

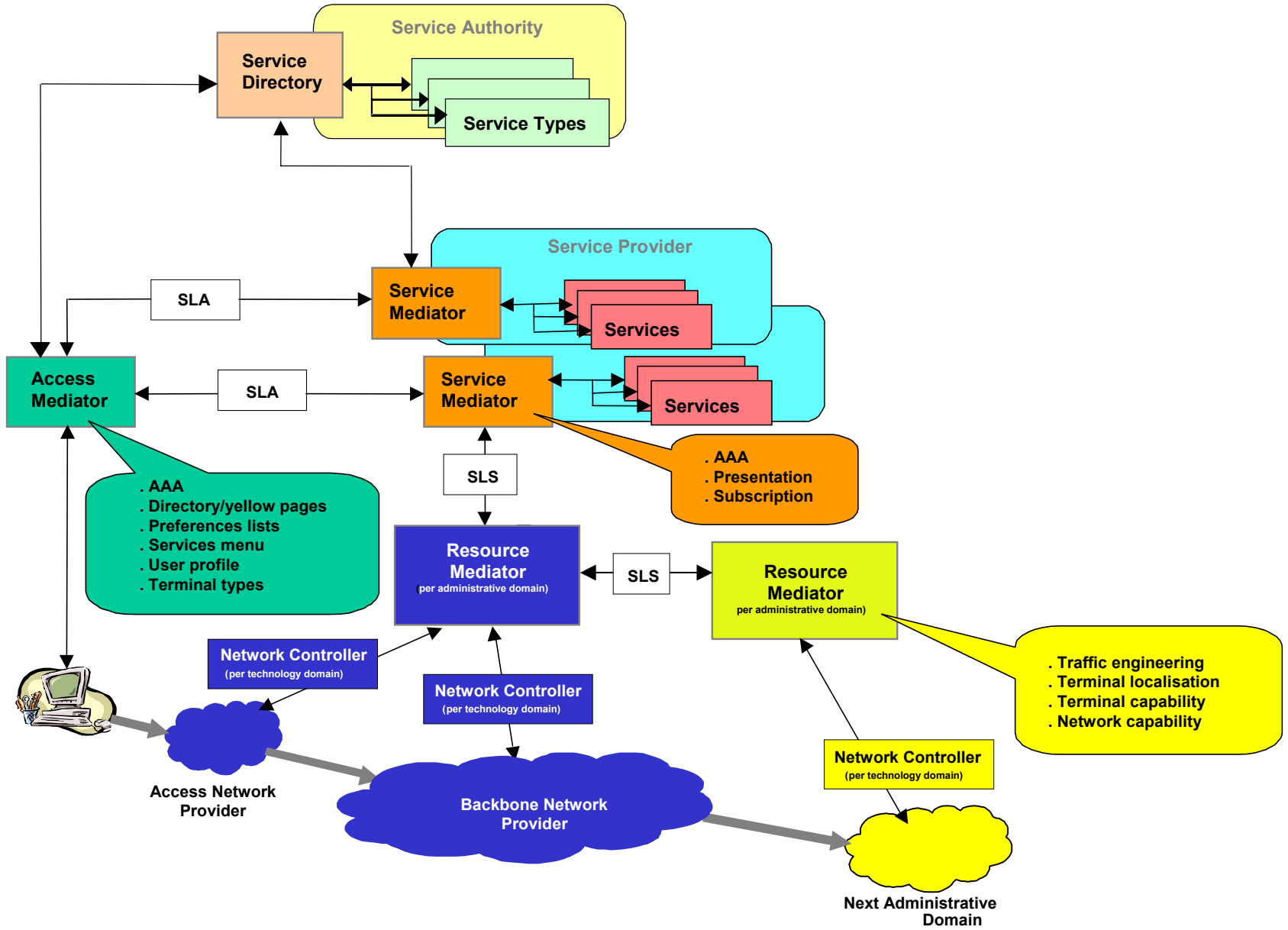
CADENUS

Creation and Deployment of End-User Services in Premium IP Networks

CADENUS Demonstration

The registration, presentation, selection and delivery of a VoD service using the CADENUS Architecture over a DiffServ network („Trial 1“)

CADENUS Architecture



Outline of the Demonstration

To show how the CADENUS architecture provides support for:

- ↓ Independence of service provision and network provision
 - ↓ VOD
 - ↓ VoIP
 - ↓ VPN

- ↓ Capabilities for monitoring

Live interaction with our real remote Service Mediator (VoD)

