



Automating Production of Cross Media Content for Multi-channel Distribution

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Abstract:

This report describes the details of integration of AXMEDIS ELTEO demonstrator components and provides User Manuals of AXMEDIS ELTEO demonstrator tools.

Keyword List: Video on demand (VOD), STB, AXSTB Player, MPEGTS Adaptation Plugin, VOD Access service, ELAXAPI_WS, TEO, Elion demonstrators.

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1 Executive Summary and Report scope

The aim of this deliverable is to describe the details of integration of AXMEDIS ELTEO demonstrator components and provide the User Manuals of AXMEDIS ELTEO demonstrator tools.

2 Introduction

As part of AXMEDIS project, a group of partners from Baltic States has undertaken to deploy an integrated AXMEDIS Framework for video-on-demand distribution. The real life demonstration prototype involves a video content producer from Lithuania (VRS Grupe), and two broadband operators – Elion (Estonia), operating an internet-based media distribution portal, and TEO (Lithuania) – IPTV service provider.

Entire ELTEO demonstrator consists of TEO, Elion and VRS Factories – sets of integrated AXMEDIS Tools to serve specific purposes of either content production/adaptation (VRS), or content distribution (TEO and Elion). Elion demonstrator uses AXMEDIS tools for PC platform. TEO demonstrator uses adopted AXMEDIS tools with newly developed components for STB platform. VRS demonstrator uses AXMEDIS tools with added functionality to produce required content for Elion and TEO demonstrators.

Although the purpose of the demonstrator is to show how AXMEDIS tools can be used in an integrated automatic content production and distribution value chain, this paper describes integration aspects of developed specific AXMEDIS tools into IPTV video on demand (VOD) service and broadband provider's VOD service for internet users.

A more detailed description of demonstrators and demonstrators themselves can be accessed at www.axmedis.org/com

3 TEO demonstrator prototype architecture

The basic structure for AXMEDIS content distribution toward TEO AXMEDIS IPTV network is presented in this section. TEO AXMEDIS IPTV demonstrator setup is based on existing TEO Gala TV infrastructure. It uses existing IPTV architecture components in addition with AXMEDIS components and newly developed components for demonstrator setup.

A set of AXMEDIS tools will be used for proper operation of TEO AXMEDIS demonstrator. AXMEDIS Query and AXEPTool will be used for content searching and downloading from global AXMEDIS network. AXMEDIS PMS server is required for licensing operations. AXDB will be used for storing AXMEDIS objects and their metadata in local TEO IPTV network.

Used tools for demonstrator setup:

VRS	TEO	Elion
AXEPTool	AXEPTool	AXEPTool
AXCP	AXCP	AXCP
AXCS	AXCS	AXCS
PMS	PMS	PMS
MPEG TS Adaptation Plugin [*]	P2P Query Support WS	P2P Query Support WS
	AXMEDIS AXDB	AXMEDIS PC Player
	AXSTB Player	ELAXAPI_WS
	Content downloader P2P client	Content & user management portal
	Content & user management portal	Credit card, bank and mobile payment gateways
	VOD access service	

	VOD server prototype	
--	-----------------------------	--

* In bold – tools and components developed by ELTEO partners

3.1 TEO IPTV architecture components

The existing TEO IPTV architecture components are:

- IPTV database, where information about users is stored;
- Billing DB, where users billing information is stored;
- Data integration module (DIM), which is existing TEO solution for integration different data formats in databases;
- TV Portal - existing portal for Gala TV. This portal is used in TEO Gala TV for IPTV services:
 - On-line TV channels;
 - Electronic program guide;
 - Gaming, etc.;
- IPTV Content Management Portal;
- VOD Server - VOD content storage server. VOD Server will be compatible with existing GALA TV network resources (Kreatel Application platform). The VOD will be capable of streaming DVB-CSA encrypted streams.
- Headend server - IPTV content distribution and broadcasting server, used for transferring MPEG-2 designated content via TCP/IP network.

Newly developed or existing AXMEDIS Framework components:

- AXDB - existing AXMEDIS database, which is used for storing metadata about AXMEDIS objects in local DB;
- AXMEDIS VOD Portal - new component developed on TEO Middleware platform. This portal is used for TEO demonstrator to present AXMEDIS content for End User. AXSTB Player use this portal to achieve information about content and usage information;
- AXMEDIS Content & User Management Portal - new component developed on IPTV Content Management Portal platform and used for TEO AXMEDIS content and user management. This module is implemented in IPTV Content Management Portal and used by TEO VOD Manager and TEO IPTV Administrator;
- VOD Access Service - a newly developed component for TEO demonstrator setup. This component is responsible for proper End User AXSTB Player connection with used DB's and services.
- AXEPTool B2B - existing AXMEDIS tool used for connecting Middleware server with AXMEDIS network and downloading AXMEDIS data from it.
- Content downloader P2P client - a newly developed component for searching and downloading AXMEDIS objects to VOD server, updating AXMEDIS object metadata and placing metadata and stream information into local AXDB. Content downloader P2P client use AXCP for automatically downloading new objects designed for TEO demonstrator. This component is a part of AXMEDIS Content & User Management Portal and is used by TEO VOD Manager for content management purposes.
- AXSTB Player - a newly developed component to play AXMEDIS objects in Kreatel STB.



