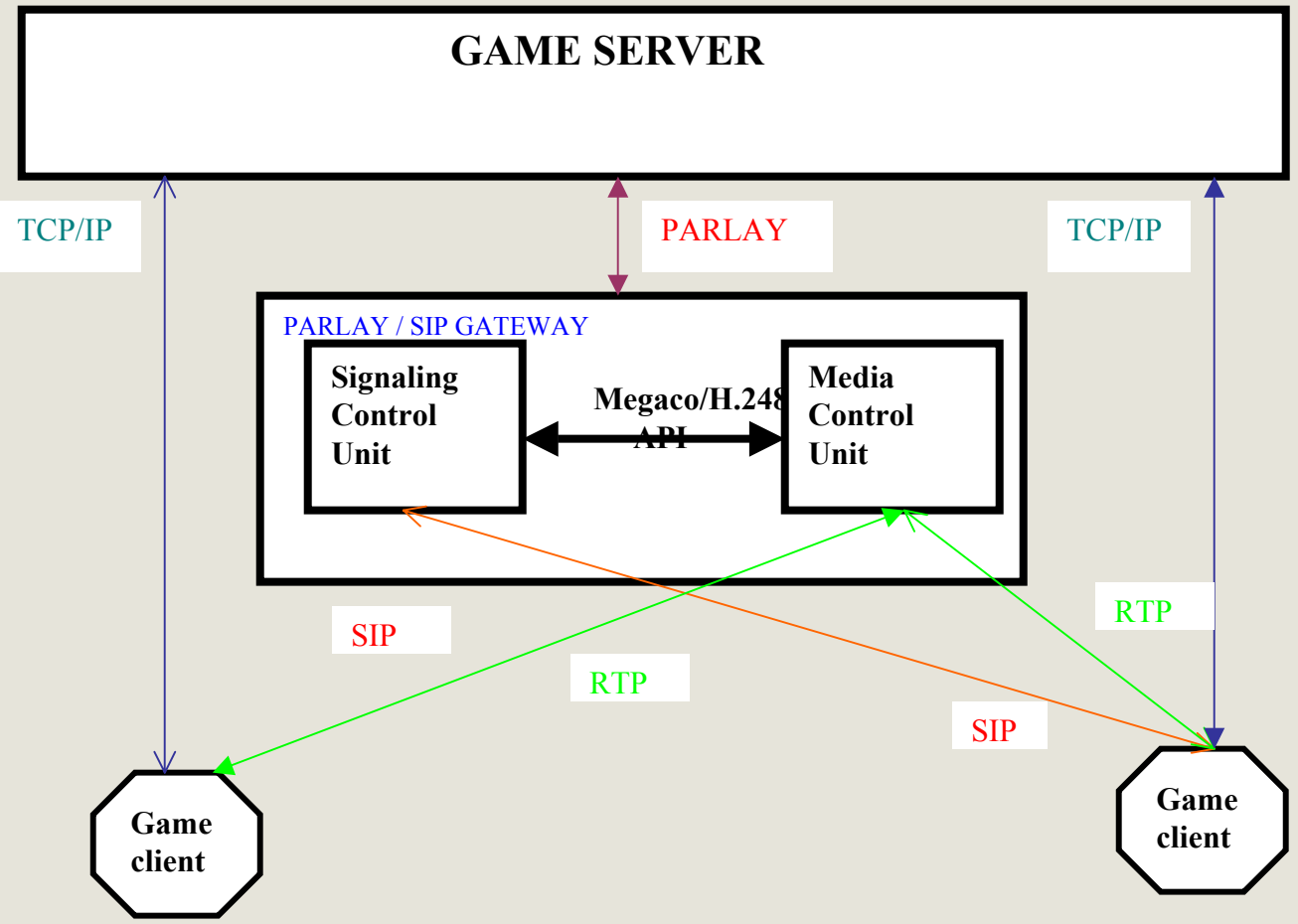
- Conferencing
- Sub-conferencing

ERICSSON