Summary of tests that we will perform on this testbed

Multiple
Applications
Flexible
Integrated
Architecture

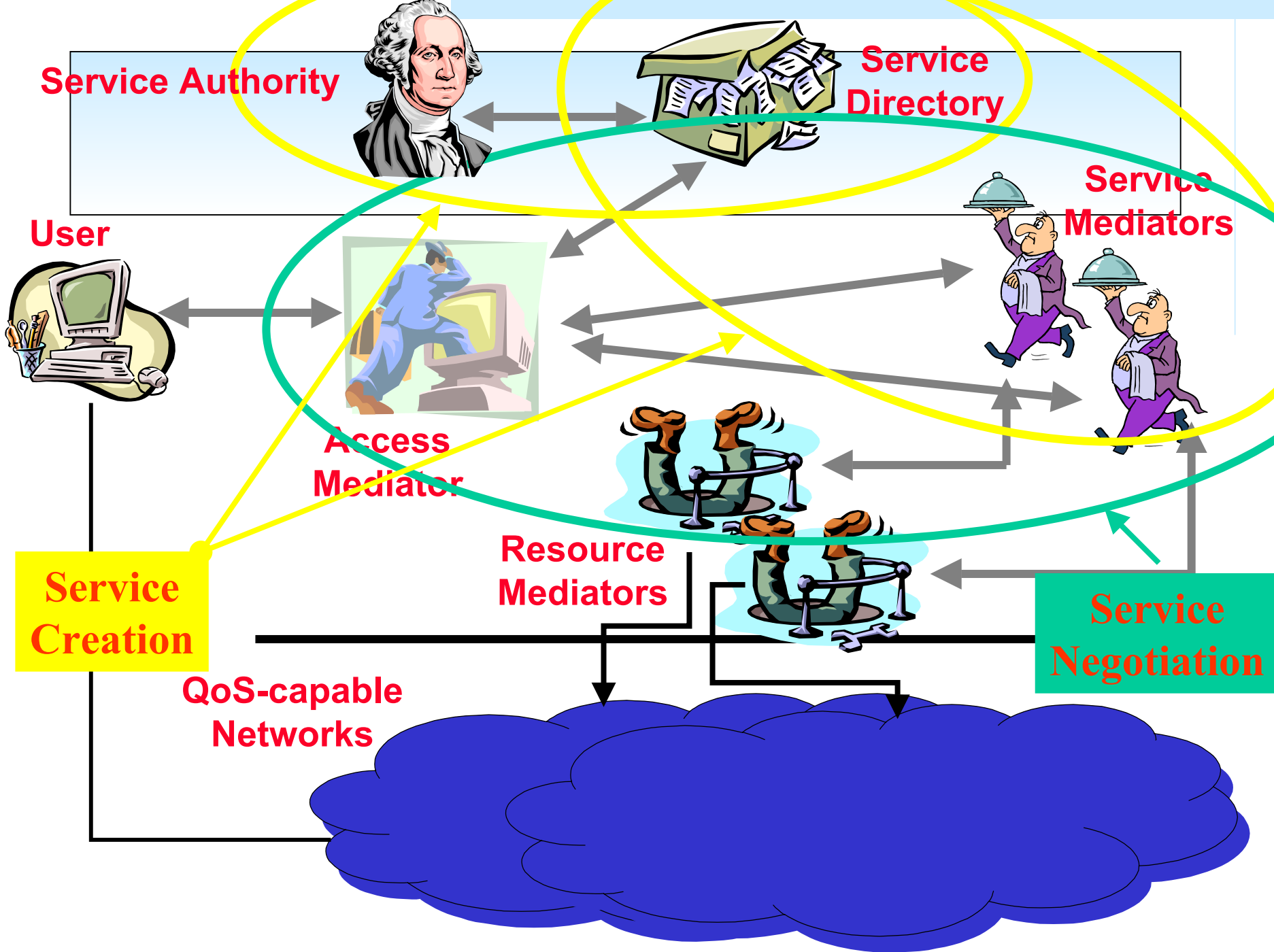
The Cadenus Video on Demand Service

Maastricht review demo

May 15th 2002

Demo roadmap

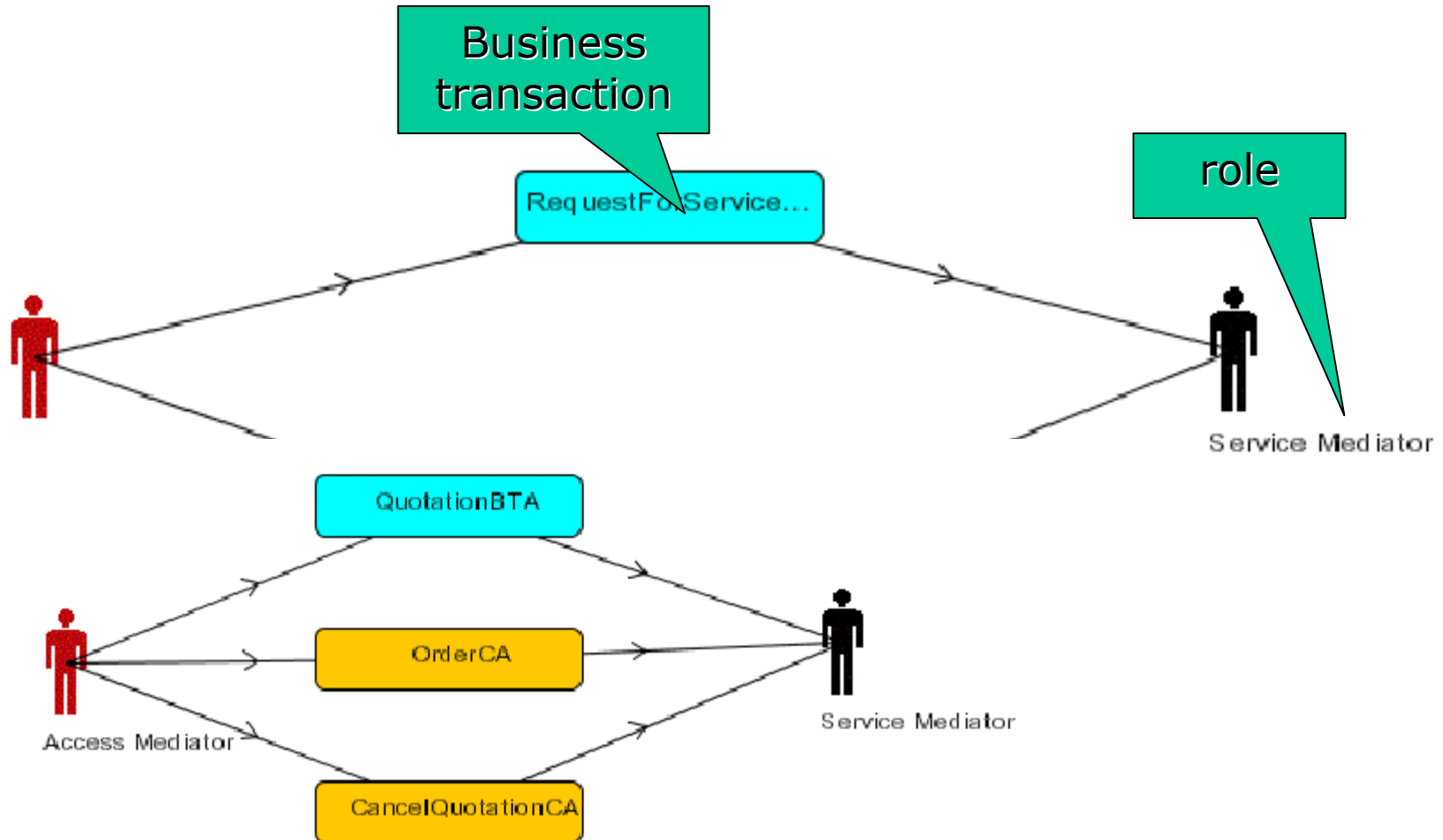
- **Service Creation:**
 - The birth of a new Web Service
- **Service Negotiation:**
 - Mediators interaction in the electronic market
 - Dynamic, policy-based network configuration
- **Service Invocation:**
 - SLA-based service ‘quality assurance’



Creation of a new Web Service

- **Four steps involved:**
 1. define and put in a standard format a description of the business process associated to service trading;
 2. define a standard Graphical User Interface to allow user's customization of the service parameters;
 3. define a standard template for the Service Level Agreement;
 4. define the rules to be applied in the translation from the SLA to the corresponding SLS(s) at negotiation time.


Step 1: Business Process Specification



Step 2: The standard GUI (VoD)


ACCESS MEDIATOR

**Cadenus Movie Database!
Homepage**

search movie title 

[advanced search](#)

search people actor director writer

name surname 

[advanced search](#)

Select a category

comedy	action
drama	sci-fi
thriller	epic
horror	animation

Most Popular Movies

- [Cadenus Demo Clip](#)
- [Mission Impossible 2](#)
- [Totò Peppino e 'a Malafemmena](#)
- [Shrek](#)
- [Ritorno al futuro 3](#)

Operazione completata Intranet locale

Step 3: the SLA template (VoD)

Access Mediator - Microsoft Internet Explorer

File Modifica Visualizza Preferiti Strumenti ?

Indirizzo Collegamenti »

ACCESS MEDIATOR

CADENUS VoD Service request

Title	Cadenus Demo Clip			
Language	italian			
Subtitle	italian			
Options	Start date	1	1	2002
	Start time	0	0	
	End date	1	1	2002
	End time	0	0	
Quality				
Gold <input type="radio"/>				
Silver <input type="radio"/>				
Bronze <input type="radio"/>				
Vcr Controls <input type="checkbox"/>				

Request

Operazione completata

Intranet locale

Reminder...the SLA

```
<?xml version="1.0" encoding="UTF-8" ?>
- <SLA>
  <Status>Active</Status>
  <Renegotiable>yes</Renegotiable>
  <DateOfSignature>Mon May 06 22:13:54 CEST 2002</DateOfSignature>
- <BuyerInfo>
  - <buyer>
    <name>UoN AM</name>
  </buyer>
</BuyerInfo>
- <SellerInfo>
  - <seller>
    <name>SM</name>
  </seller>
</SellerInfo>
- <Service>
  <ServiceName>video on demand</ServiceName>
- <ServiceInfo>
  <ID>1</ID>
  <title>Cadenus Demo Clip</title>
  <lang>italian</lang>
  <subtitle>italian</subtitle>
  <quality>gold</quality>
  <startTime>2002-1-1T0:0</startTime>
  <endTime>2002-1-1T0:0</endTime>
  <vcrControl>no</vcrControl>
</ServiceInfo>
</Service>
```

...

```
- <Payment>
- <CostInfo>
  - <Cost>
    <Value>12</Value>
    <Currency>euro</Currency>
  </Cost>
- <Payment>
  <Cash>yes</Cash>
  <CreditCard>yes</CreditCard>
  <BankTransfer>yes</BankTransfer>
</Payment>
</CostInfo>
</Payment>
</SLA>
```

...

