

Application Support by QoS Middleware

Falk Kemmel, Anne Thomas (TU Dresden)
Sotiris Maniatis, Charilaos Tsetsekas (NTU Athens)

Outline

- **Motivation**
- **QoS Middleware Architecture**
- **Support of Application Development**
- **Support of Legacy Applications**
- **Overall Scenario**
- **Conclusions & Outlook**

Motivation

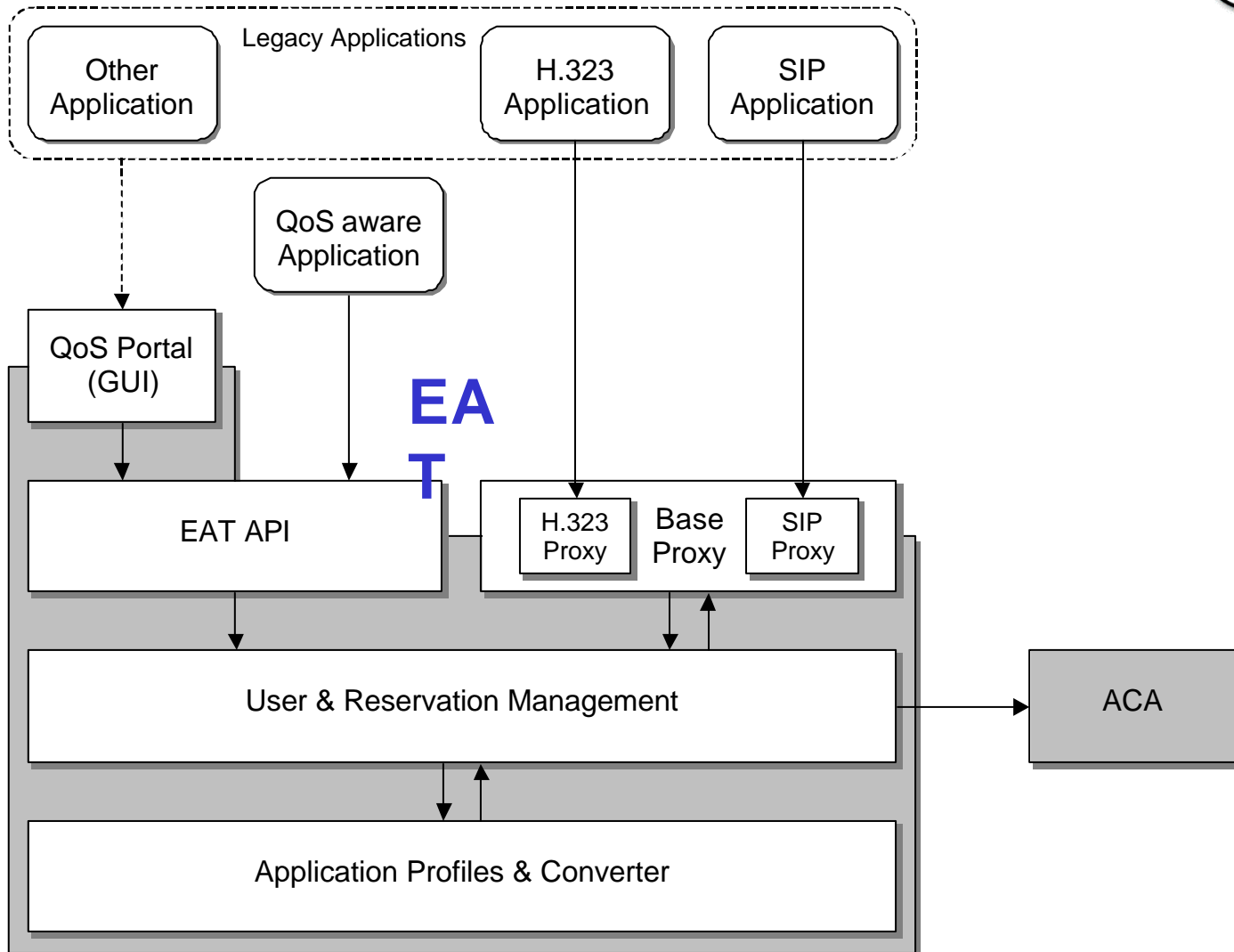
- **DiffServ approach as most promising solution for QoS in the Internet**
- **Two disadvantages:**
 - No QoS guarantees → AQUILA approach
 - Gap between QoS in the *network* and the *applications* → this talk
- **Need for QoS middleware to access the AQUILA's QoS network**
- **Support of different applications types:**
 - Legacy (non QoS-aware) apps
 - Newly developed applications and Internet services

