Using ODRL to express rights for different content usage scenarios

Second International ODRL Workshop 2005

Carlos Serrão, Miguel Dias and Jaime Delgado

carlos.serrao@adetti.iscte.pt

ISCTE, Lisboa - Portugal, July 7-8, 2005

www.adetti.pt

associação para o desenvolvimento das telecomunicações e técnicas de informática

Summary/ Objectives

- **Show and demonstrate how ODRL is being used for several content protection scenarios, where rights management is necessary**
  - Digital Music e-commerce (download/streaming)
  - Earth-Observation JPEG2000-based products
  - Video-Surveillance data
- **Provide an overview of the OpenSDRM platform**
- **Describe the rights management and enforcing middleware layer**
- **Provide and describe the ODRL license templates for the different scenarios**

Edifício ISCTE, Av. Forças Armadas, 1600-082 Lisboa, Portugal Phone: **+ 351 217 826 480** Fax: **+ 351 217 826 488** email: **adetti@adetti.pt** **www.adetti.pt**

Introduction

- **OpenSDRM is a DRM platform, based on ODRL, developed primarily for the MOSES project (IST), but that is being used and improved through several other projects:**
  - **MOSES**, an FP5 IST project, development of an open-standards based DRM platform to manage content rights on a digital music e-commerce scenario
  - **WCAM**, an FP6 IST project, provision and adaptation of the OpenSDRM platform to provide video-surveillance data rights management
  - **HICOD2000**, an European Space Agency project, for controlling and managing the access rights to Earth Observation Products in JPEG2000
  - **MEDIANET**, an FP6 IST project, in which we are developing a Home Network based Music JukeBox, that protects, controls and manages content access rights

Edifício ISCTE, Av. Forças Armadas, 1600-082 Lisboa, Portugal Phone: + 351 217 826 480 Fax: + 351 217 826 488 email: adetti@adetti.pt www.adetti.pt

Introduction

- **The paper discusses basically two different things:**
  - A client-side system that manages the connection between the content rendering application and the Rights Expression
  - A server-side system to handle license templates that can be defined by the several content provision systems according to their business model
- **Goal: provide a rights management interoperability layer**

Edifício ISCTE, Av. Forças Armadas, 1600-082 Lisboa, Portugal Phone: **+ 351 217 826 480** Fax: **+ 351 217 826 488** email: **adetti@adetti.pt** **www.adetti.pt**

OpenSDRM platform

- **OpenSDRM is a service-oriented DRM platform independent from:**
  - the type of content
  - the content protection system
  - the implemented business model
- **OpenSDRM is mostly composed by:**
  - External Actors (End-users, Device Producers, Content Providers, Security Tools Providers, IPR societies) and Systems (Content Selection Systems, Content Delivery Systems, Financial Systems, Certification System, Devices)
  - Internal Components and Interfaces (Content Management System, License Manager System, Payment System, Content Protection System, Authentication and Accounting System)

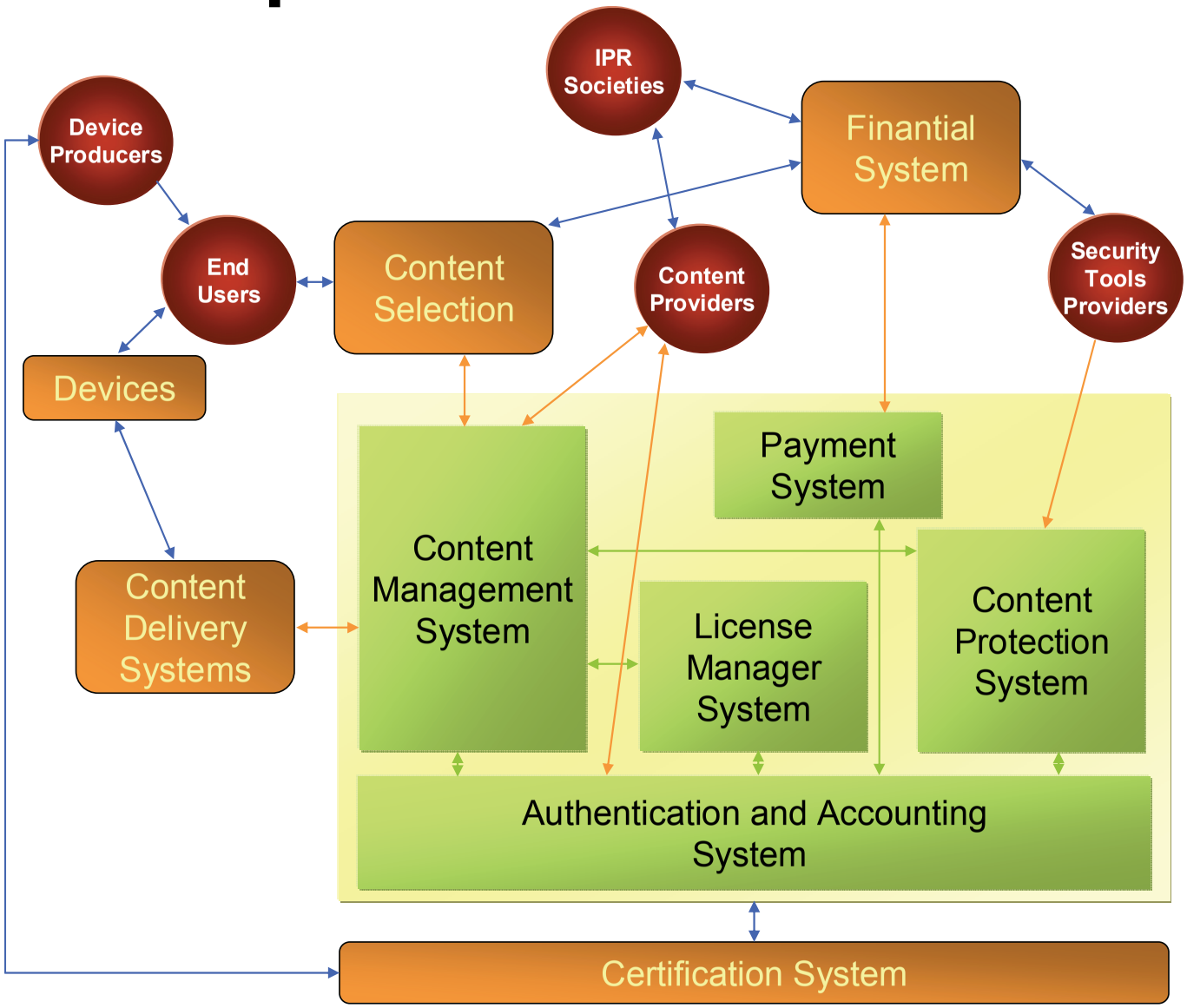
Edifício ISCTE, Av. Forças Armadas, 1600-082 Lisboa, Portugal Phone: **+ 351 217 826 480** Fax: **+ 351 217 826 488** email: **adetti@adetti.pt** **www.adetti.pt**