Step 4: the SLS (tequila@)

```
<?xml version="1.0" encoding="UTF-8" ?>
- <SLS>
  <SLSID>1</SLSID>
  - <Scope>
    - <Ingress>
      <Address ID="1">143.225.229.2</Address>
    </Ingress>
    - <Egress>
      <Address ID="1">143.225.229.3</Address>
    </Egress>
  </Scope>
- <FlowID>
  - <Source>
    - <SourcePrefix ID="1">
      <Address>143.225.229.2</Address>
      <Mask>32</Mask>
    </SourcePrefix>
  </Source>
  - <Destination>
    - <DestPrefix ID="1">
      <Address>143.225.229.3</Address>
      <Mask>32</Mask>
    </DestPrefix>
  </Destination>
- <TypeOfService>
  <TOS ID="1">184</TOS>
</TypeOfService>
<DestPort>5000</DestPort>
<SourcePort>5500</SourcePort>
  ...
  <BucketRate>1500</BucketRate>
  <MTU>1500</MTU>
  <MPS>50</MPS>
</TokenBucket>
</TrafficConformance>
- <ServiceSchedule>
  - <Date>
    - <YearRange>
      <YearStart>2002</YearStart>
      <YearEnd>2002</YearEnd>
    </YearRange>
    - <MonthRange>
      <MonthStart>1</MonthStart>
      <MonthEnd>1</MonthEnd>
    </MonthRange>
    - <DayRange>
      <DayStart>1</DayStart>
      <DayEnd>1</DayEnd>
    </DayRange>
    - <TimeRanges>
      - <TimeRange ID="1">
        <TimeStart>0</TimeStart>
        <TimeEnd>0</TimeEnd>
      </TimeRange>
    </TimeRanges>
  </Date>
</ServiceSchedule>
<ExcessTreatment>Dropping</ExcessTreatment>
</SLS>
```

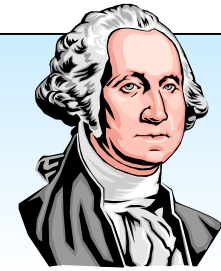
...

-----> object

The Service Directory



- Contains the models of the standardized services (*service types*)
- Gives a SM the possibility to publish its own profile and the services it offers
- Gives the AM the possibility to retrieve information about the portfolio of services and about the SMs that are offering them
- Acts both as a *registry* and as a *repository*



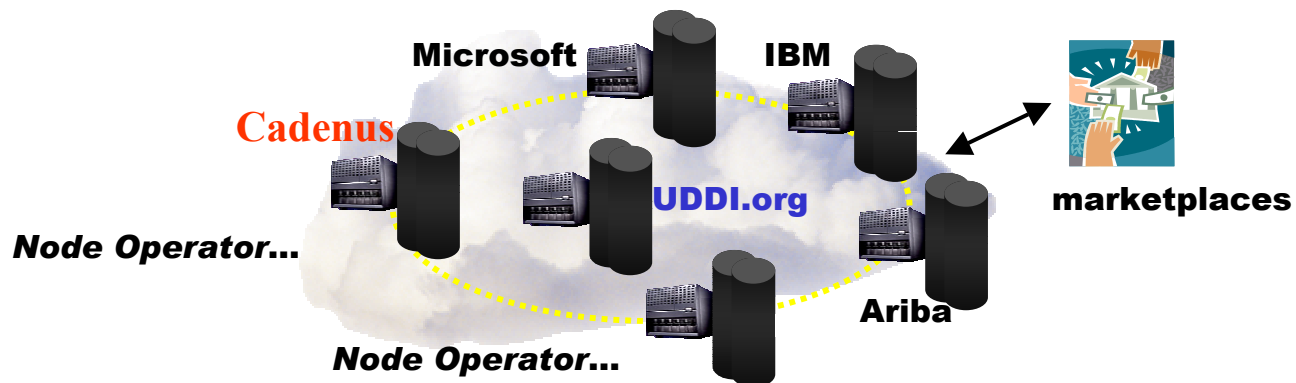
The Service Authority

- Supervises the entire framework
- Defines, upon SMs' requests, new service types
- Makes sure that any registered *Service type* is compliant with the current specifications
- Avoids service duplicates, by making sure that no registered service appears in the Directory in two slightly differing versions

UDDI (*Universal Description Discovery and Integration*)



- A framework for the *description* and *discovery* of services based on the creation of a world-wide registry aimed at facilitating *integration*
- Uses XML to represent data
- Uses SOAP (Simple Object Access Protocol) to exchange messages (query, registration, etc)
- A *logically centralized*, but *physically distributed* service



UDDI at work




1. Standards bodies and programmers populate the registry by describing services via metadata

4.



Marketplaces, search engines and applications formulate queries to obtain information about the companies and the registered services

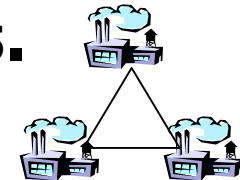
2.

Companies populate the registry with information related to their own profiles and the technical descriptions of the services they support

UDDI Business Registry

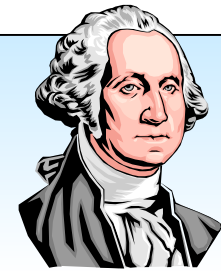


3. Inside the registry unique identifiers are assigned to each business entity and to each service

5.



The information may be used to invoke the desired Web service



Publishing a new Service Type

CADENUS

Business Process Specification

Name	OverviewURL	Taxonomy	
VoD	www.cadenus.org/BP_VoD.xml	Cadenus	Modify fields

Service Type descriptions

Text	Language	Cancel
VoD service type Specification	en	<input type="checkbox"/>
tipologia di servizio: Video On Demand	it	<input type="checkbox"/>
		<input type="button" value="Submit"/>

[Add Description](#)

OverviewURL descriptions

Text	Language	Cancel
Business Process Specification for VoD	en	<input type="checkbox"/>
Specifica del BusinessProcess per il VoD	it	<input type="checkbox"/>
		<input type="button" value="Submit"/>

[Add Description](#)