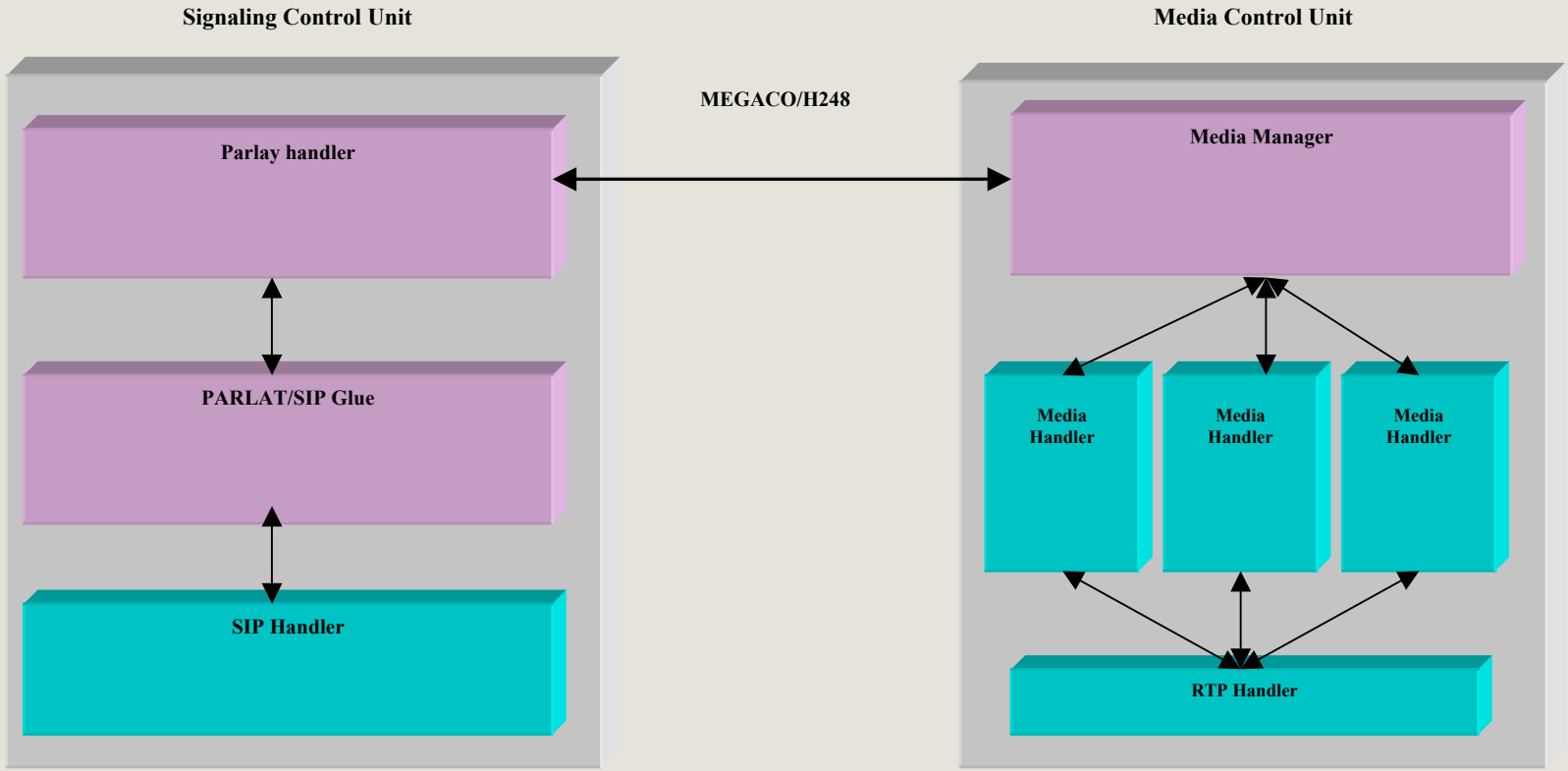
The game ...



Architecture ...



Architecture ...



Dial in ..