OpenSDRM platform

- **Technically speaking, OpenSDRM is composed by:**
  - Server-side components
    - Individualized, self-contained software components
    - Web-Services based
    - Expose public interfaces using WSDL
    - Exchange messages using SOAP
    - Message exchanging is secure at the communication level by SSL/TLS protocol and at the application level by XML Digital Signature and XML Encryption
  - Client-side components
    - A digital Wallet software, that can securely store information on the client-side file-system and registry
    - Controls and mediates user access to content

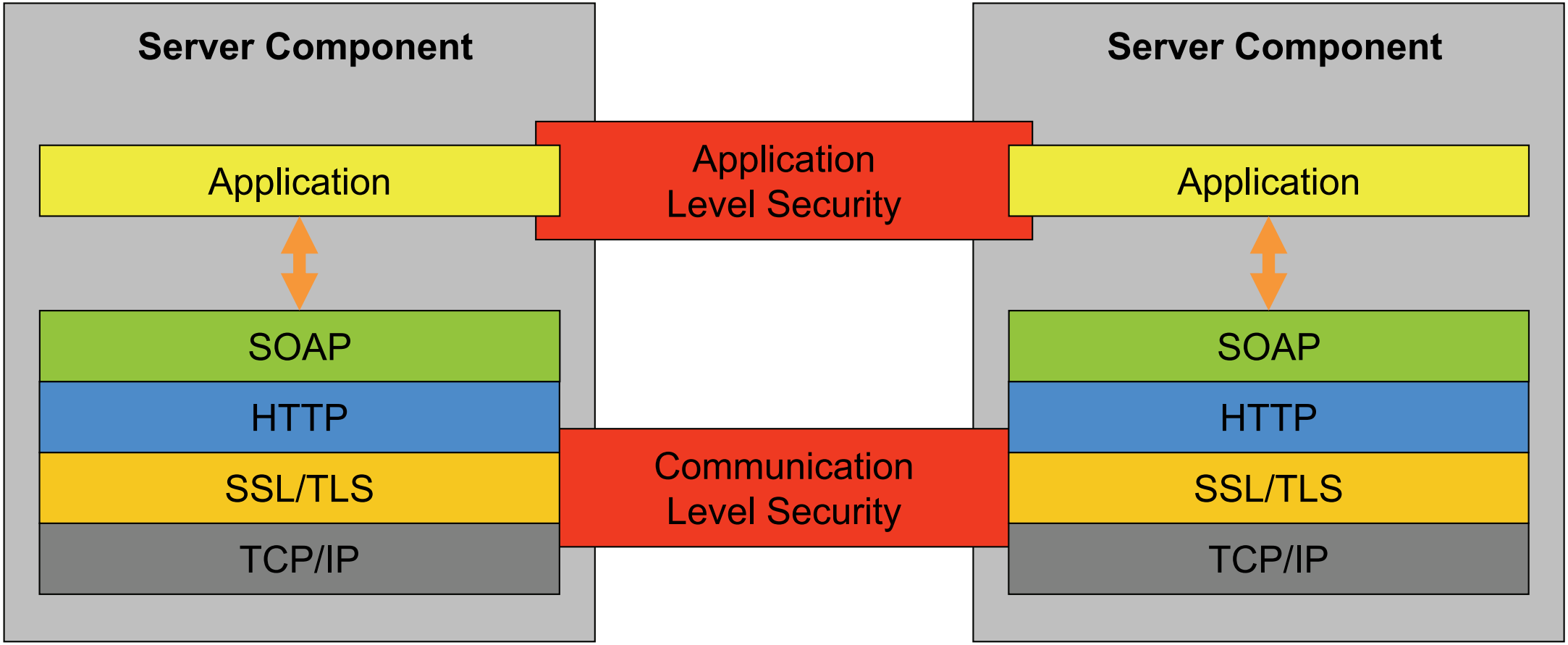
Edifício ISCTE, Av. Forças Armadas, 1600-082 Lisboa, Portugal Phone: + 351 217 826 480 Fax: + 351 217 826 488 email: adetti@adetti.pt www.adetti.pt