Untitled Document - Microsoft Internet Explorer

CADENUS

Business Process Specification

name VoD

overviewURL www.cadenus.org/BP_VoD.xml

this fields are required

Taxonomy

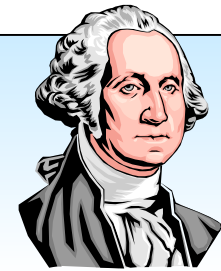
KeyName Cadenus

Submit

BP name

BP Specification

Taxonomy Specification



An example: registering a service

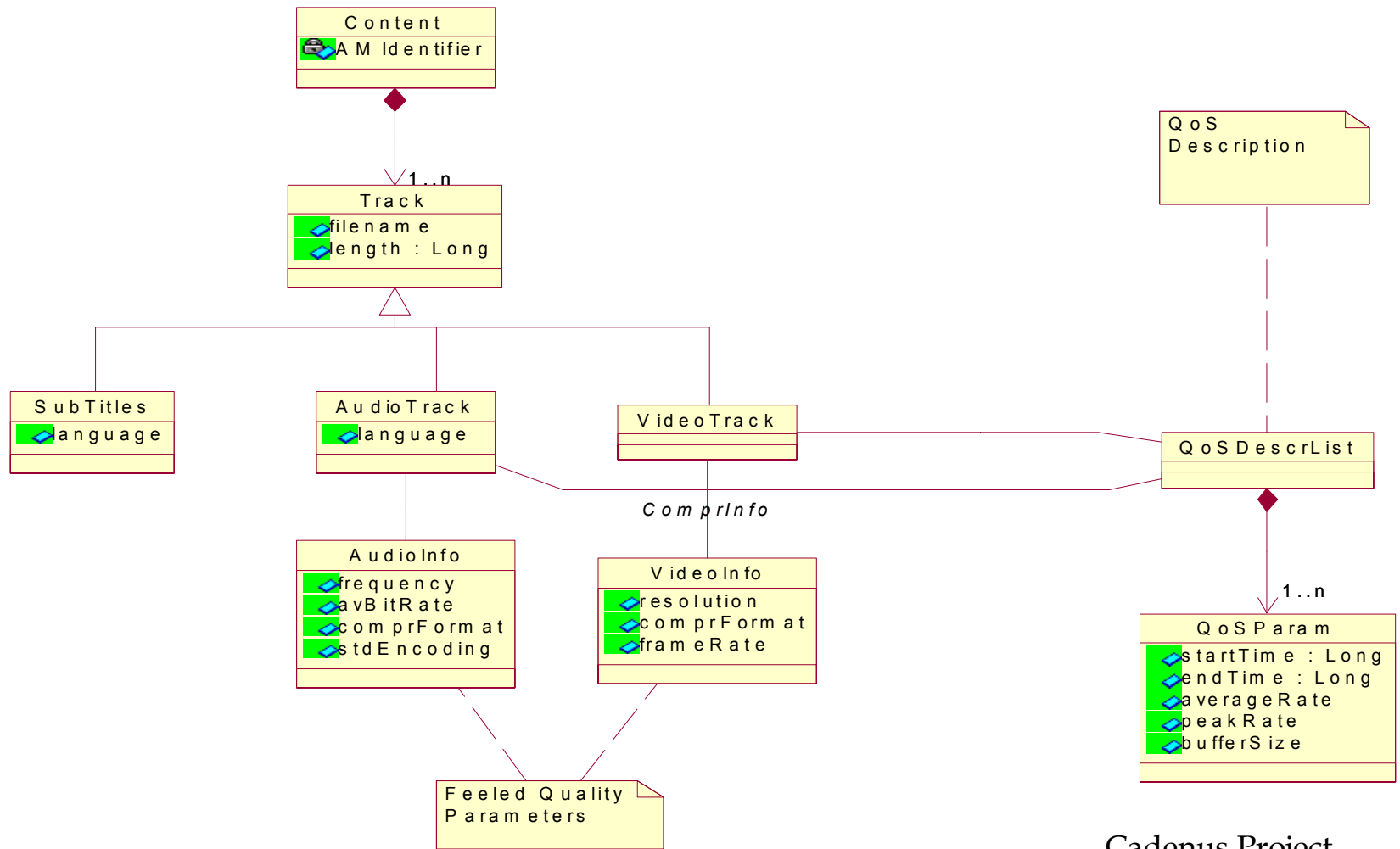
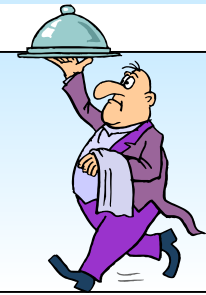
Business Entity	
nome	filmOnLine
descrizione	Descrizione my business provide the best film ... Lingua en
Add Description	
contatto	Nome luigi ballarano ruolo null e-mail ogigi@freemail.it tel. 0825-9860..
Add contact	
discoveryURLs	DiscoveryURL http://www.filmonline.com/ebxmlcpp.xml UseType cpp
Add discoveryURL	
Business Service	
nome	videoProviding
descrizione	Descrizione my VoD Service... Lingua en
Add Description	
accesspoint	http http://www.candida.supereva.com/servlet/BindMessageRouter
Servizi	
nome	uuid:D7398851-EF57-9ABC-240C-4BC473110DBA
Add Service	
save Cancel	

Untitled Document - Microsoft Internet Explorer

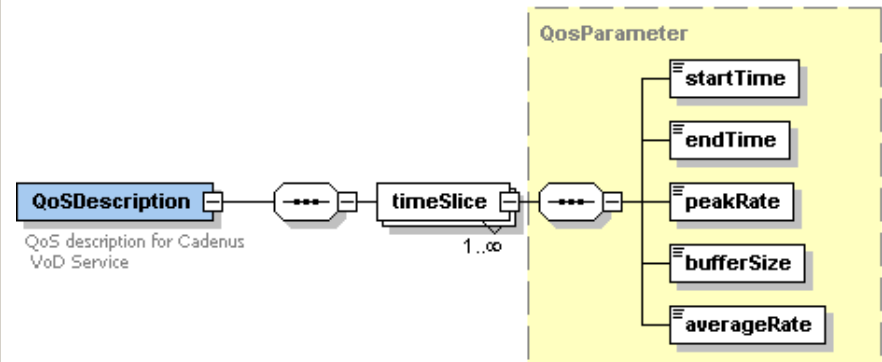
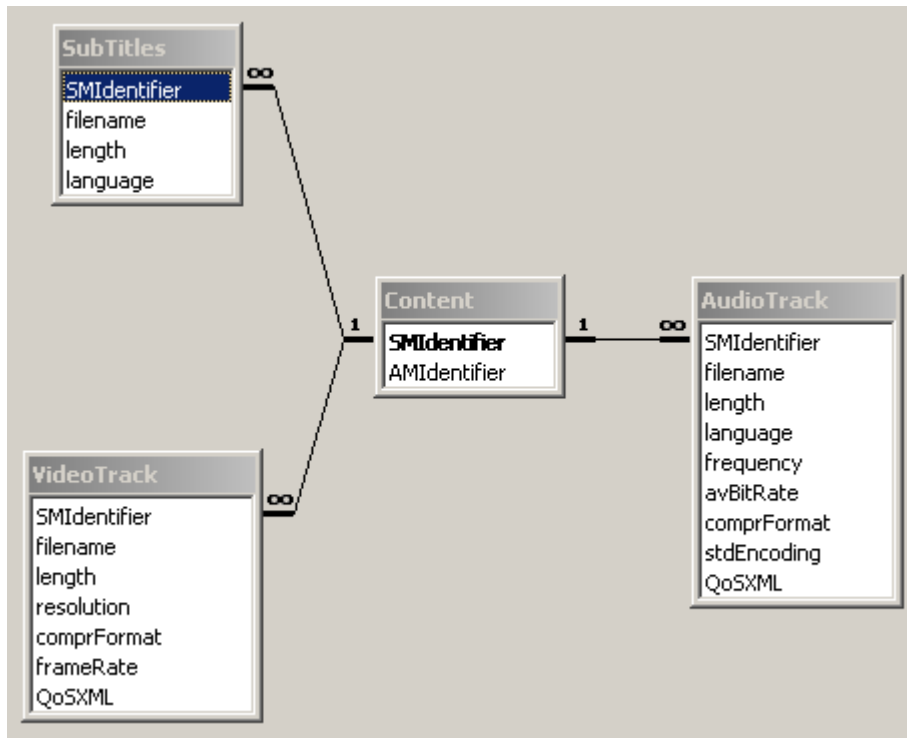
Business Service	
nome	<input type="text"/>
descrizione	<input type="text"/> <input type="button" value="Add description"/>
accesspoint	http <input type="text"/>
Servizi	
nome	VoD <input type="checkbox"/>
nome	VoIP <input type="checkbox"/>
nome	VPN <input type="checkbox"/>