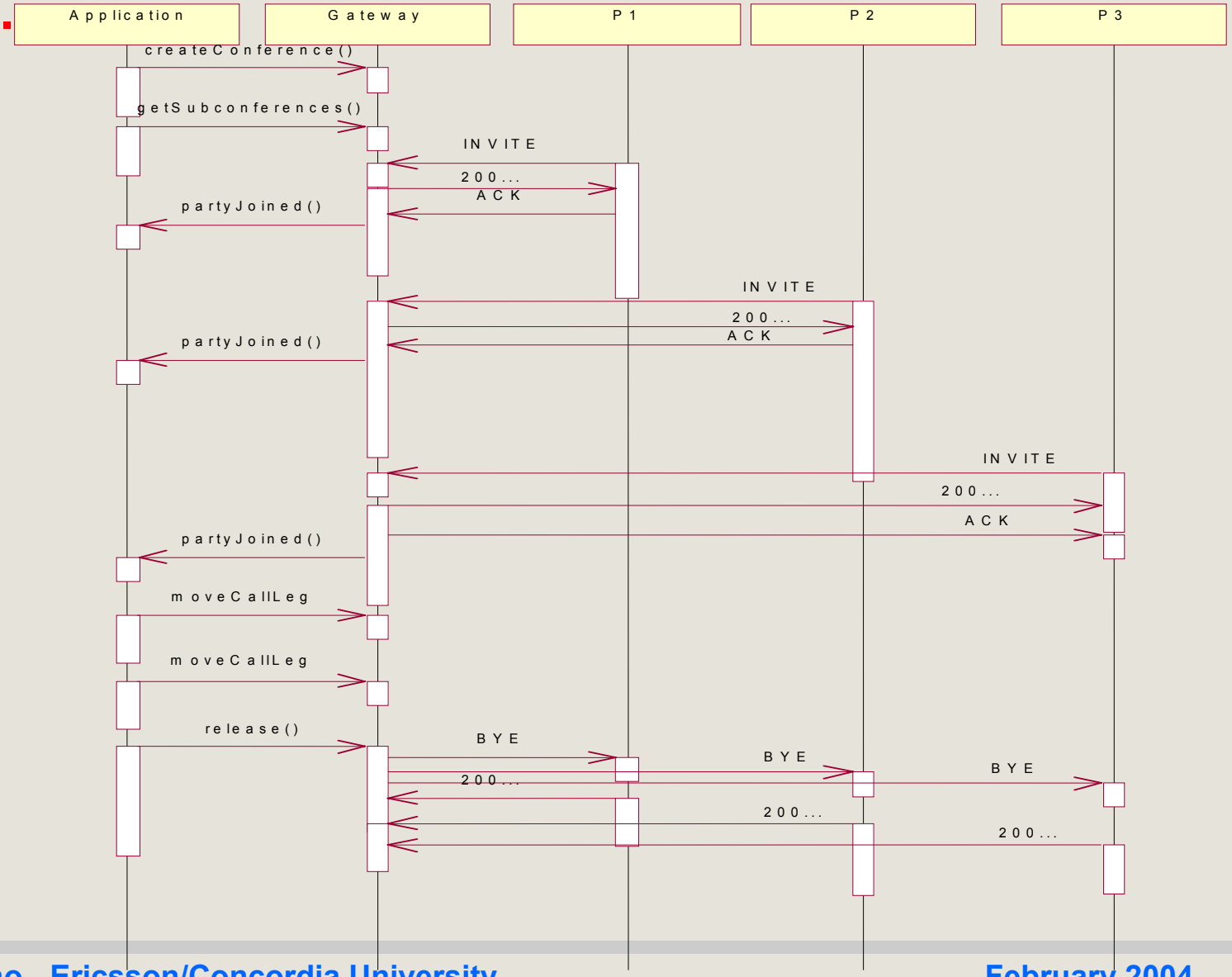