Outline

- Motivation
- QoS Middleware Architecture
- Support of Application Development
- Support of Legacy Applications
- Overall Scenario
- Conclusions & Outlook

Architecture

- **End-user Application Toolkit (EAT) as QoS middleware between**
 - Applications & end-users *and*
 - AQUILA Resource Control Layer (RCL)
- **Requirements from the applications:**
 - Several interfaces towards applications & users
 - Support of automatic and manual reservations
 - Different levels of QoS abstraction
- **Requirements from the RCL:**
 - CORBA interface to Admission Control Agent
 - Use of network services
 - Technical requirements concerning reservations etc.



Outline

- Motivation
- QoS Middleware Architecture
- **Support of Application Development**
- **Support of Legacy Applications**
- **Overall Scenario**
- **Conclusions & Outlook**

Support of Application Development

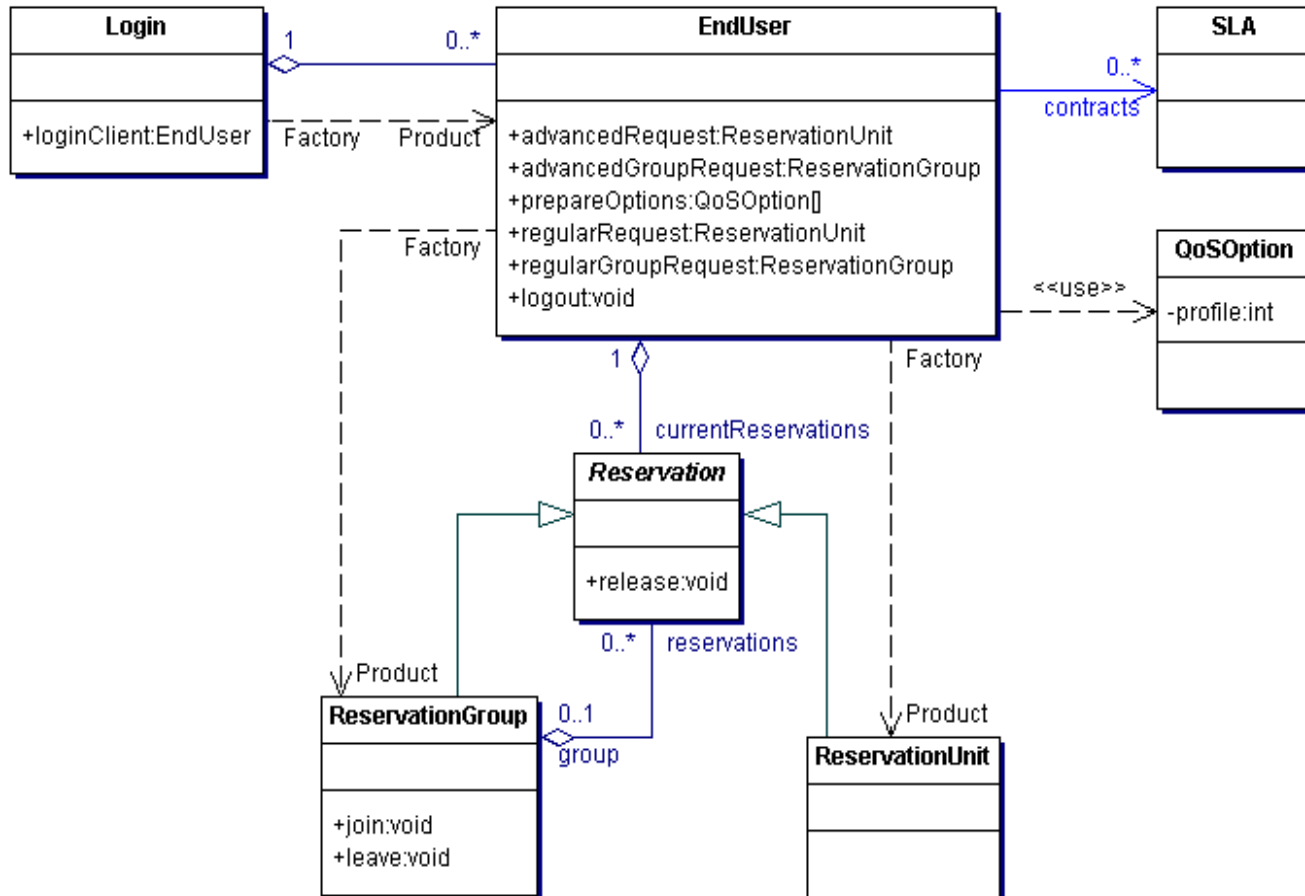
■ EAT API provides interfaces & functions for:

- User authentication
- Service retrieval
- Application Profile retrieval
- Reservation request & release
 - at different levels of QoS abstraction
 - uni-, bi-directional, groups
- Accounting information

■ CORBA-based API

■ Use of design patterns: composite, abstract factory

EAT API (Extract)



Outline

- Motivation
- QoS Middleware Architecture
- Support of Application Development
- **Support of Legacy Applications**
- **Overall Scenario**
- **Conclusions & Outlook**

Support of Legacy Applications

■ Manual support

- QoS Portal
- Application Profiles & EAT Converter

■ Automatic support

- Protocol Gateways (or Proxies)


QoS Portal – Manual Support

■ Web-based GUI to access the EAT and to use AQUILA QoS

- 1) Login
- 2) Choose reservation level
- 3) Do an advanced reservation (mainly for AQUILA people)
or
- 3) Do a regular reservation
 - a) Choose a predefined application (profile)
 - b) Choose a predefined QoS option for each service component
- App utilisation phase*
- 4) Release the reservation
- 5) Logout

Aquila QoS Portal - Microsoft Internet Explorer

Datei Bearbeiten Ansicht Favoriten Extras ?

Welcome to the  *Portal*

NEW RESERVATION **CURRENT RESERVATIONS** RESERVATION HISTORY LOGOUT

REGULAR ADVANCED

Supported Applications

STREAMINGVIDEO	RealSystem	OK
MULTIMEDIA	NetMeeting	OK
GAME	OIDS	OK

Fertig Lokales Intranet

Welcome to the



Ext_Desktop

NEW RESERVATION

REGULAR

ADVANCED

**CURRENT
RESERVATIONS**

**RESERVATION
HISTORY**

LOGOUT

NetMeeting 3.01

Application Type: MULTIMEDIA

Application Component: AUDIO

	audio quality
<input type="radio"/> Option 1	very low quality (28.8kBit/s)
<input type="radio"/> Option 2	medium quality (64kBits/s)
<input checked="" type="radio"/> Option 3	high quality (128kBits/s)
<input type="radio"/> Option 4	No Reservation (Best Effort)

To Advanced
Mode



Application Component: VIDEO

	video quality
<input type="radio"/> Option 1	very low quality (28.8kBit/s)
<input checked="" type="radio"/> Option 2	medium quality (64kBits/s)
<input type="radio"/> Option 3	high quality (160kBits/s)
<input type="radio"/> Option 4	No Reservation (Best Effort)