Service Mediator
Contacts
Cpp
Service EndPoint
ServiceType

VoD- the SM's Database

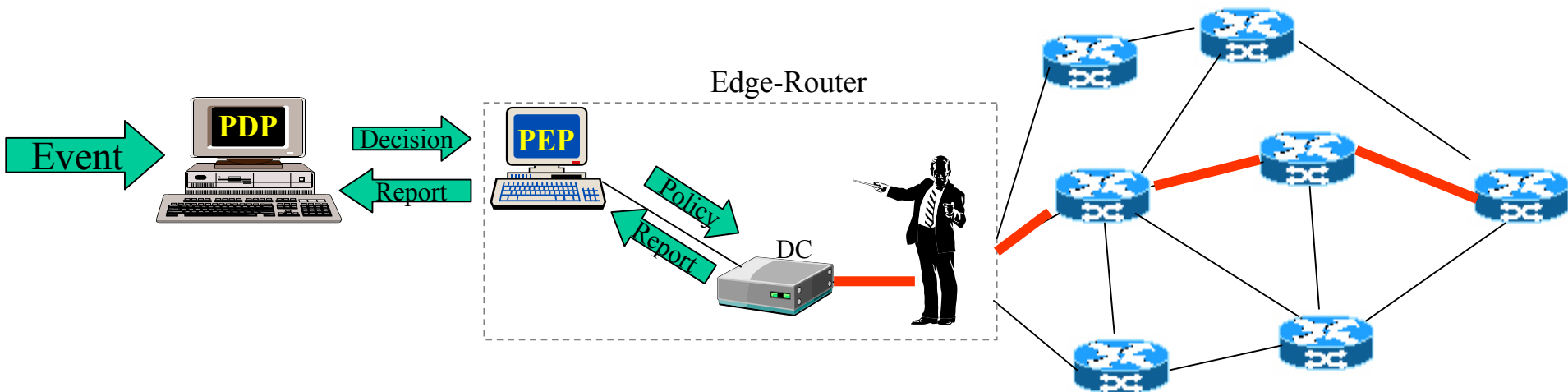


VoD- the SM's Database

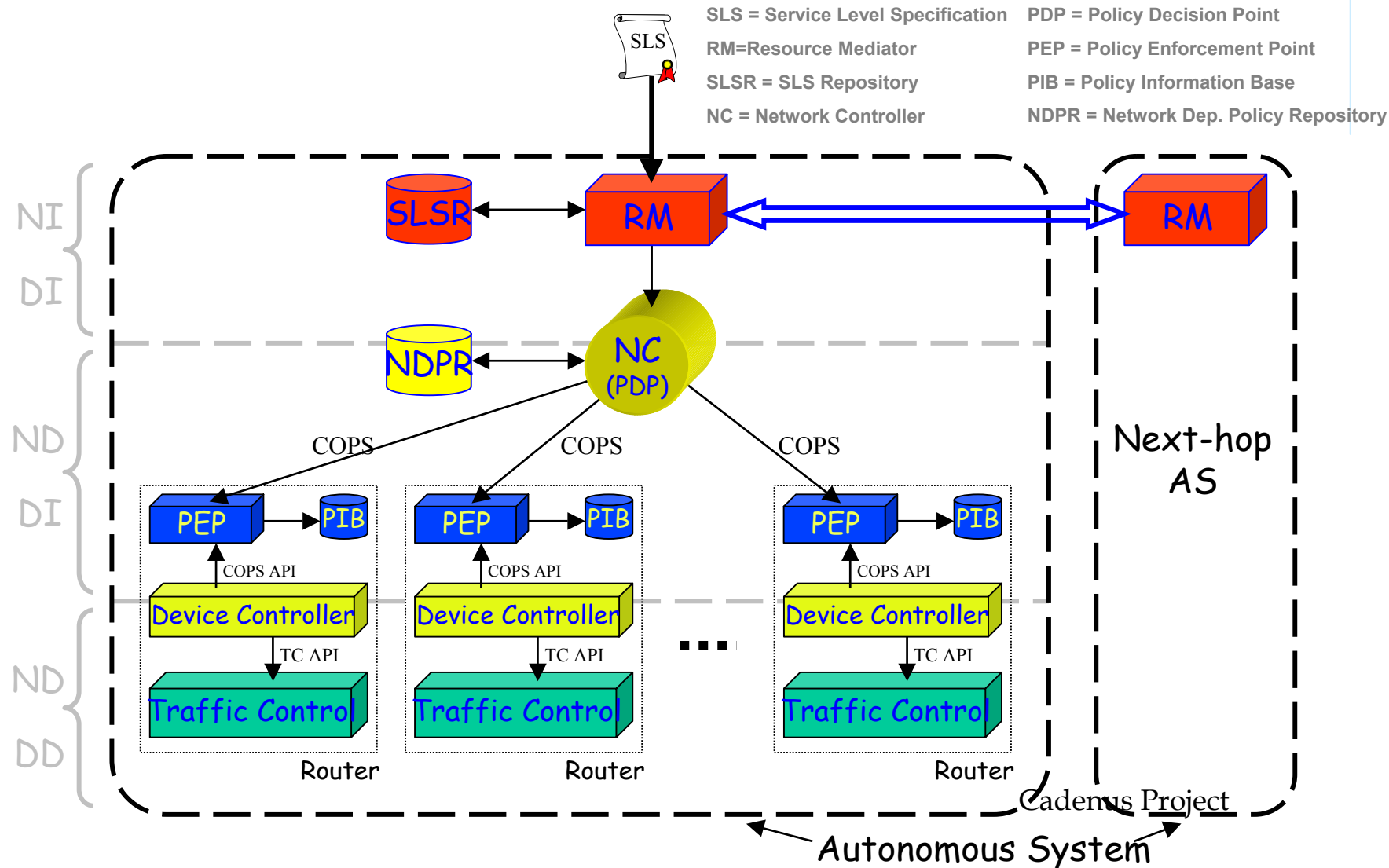


Dynamic network configuration

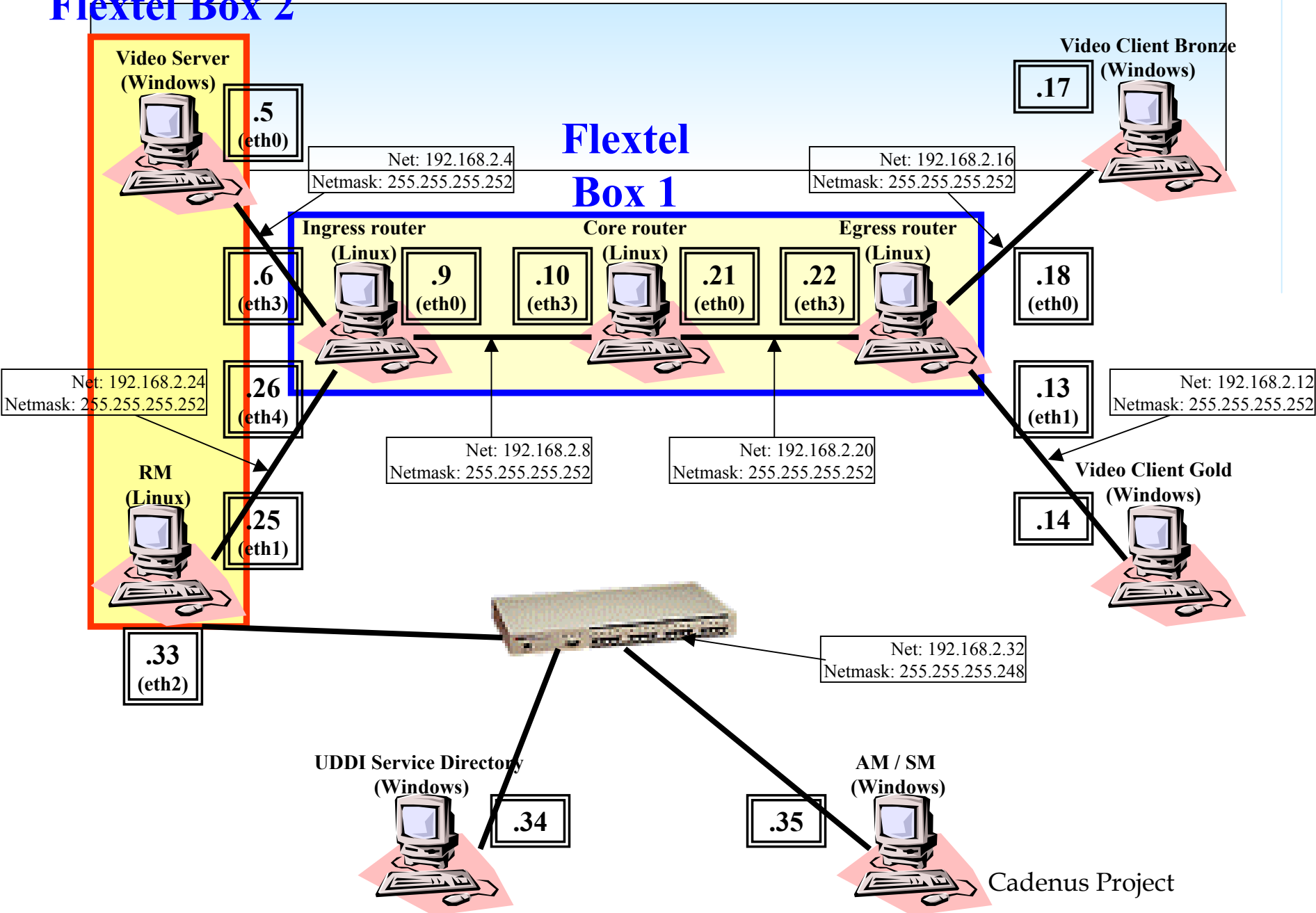
A policy-based approach



Dynamic network configuration



Flextel Box 2



Other issues faced...