OpenSDRM platform



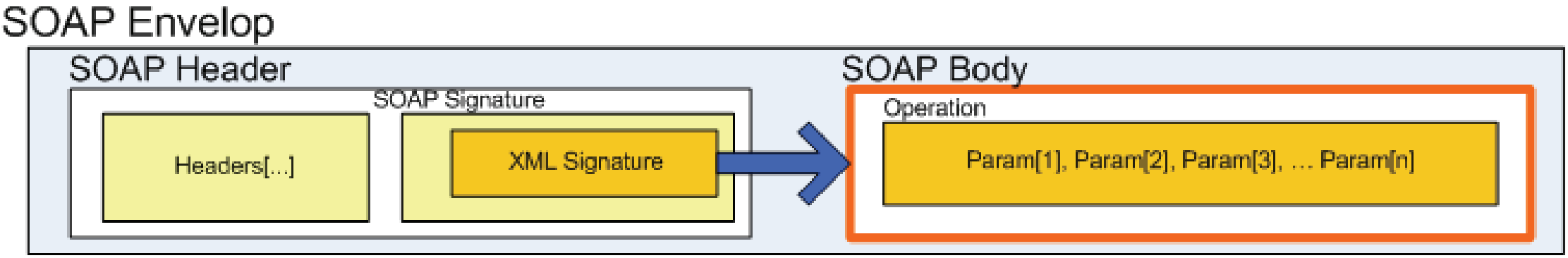
Edifício ISCTE, Av. Forças Armadas, 1600-082 Lisboa, Portugal Phone: + 351 217 826 480 Fax: + 351 217 826 488 email: adetti@adetti.pt www.adetti.pt

OpenSDRM Security



Edifício ISCTE, Av. Forças Armadas, 1600-082 Lisboa, Portugal Phone: + 351 217 826 480 Fax: + 351 217 826 488 email: adetti@adetti.pt www.adetti.pt

OpenSDRM Security



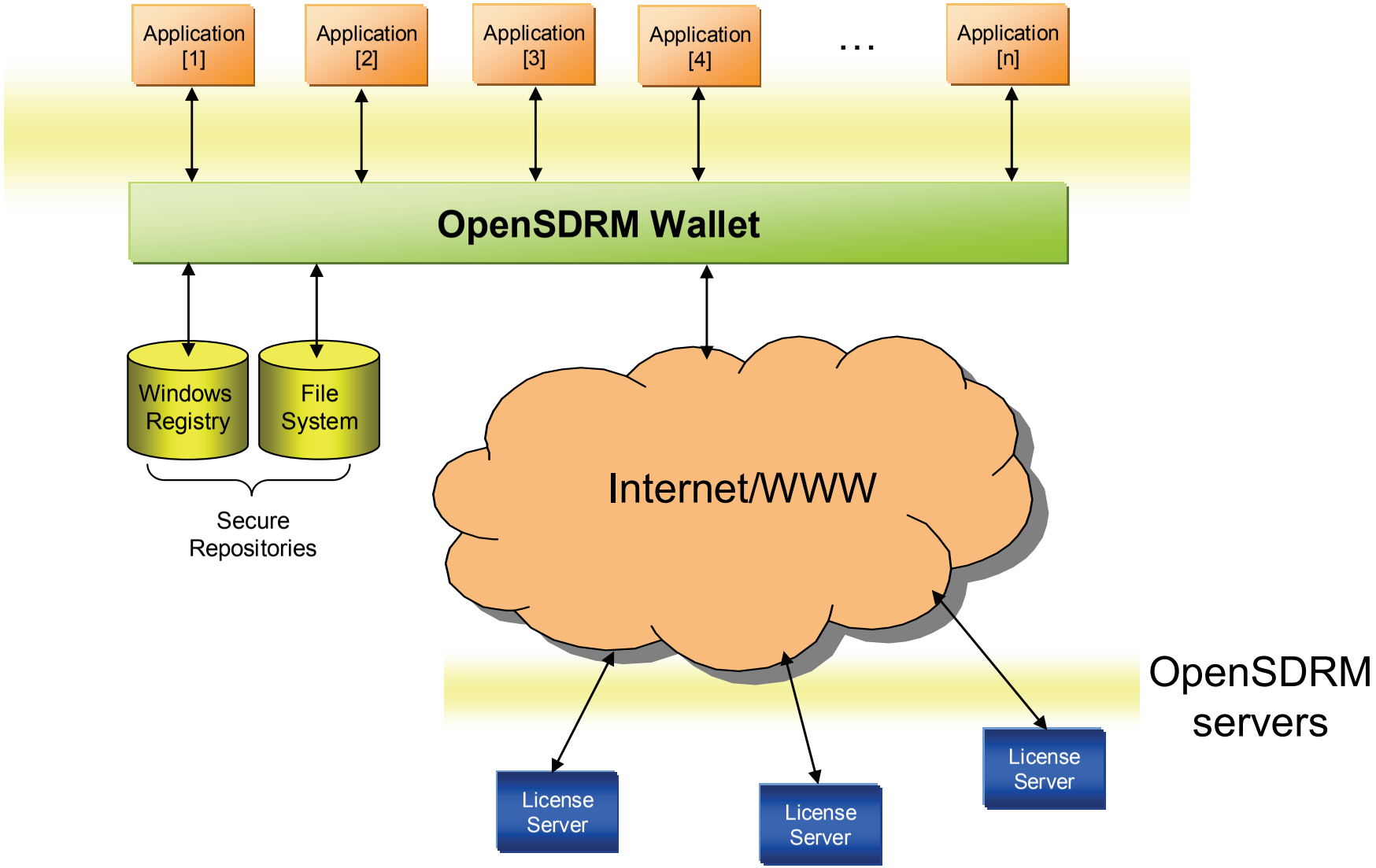
Edifício ISCTE, Av. Forças Armadas, 1600-082 Lisboa, Portugal Phone: + 351 217 826 480 Fax: + 351 217 826 488 email: adetti@adetti.pt www.adetti.pt