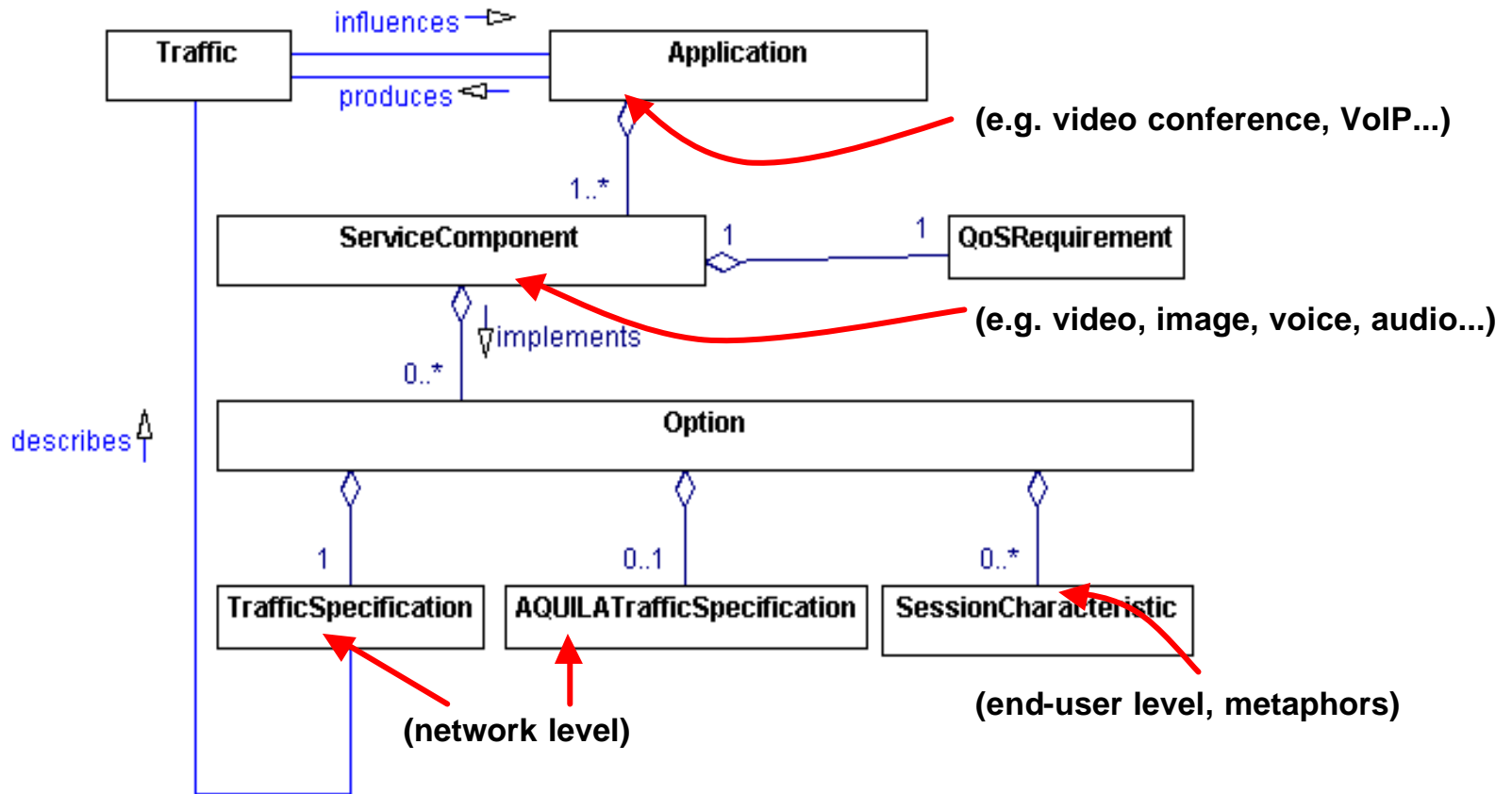
To Advanced
Mode



Application Profiles (1)

- **Syntax to describe applications' QoS characteristics**
- **Supports conversation between different levels:**
 - Network level → AQUILA reservation request
 - Application level → Implementation issues (service components)
 - End-user level → QoS Portal
- **One *Application Profile* for each app**
- **Several *Service Component Profiles***
 - Audio, Video, Data, etc.
- **XML profile repository for EAT**

Application Profiles (2)



Converter

■ Automatic conversation between Application Profile levels:

1) Preparation of QoS options

- Considering the options defined in the Service Component Profile
- Considering the end-user's SLAs (subscribed network services)

2) Calculation of reservation parameters

- Considering the chosen QoS option

Protocol Gateways – Automatic Support

■ Interception/Sniffing of signalling messages to

- Detect IP addresses and dynamically negotiated port numbers
- Analyse multimedia content concerning CODECs