- Interdomain functionality:
 - SLS ‘splitting’ techniques.
 - MPLS infrastructure at the lower layer:
 - Traffic engineering (RSVP-TE)
 - Dynamic configuration of Traffic Trunks
 - COPS for Traffic Engineering
 - Complete implementation under Linux
- Monitoring:
 - Design of a Cadenus monitoring framework
 - D2.2
 - Liason with MoMe (Monitoring and Measurement) cluster



SLA and Voice Over IP

SLA Parameters

Profiles: Residential (per call basis: e.g. through Dial-up)

Corporate (per monthly basis: e.g. to connect two sites)

Service Level Agreement for VoIP

CORPORATE

Quality:

Duration: (Days)

Destination: (IP address)

RESIDENTIAL

Quality:

Duration: (Minutes)

Destination: (IP address)



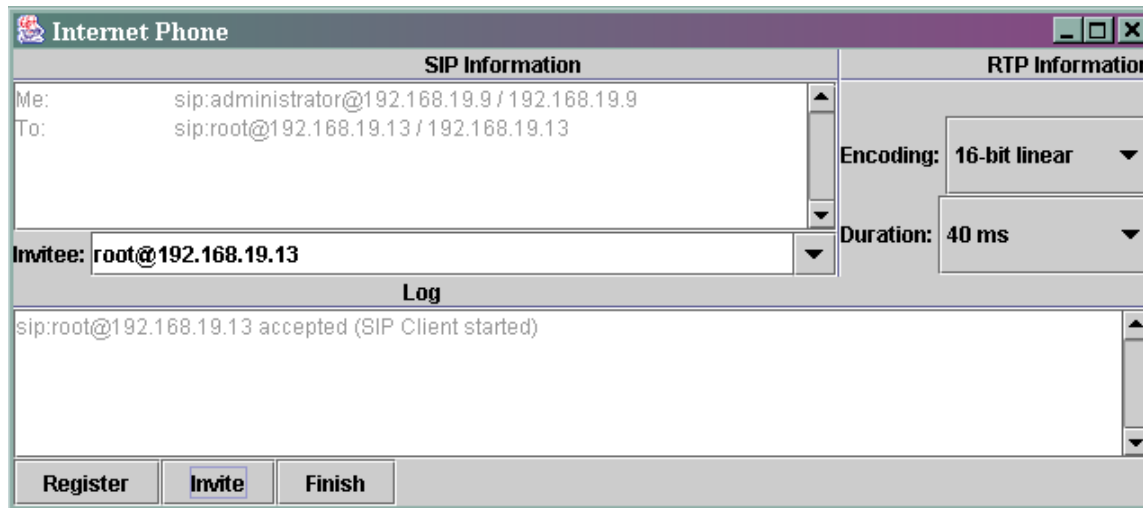
SLS Parameters

	GOLD	SILVER	BRONZE
Latency	< 100 ms	150 ms	200 ms
Loss	< 0.2 %	5 %	10 %
Jitter	< 20 ms	-	-
Bandwidth	> 100 kbps	80 kbps	< 80kbps

Cadenus Project

VoIP Application

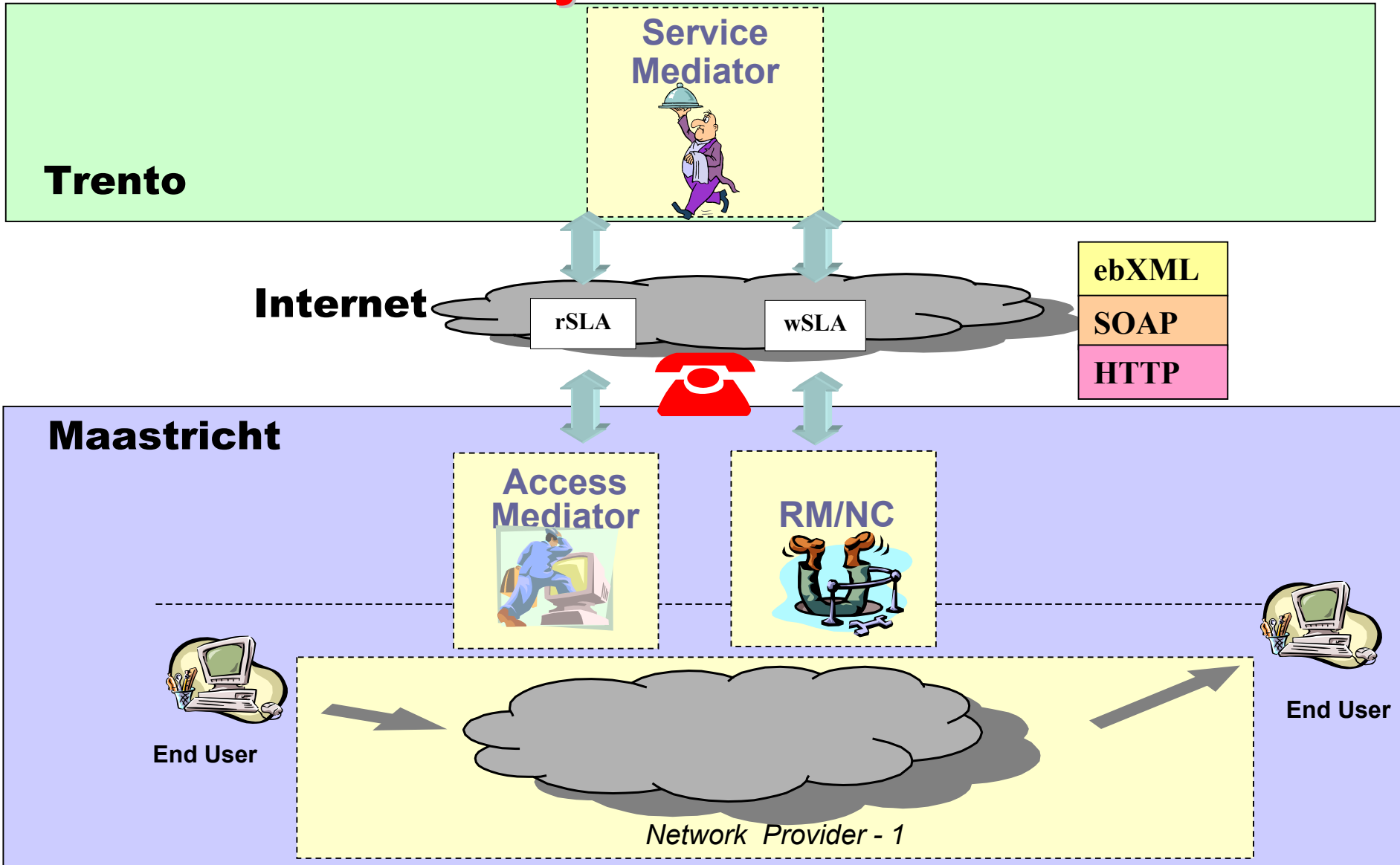
- Connection topology: PC2PC
(Extension coming) PC2Phone
- Connection mode: Full-duplex
- Platform Independent
(O.S. tested) Windows 98/NT/2000/XP
Linux