License Management on the system

- **On the client-side licenses are handled by the OpenSDRM digital Wallet**
  - Mediates the access from content rendering applications and the OpenSDRM server-side components
  - Stores user private information, and licenses securely
    - Locally, on the file-system or on the registry
    - Remotely, on a server
  - Responsible for rights management at the end-user side.

Edifício ISCTE, Av. Forças Armadas, 1600-082 Lisboa, Portugal Phone: + 351 217 826 480 Fax: + 351 217 826 488 email: adetti@adetti.pt www.adetti.pt

License Management on the system



Edifício ISCTE, Av. Forças Armadas, 1600-082 Lisboa, Portugal Phone: + 351 217 826 480 Fax: + 351 217 826 488 email: adetti@adetti.pt www.adetti.pt

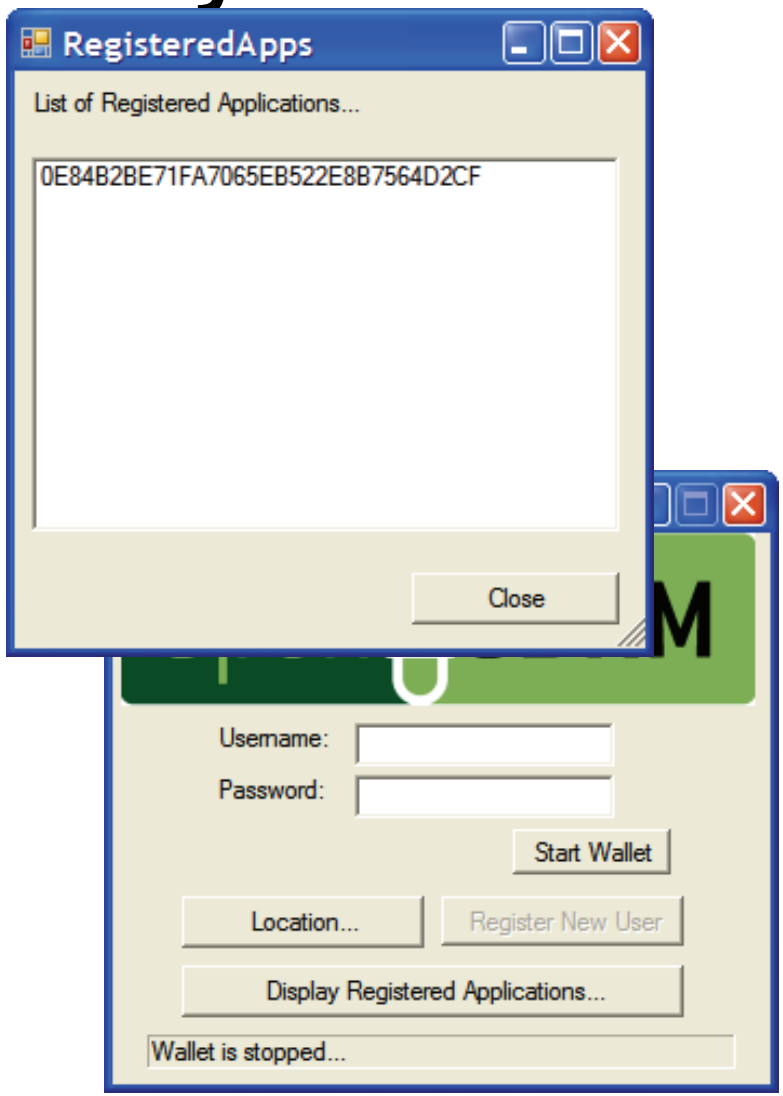
License Management on the system

- **OpenSDRM Wallet allows the coexistence of:**
  - many DRM-protected files and
  - many DRM-enabled applications
- **on a single client system, presenting a horizontal approach to DRM**
- **Client-side interoperability layer**
- **Abstracts the content rendering applications from the REL used**
- **At the same time this approach also provides server-side interoperability since clients are independent from the server where they obtain the licenses.**