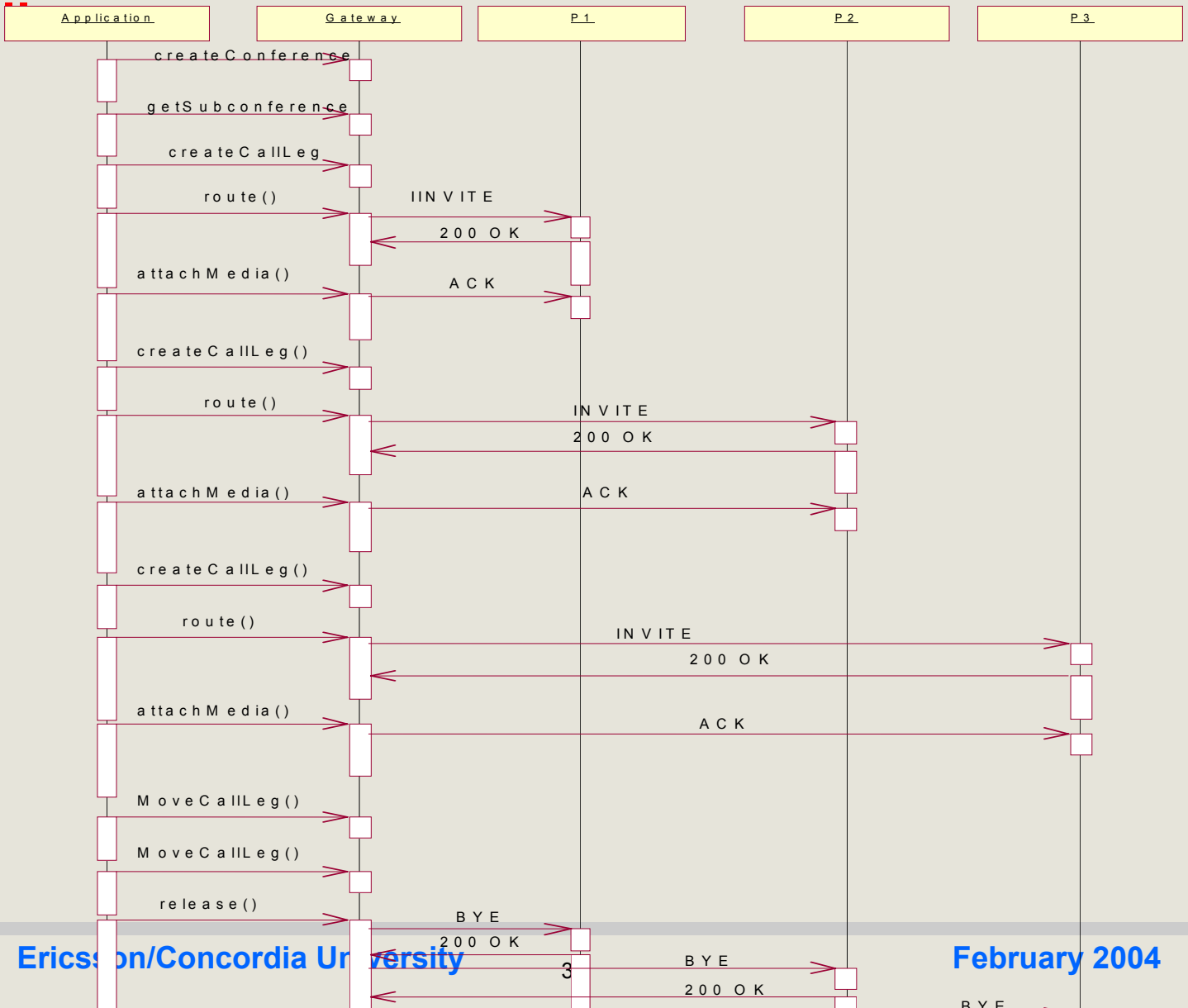