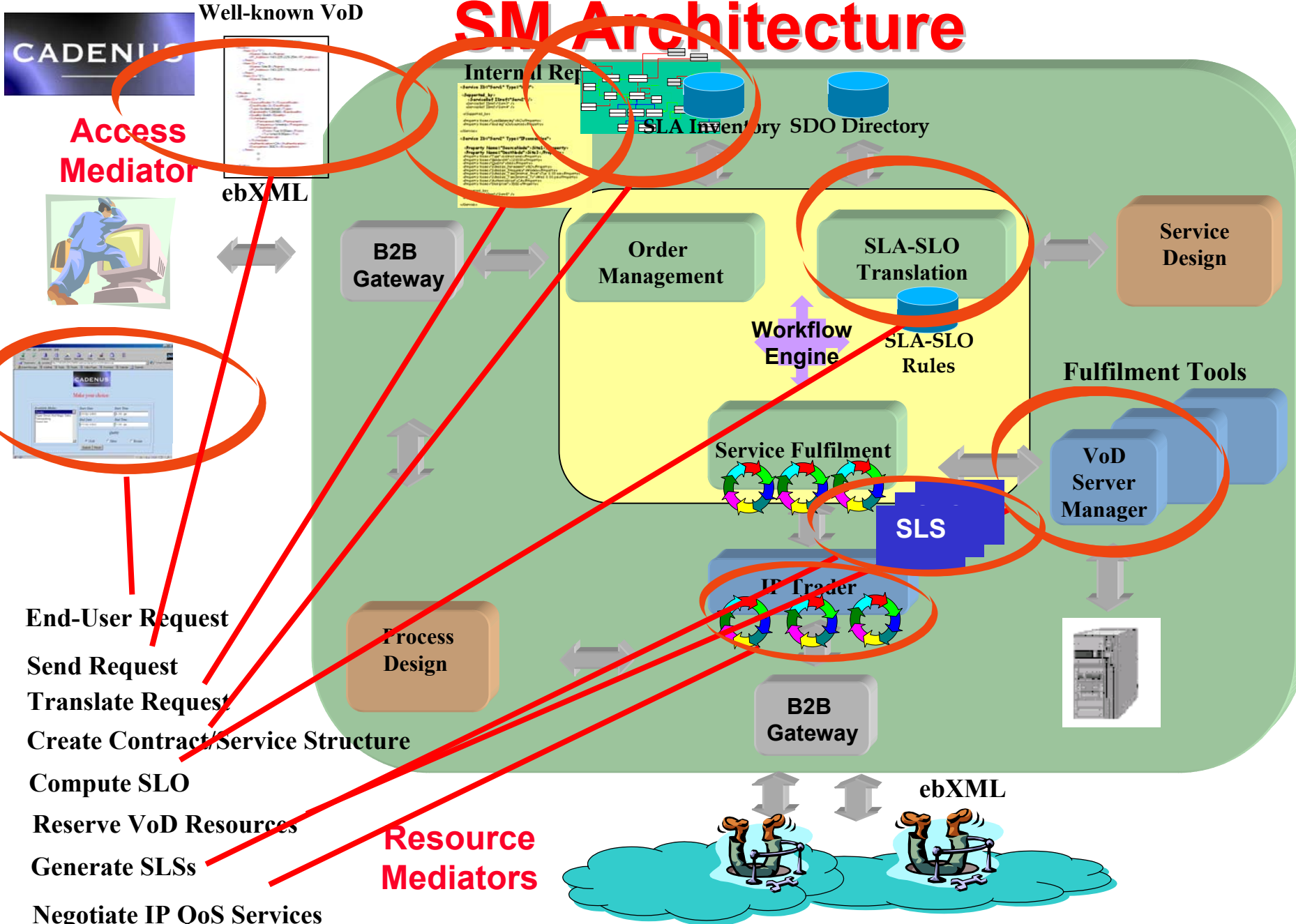
1st phase: SIP (Session Initiation Protocol) Cadenus Project
2nd phase: RTP (Real time Protocol)

Service Mediator: VoD Service Demo

Demo Physical architecture



SM Architecture

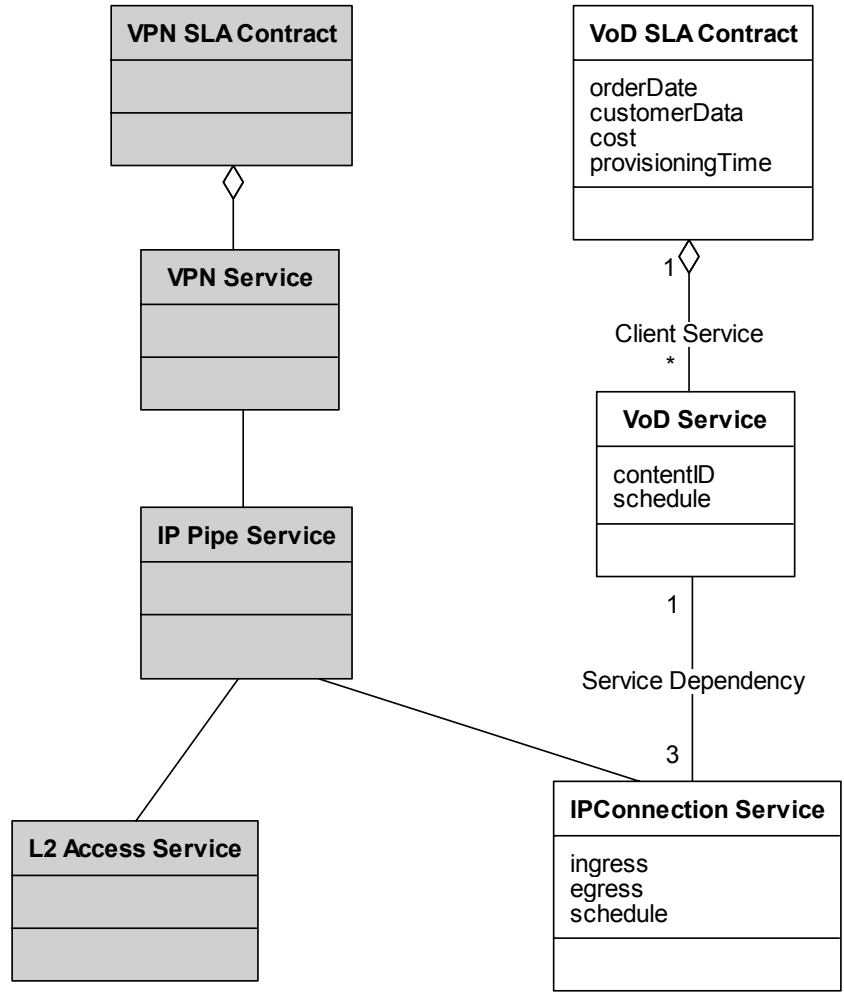


- End-User Request
- Send Request
- Translate Request
- Create Contract/Service Structure
- Compute SLO
- Reserve VoD Resources
- Generate SLSs
- Negotiate IP QoS Services

VoD Service Design

- ↓ Steps for introducing a new service type in the Service Mediator:
 - ↓ SLA Template and Service Template
 - ↓ Service negotiation and configuration workflows
 - ↓ SLA-SLO translation rules
 - ↓ Data format translation rules
 - ↓ Configuration policies

VoD Service Model



VoD QoS Characterisation

↓ Assumption:

↓ the customer has an Internet access with bandwidth suitable to the required CoS

↓ Video recorded at constant quality (e.g. MPEG 2)

↓ VoD Class of Service imposes constraints on the IP connectivity service required