Edifício ISCTE, Av. Forças Armadas, 1600-082 Lisboa, Portugal Phone: **+ 351 217 826 480** Fax: **+ 351 217 826 488** email: **adetti@adetti.pt** **www.adetti.pt**

License Management on the system

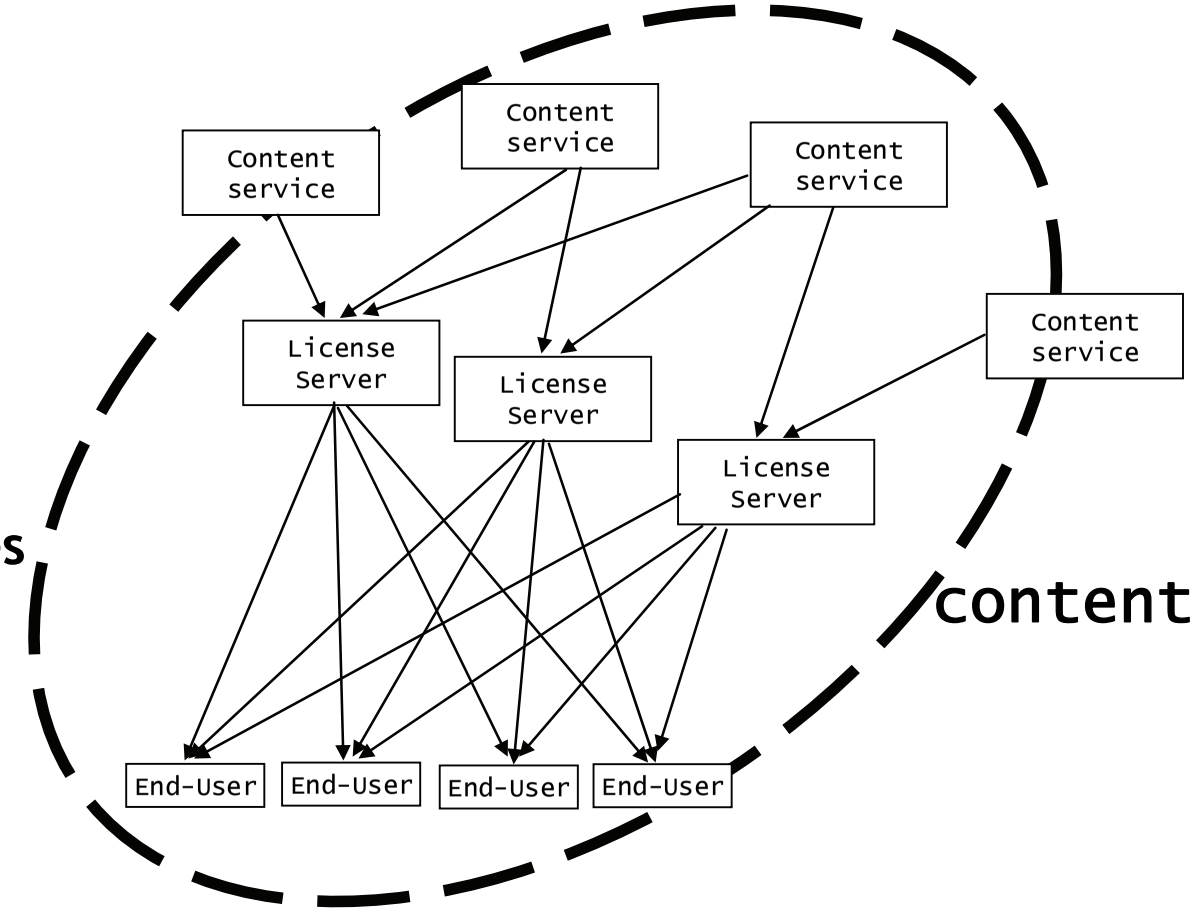
- **Content Rendering Application (CRA) <-> OpenSDRM Digital Wallet (ODW)**
  - CRA registration on the ODW
  - CRA requests operation over the content
    - CRA establishes trust with ODW, through credentials exchange
    - CRA and ODW establish common secret session key
    - CRA requests operation over content
    - ODW authorizes or denies the operation
    - ODW returns content key(s)



Edifício ISCTE, Av. Forças Armadas, 1600-082 Lisboa, Portugal Phone: + 351 217 826 480 Fax: + 351 217 826 488 email: adetti@adetti.pt www.adetti.pt