Figure 5 - Mapping for dial-in

Dial out ...


Application
Gateway
P1
P2
P3
createConference
getSubconference
createCallLeg
route()
IINVITE
200 OK
attachMedia()
ACK
createCallLeg()
route()
INVITE
200 OK
attachMedia()
ACK
createCallLeg()
route()
INVITE
200 OK
attachMedia()
ACK
MoveCallLeg()
MoveCallLeg()
release()
BYE
200 OK
BYE
200 OK
BYE

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 ...

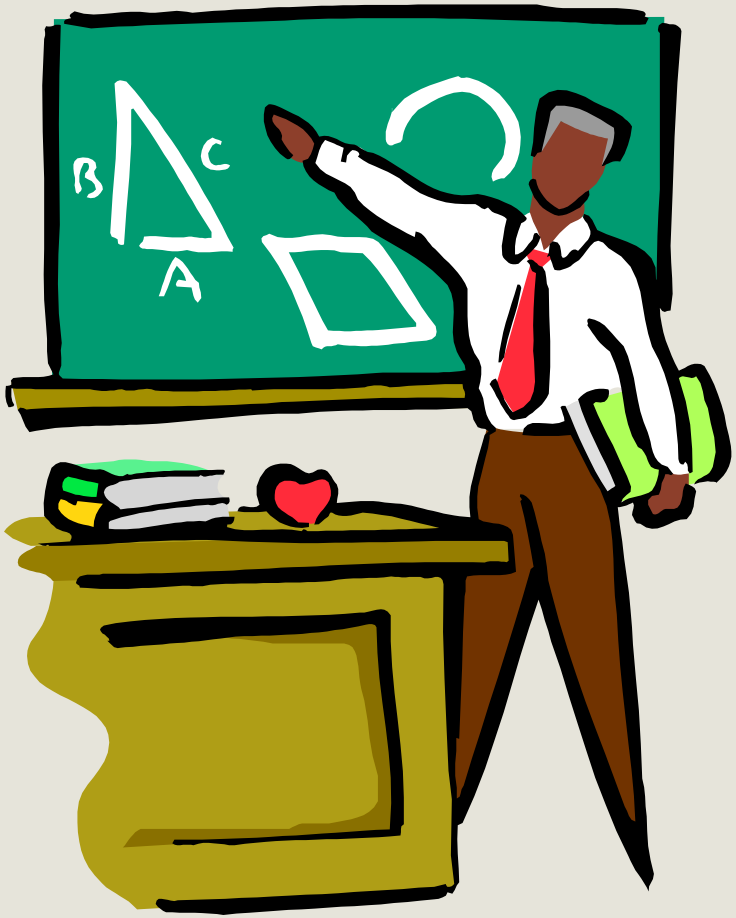
Pros

- 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

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

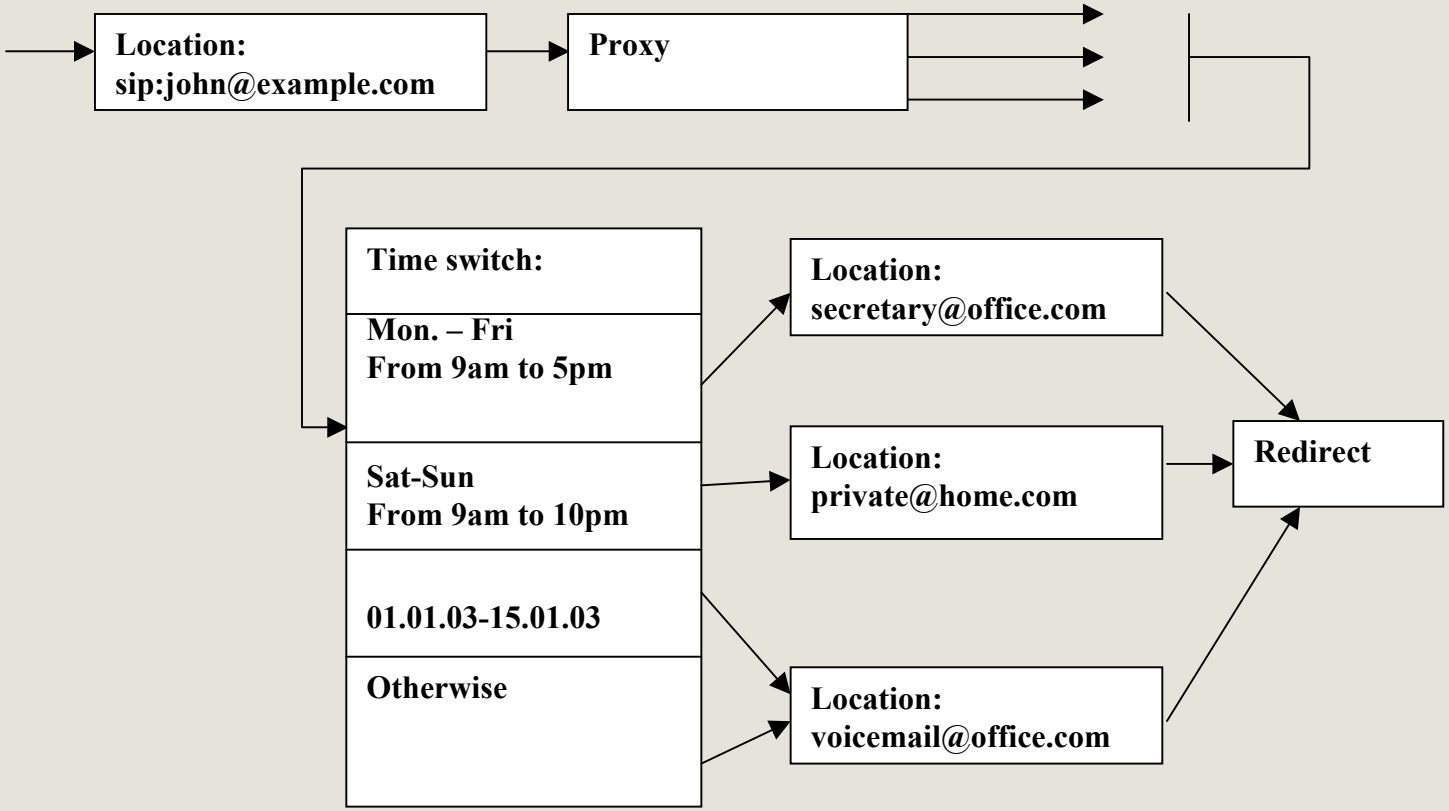
Constructs for an XML Based CPL ...

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 Netowork 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

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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