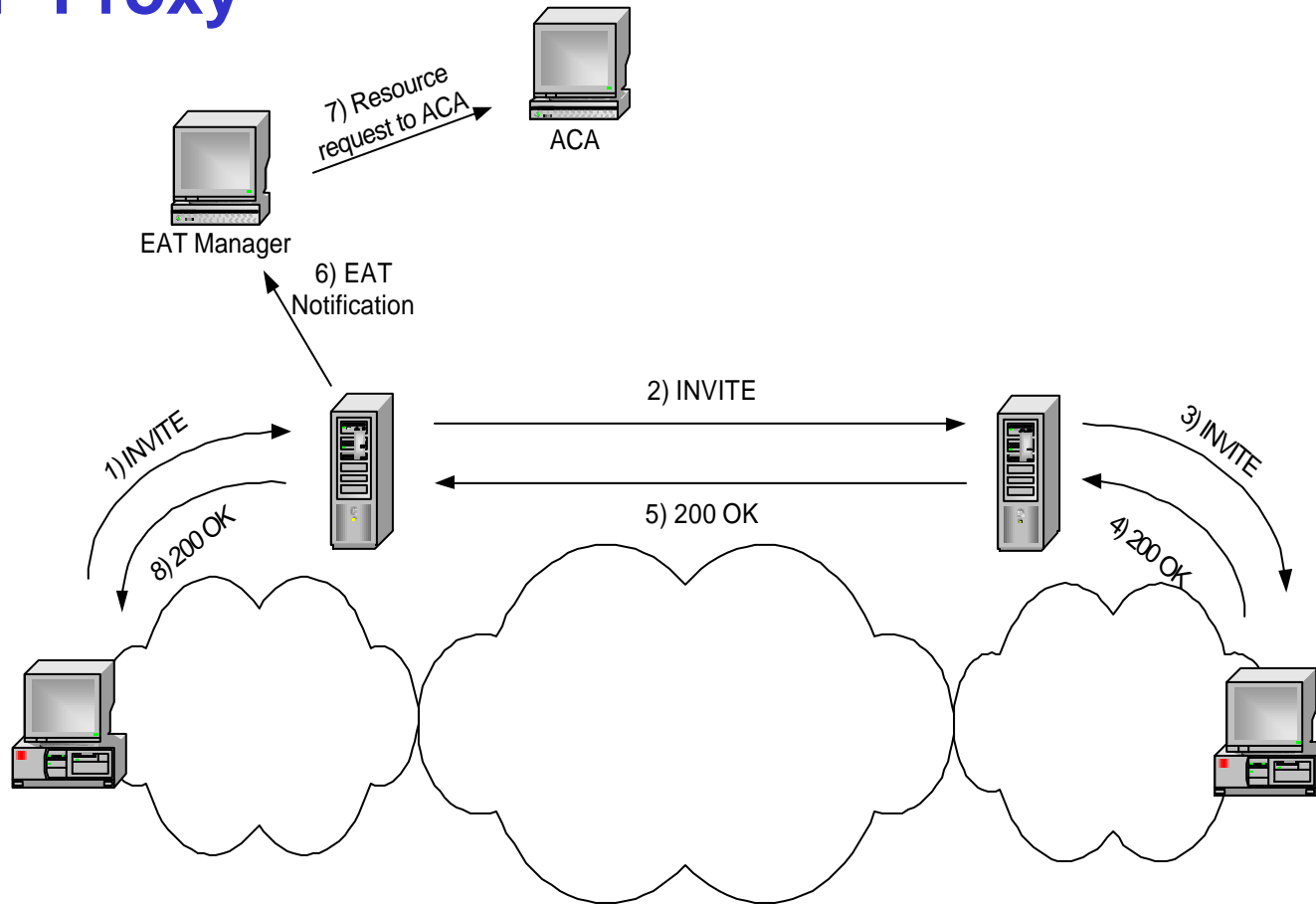
■ Interworking with EAT management

- *Initiation* of reservation requests without user involvement
→ automatic reservation (SIP Proxy)
- *Completion* of former established manual reservations
→ half-automatic reservation (H.323 Proxy)