License Management on the system

- **The system works in a many-to-many context:**
  - Many Content Services
  - Many License Servers
  - Many End-Users
  - Many Content Rendering Applications
- **The different content services define their own different business models based on license templates.**



Edifício ISCTE, Av. Forças Armadas, 1600-082 Lisboa, Portugal Phone: + 351 217 826 480 Fax: + 351 217 826 488 email: adetti@adetti.pt www.adetti.pt

License Management on the system

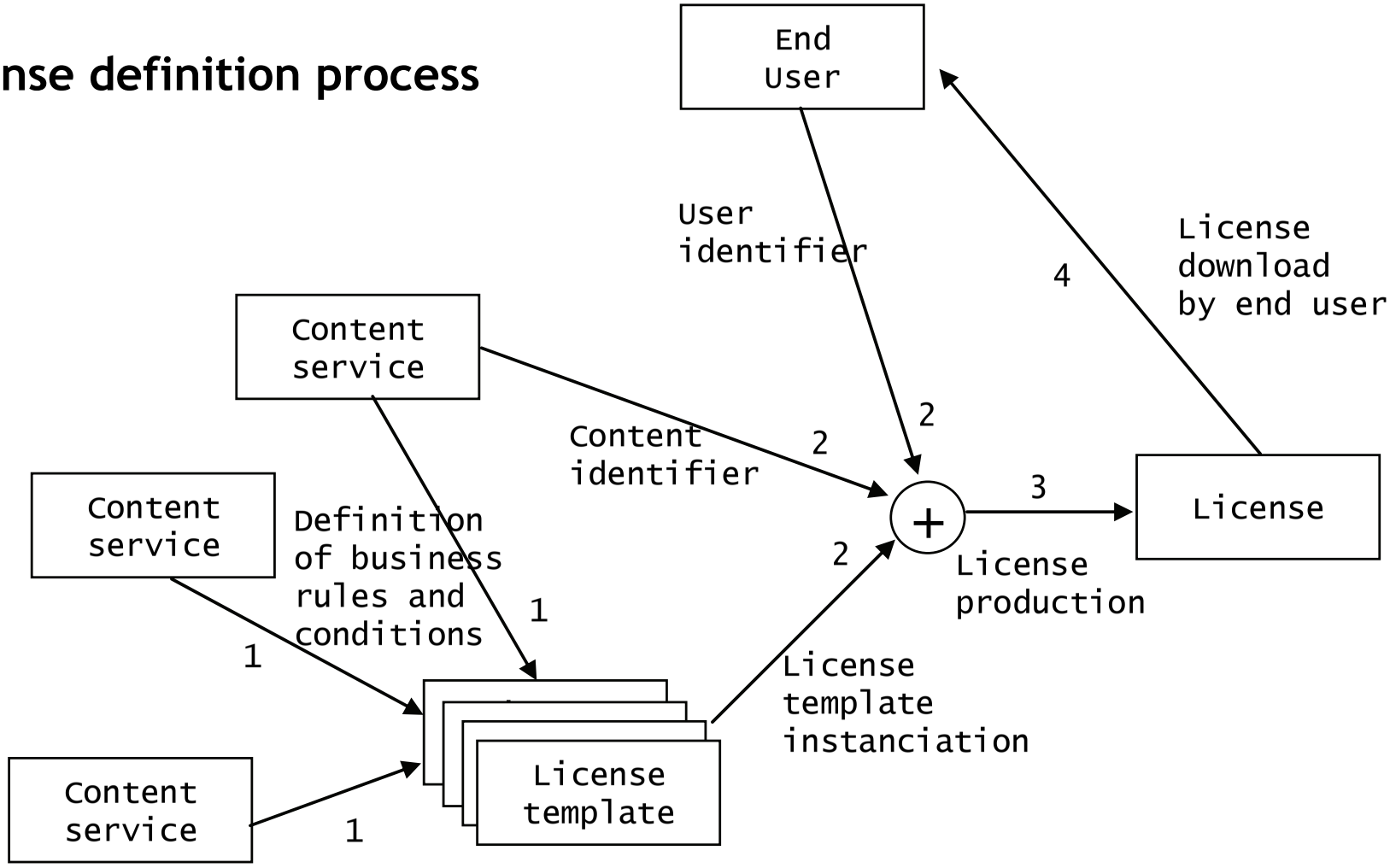
- **License Template Definition**
  - %KEY%
  - %CID%
  - %UID%
  - %SDATE%
  - %EDATE%
  - %PARAM%
- **Values are replaced when license is instantiated**

```
<?xml version="1.0" encoding="UTF-8" ?>
<o-ex:rights xmlns:o-ex="http://odrl.net/1.1/ODRL-EX"
         xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
         xmlns:o-dd="http://odrl.net/1.1/ODRL-DD"
         xmlns:ds="http://odrl.net/1.1/ODRL-DD"
         xsi:schemaLocation="http://odrl.net/1.1/ODRL-EX
../schemas/ODRL-EX-11.xsd
         http://odrl.net/1.1/ODRL-DD ../schemas/ODRL-DD-11.xsd">
   <o-ex:agreement>
      <o-ex:asset>
         <ds:keyInfo>
            <ds:keyValue>%KEY%</ds:keyValue>
         </ds:keyInfo>
         <o-ex:context>
            <o-dd:uid>%CID%</o-dd:uid>
            <o-dd:name>%PARAM_1%</o-dd:name>
         </o-ex:context>
      </o-ex:asset>
      <o-ex:permission>
         <o-dd:play>
            <o-ex:constraint>
               <o-dd:individual>%UID%</o-dd:individual>
               <o-dd:count>%PARAM_2%</o-dd:count>
               <o-dd:datetime>
                   <o-dd:start>%SDATE%</o-dd:start>
                   <o-dd:end>%EDATE%</o-dd:end>
               </o-dd:datetime>
            </o-ex:constraint>
         </o-dd:play>
      </o-ex:permission>
   </o-ex:agreement>
</o-ex:rights>
```