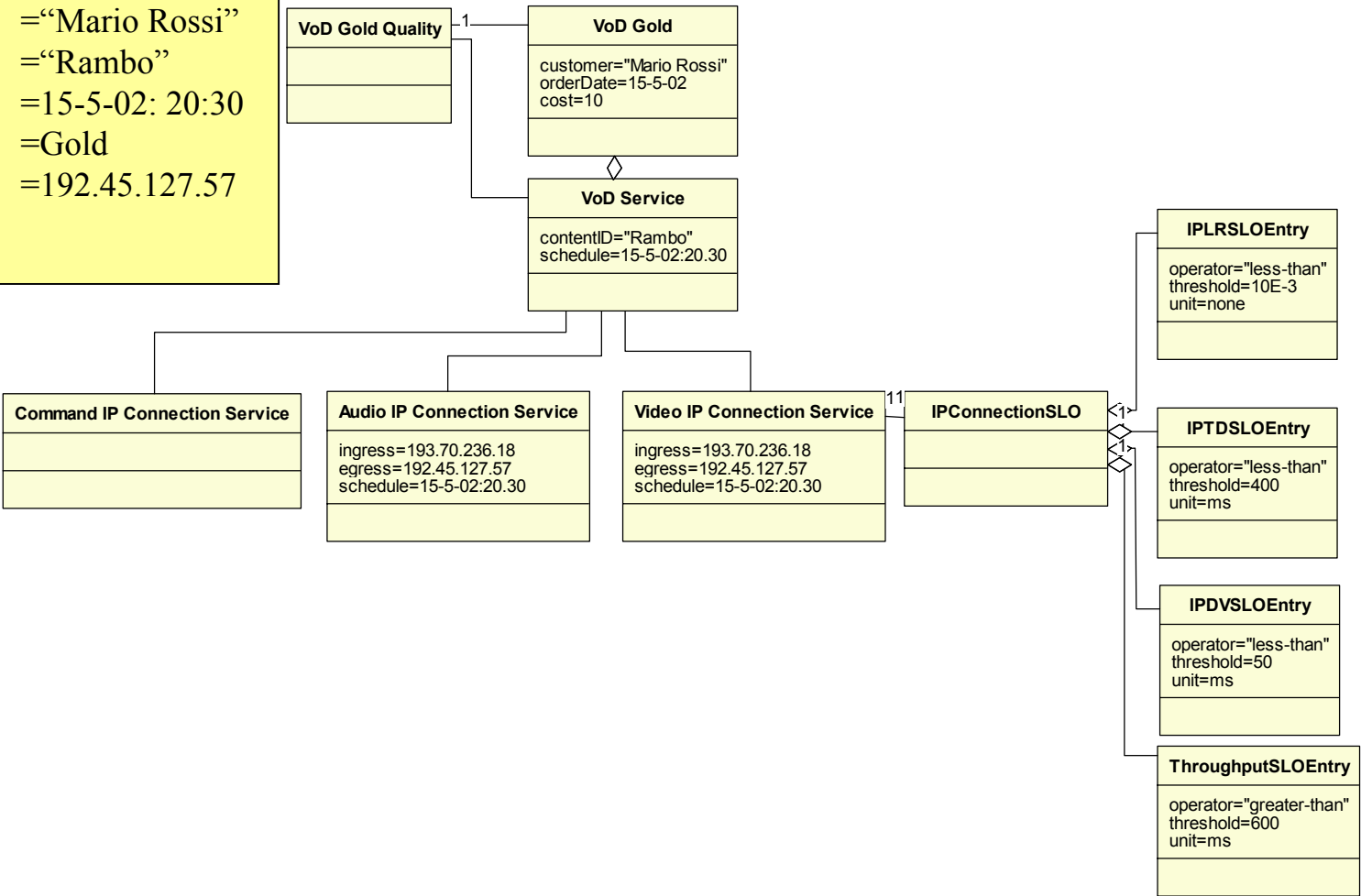
↓ Bandwidth requirements

↓ Performance parameters requirements for the different channels required (video, audio, control)

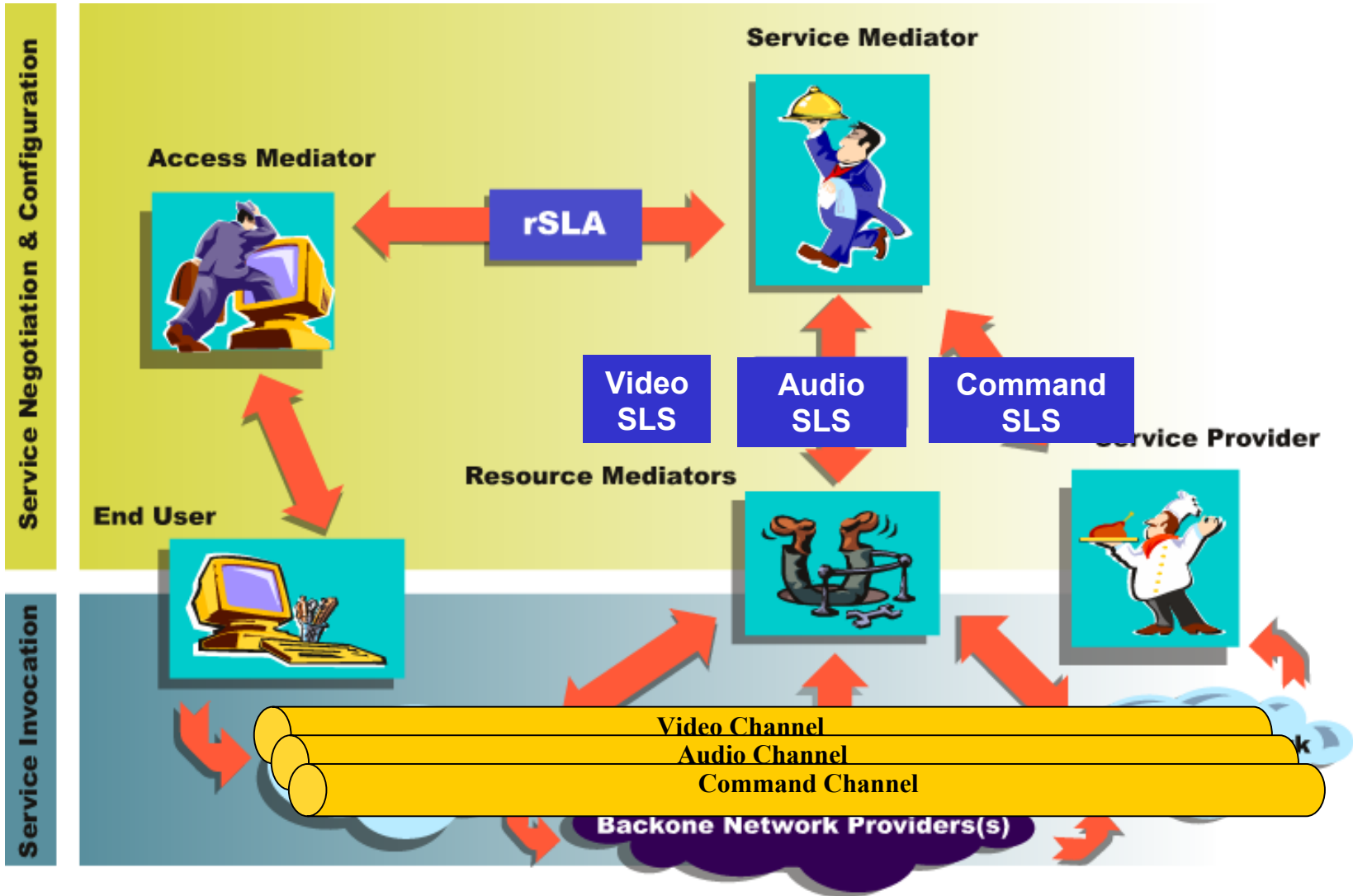
VoD Instance

End-User-Request

Customer	=“Mario Rossi”
Selected Title	=“Rambo”
Schedule	=15-5-02: 20:30
Quality	=Gold
IP Address	=192.45.127.57
...	



SLS Generation



SLS QoS Parameters

VoD CoS	Channel Type	IPTD (ms)	IPLR	IPDV (ms)	Bandwidth (Kbps)
Gold	Video	400	10E-3	50	2000
	Audio	400	10E-3	U	64
	Command	400	10E-3	U	50
Silver	Video	400	10E-3	50	256
	Audio	400	10E-3	U	32
	Command	400	10E-3	U	50
Bronze	Video	U	U	U	U
	Audio	U	U	U	U
	Command	U	U	U	U

Tests and Measurement for Trial 1

- ↓ Functional testing of the architecture:
 - ↓ Service registration and partner localisation (AM, SM, SA)
 - ↓ Service design, SLA-SLS translation (SM)
 - ↓ Service negotiation and configuration (AM, SM, RM)
 - ↓ Service invocation (RM)
 - ↓ SLA monitoring
- ↓ Non functional testing:
 - ↓ Performance
 - ↓ Scalability
 - ↓ Usability