■ Extensible Proxy Framework

- Controlled by a Proxy Manager

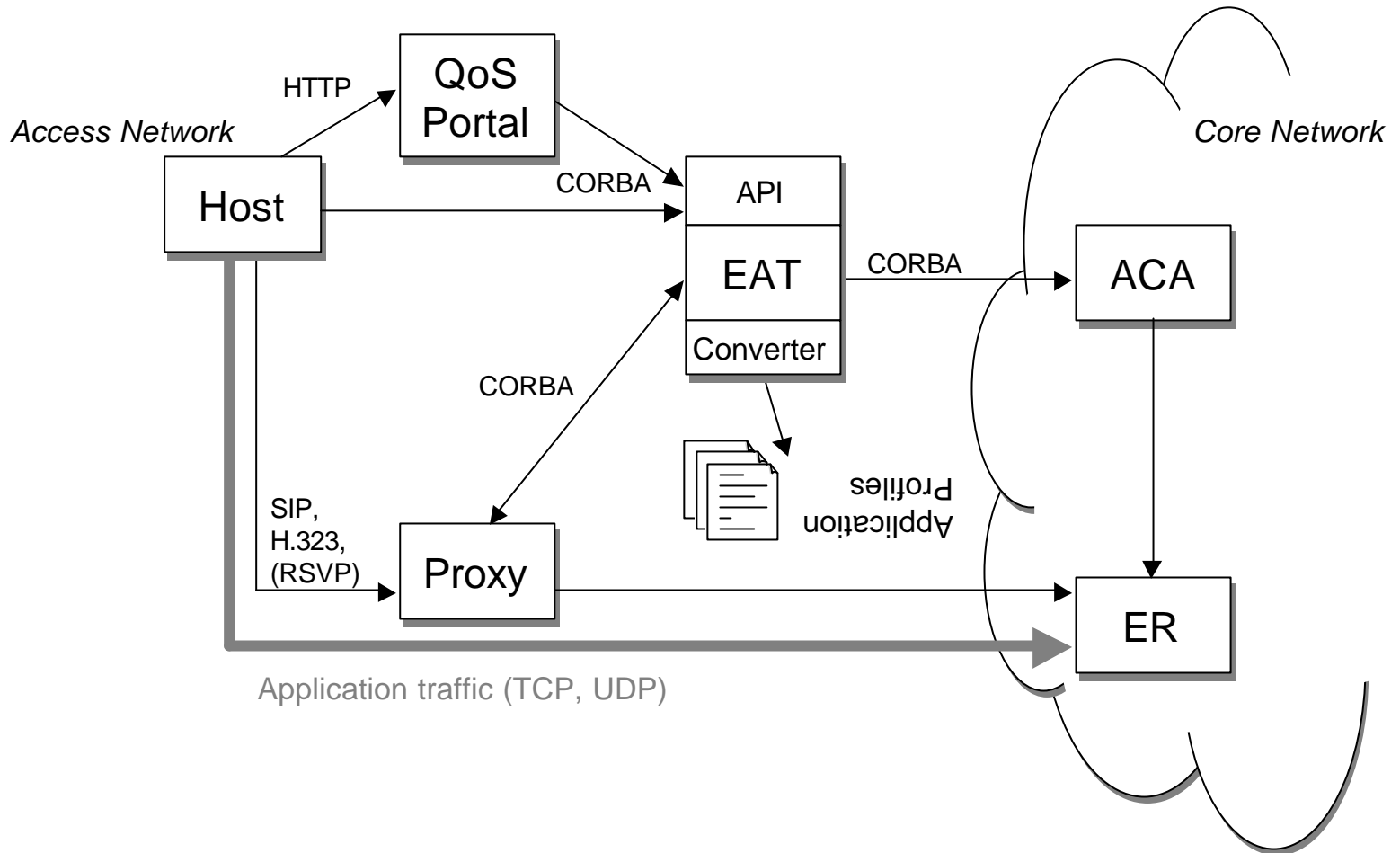
SIP Proxy



Outline

- Motivation
- QoS Middleware Architecture
- Support of Application Development
- Support of Legacy Applications
- **Overall Scenario**
- **Conclusions & Outlook**

Overall Scenario



Outline

- Motivation
- QoS Middleware Architecture
- Support of Application Development
- Support of Legacy Applications
- Overall Scenario
- **Conclusions & Outlook**

Conclusions & Outlook (1)

■ EAT in general

- Distributed architecture
- Three main interfaces for applications:

1. API

- Application development
- Specific for AQUILA
- Concepts for reuse: reservation groups, etc.

2. QoS Portal

- On top of the API
- Existing prototype for QoS reservations for AQUILA
- Concept for Complex Internet Services like Mediazine

Conclusions & Outlook (2)

3. Proxies

- Existing automatic proxy for SIP, half-automatic for H.323
- Idea: new automatic proxies for H.323, RSVP based on the framework
- Open: integration of application/codec profiles

■ Application Profiles & Converter

- Used by the API, Portal
- Existing profiles for NetMeeting, RealSystem, OIDS Game
- New profiles on the base on templates for CODECs

More Information?

www.ist-aquila.org



Thank you!