Edifício ISCTE, Av. Forças Armadas, 1600-082 Lisboa, Portugal Phone: + 351 217 826 480 Fax: + 351 217 826 488 email: adetti@adetti.pt www.adetti.pt

License Management on the system

- **License definition process**



Edifício ISCTE, Av. Forças Armadas, 1600-082 Lisboa, Portugal Phone: + 351 217 826 480 Fax: + 351 217 826 488 email: adetti@adetti.pt www.adetti.pt

ODRL usage scenarios

- **Three different scenarios**
  - Digital Music e-commerce
  - Earth-Observation products
  - Video-Surveillance
- **The license templates share some common points:**
  - %CID% - content unique identifier
  - %UID% - user unique identifier
  - %SDATE%, %EDATE% - license validity
  - %KEY% - content encryption key
  - License confidentiality and integrity

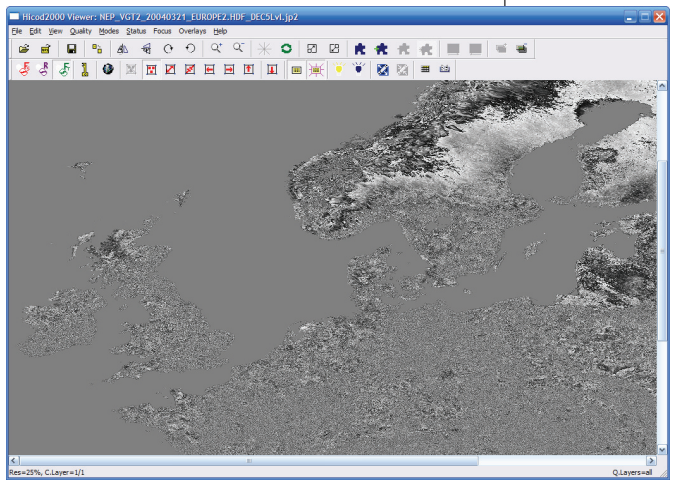
Edifício ISCTE, Av. Forças Armadas, 1600-082 Lisboa, Portugal Phone: **+ 351 217 826 480** Fax: **+ 351 217 826 488** email: **adetti@adetti.pt** **www.adetti.pt**

ODRL usage scenarios

- **Music download and streaming**
  - This scenario represents a typical music portal, where an end-user can go and select some tracks of music to download/stream to listen
  - Template specific conditions:
    - **Play count**: setup how many times the content can be rendered by the end-user application;
    - **Operations**: definition of a set of possible operations that might be conducted over the content – in the case of the presented music business model the possible operations are:
      - lend
      - save
      - play

Edifício ISCTE, Av. Forças Armadas, 1600-082 Lisboa, Portugal Phone: + 351 217 826 480 Fax: + 351 217 826 488 email: adetti@adetti.pt www.adetti.pt

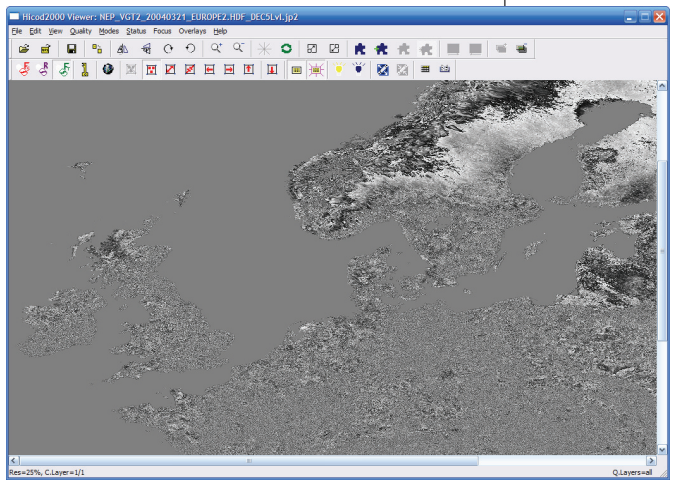
ODRL usage scenarios



- **Remote sensing of JPEG2000 images**
  - This scenario refers to a content business situation in which an end-user can access an Earth Observation (EO) portal on the WWW and order some visible EO products which are then converted to JPEG2000 format.
  - These JPEG2000 EO products are protected by the EO portal supplier and sent in an encrypted format (using the JPSEC format) to the end-user
  - OpenSDRM is used to protect the access to the multiple resolutions of the EO product and to control which operations can be conducted over the content.

Edifício ISCTE, Av. Forças Armadas, 1600-082 Lisboa, Portugal Phone: + 351 217 826 480 Fax: + 351 217 826 488 email: adetti@adetti.pt www.adetti.pt

ODRL usage scenarios

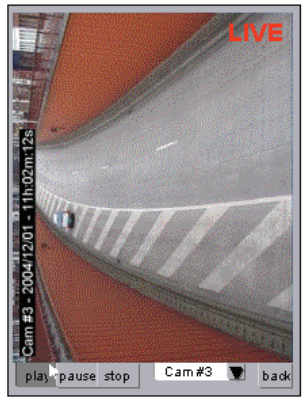


- **Remote sensing of JPEG2000 images**
  - OpenSDRM produces licenses for the EO products based on a template that allows the specification of the following parameters:
    - **Resolution level**: the JPEG2000 EO products have different resolutions (to a maximum number of six). Each of the resolutions is protected with a different key and the access to each level can be conditioned to a particular user or user group;
    - **Operations**: this parameter allows the specification of which are the operations that can be conducted on the content. In this particular business model the save operation is the one that is possible to specify. This operation allows the end-user to recover the original EO product format.

Edifício ISCTE, Av. Forças Armadas, 1600-082 Lisboa, Portugal Phone: + 351 217 826 480 Fax: + 351 217 826 488 email: adetti@adetti.pt www.adetti.pt

ODRL usage scenarios

A



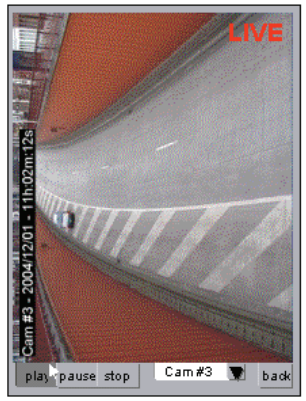
B

- **Video-surveillance streaming and storage**
  - Development of an integrated system for secure delivery of video surveillance data over a wireless network, while remaining scalable and robust to transmission errors
  - Content is encoded in Motion-JPEG2000 and streamed with a specific RTP protocol encapsulation to prevent the loss of packets containing the most essential data
  - Protection of the video data is performed at content level using the standardized JPSEC syntax, along with flexible encryption of quality layers or resolution levels

Edifício ISCTE, Av. Forças Armadas, 1600-082 Lisboa, Portugal Phone: **+ 351 217 826 480** Fax: **+ 351 217 826 488** email: **adetti@adetti.pt** **www.adetti.pt**

ODRL usage scenarios

A



B

- **Video-surveillance streaming and storage**
  - OpenSDRM is used to manage all authenticated peers on the WLAN (from end-users to cameras), as well as to manage the rights to access and display conditionally the video data.
  - The OpenSDRM License Server produces licenses for this scenario based on the following parameters:
    - **Resolution level**: the video-surveillance data maybe streamed with different quality resolution layer. The license defined in these scenarios allows the definition of different access levels concerning the resolution layer;
    - **Operations**: this parameter allows the specification of the possible operations that can be conducted over the content by a given user or group of users:
      - Save
      - Display
      - Play

Edifício ISCTE, Av. Forças Armadas, 1600-082 Lisboa, Portugal Phone: + 351 217 826 480 Fax: + 351 217 826 488 email: adetti@adetti.pt www.adetti.pt

Conclusions

- The paper describes a system that uses ODRL to express rights over protected content
- OpenSDRM uses a digital wallet that enables interoperability at the client-side of the different protected content types and different content applications
- This mechanism enables DRM-supported applications to request, to the digital Wallet middleware, authorization to perform operations over the protected content
- The required clearance of these operations, mediated by the Wallet, is expressed in ODRL-formatted licenses
- The system is REL-independent

Edifício ISCTE, Av. Forças Armadas, 1600-082 Lisboa, Portugal Phone: + 351 217 826 480 Fax: + 351 217 826 488 email: adetti@adetti.pt www.adetti.pt

Future Work

- Continue the development of rights management middleware
- Improve the protocol between the content rendering application and the digital wallet
- Include the support for multiple RELs

Edifício ISCTE, Av. Forças Armadas, 1600-082 Lisboa, Portugal Phone: + 351 217 826 480 Fax: + 351 217 826 488 email: adetti@adetti.pt www.adetti.pt

Questions ?

- **Please redirect them to**
  - carlos.serrao@iscte.pt
  - carlos.j.serrao@gmail.com
  - c.serrao@netvisao.pt

- **You may also take a look at (projects and examples where OpenSDRM is being used):**
  - www.ist-moses.org
  - www.ist-wcam.org
  - www.ist-ipmedianet.org
  - www.hicod2000.org
  - www.music-4you.com
  - www.adetti.pt
  - www.iscte.pt