- Make and view reports about user actions in TEO AXMEDIS DB.

3.1.1.3 Relationship with other tools

Integrations of TEO Content & User Management Portal with AXMEDIS P2P network is made using Content Downloader P2P Client, which is responsible for placing downloaded AXMEDIS object into VOD server, updating AXMEDIS object metadata and placing metadata and stream information into AXDB. Content downloader P2P Client uses AXMEDIS P2PWS web service (<http://axcs.axmedis.org:8080/P2PQuerySupportWs/P2PWS?wsdl>) for searching required objects in AXMEDIS P2P network.

VOD Access Service is used to connect with other databases (IPTV, AXDB, Billing) and retrieve required information or add new data records.

3.1.1.4 Detailed description of the functionalities and Screenshots

For searching objects whose creator is VRS, XML request (presented below) is created and used:

```
<?xml version="1.0" encoding="UTF-8"?>
<query xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="D:\Source\Axmedis\QuerySupportClient\QUERY-v1-6.xsd">
  <source>
    <location>AXEPTOOL</location>
  </source>
  <result>
    <AXInfofield>DCMI:title</AXInfofield>
  </result>
  <AXinfoQuery>
    <querycondition>
      <nesting>
        <test>
          <field>DCMI:creator</field>
          <operator>EQ</operator>
          <value>VRS</value>
        </test>
      </nesting>
    </querycondition>
  </AXinfoQuery>
</query>
```

For automatically downloading of required content AXCP rule (presented below) is created and scheduled for executing. This rule checks for uploaded objects, which creator is VRS, and if this object is not downloaded, starts to download.

```
var where = "AXEPTOOL";
var title = "VRS";
var format = "MPEG2TS";
var axeptoolUri = "http://localhost:7780/WebServices/P2PMonitoring";
var trackerUri = "http://axtrk.axmedis.org:8080/AXTrackv2/";
var manager = new AXP2PManager(axeptoolUri, trackerUri);

var selection = <selection name="Selection(0)" timestamp="2007-10-30T12:46:31-00:00" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="Selection-v1-6.xsd">
  <query name="Query(0)" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="QUERY-v1-6.xsd">
    <source>
```

```

        <location>{where}</location>
    </source>
    <result>
        <AXInfofield>DCMI:title</AXInfofield>
        <AXInfofield>DCMI:creator</AXInfofield>
    </result>
    <AXinfoQuery>
        <querycondition>
            <nesting>
                <test>
                    <field>DCMI:title</field>
                    <operator>CONTAINS</operator>
                    <value>{title}</value>
                </test>
                <and/>
                <test>
                    <field>DCMI:format</field>
                    <operator>CONTAINS</operator>
                    <value>{format}</value>
                </test>
            </nesting>
        </querycondition>
    </AXinfoQuery>
</query>
</selection>;

var mainQuerySupportUri =
"http://axdb.axmedis.org:8080/MainQuerySupportWSF/mqs?WSDL";
var MQS_user = "admin";
var MQS_pwd = "axmedis";

var selObj = new AxSelection(selection.toString());
selObj.querySupportURI = mainQuerySupportUri;
selObj.resolveQuery(MQS_user,MQS_pwd,0);
var axoidlist="";
var source=0;
axoidlist = selObj.getP2PResult();
source = 1;
files = getfilelist (path, "*.axm");
for(var i=0; i<axoidlist.length; i++)
{
    var exists = 0;
    files = getfilelist (path, "*.axm");
    for (i in files)
    {
        var axob = new AxmedisObject(files[i]);
        var res = axob.getContent();
        aid = axob.getAXOID();
        if (aid == axoidlist[i])
            exists = 1;
    }
    if (exists == 0)
    {
        manager.downloadObject (axoidlist[i]);
    }
}
true;

```

For using AXDB, all required actions described in “DE3.1.2.2.9Specification of AXMEDIS database and query support, first update of part E of DE3.1.2” were made. For saving objects and getting their information LoaderSaverWS web services was deployed and used in TEO Content & User Management Portal. For making query in local AXDB MainQuerySupportWS web service was deployed and used.

Detailed TEO Content & User Management Portal usage description and screenshots can be found in Content and User Management Manuals.

3.1.2 AXSTBPlayer

3.1.2.1 General description

AXSTB Player is used on STB-box device by End User to browse and view AXMEDIS objects also view content usage and billing information.

3.1.2.2 Main functionalities

AXSTB Player main functionalities are:

- An attractive user interface integrated with GALA TV screenshot system;
- STB Remote control enabled user functionality;
- User registration screen, which acquires user's information received from service provider
- End user can control AXSTB player with following actions: Select different categories of content, view info of selected content, play, stop, pause and seek the digital content being played;
- AXSTB Player supports MPEG2TS video stream digital format with hardware descrambling of scrambled video content.

3.1.2.3 Relationship with other tools

AXSTB Player uses VOD Access Service to communicate with AXDB, user information and billing databases. Content licenses are acquired through AXMEDIS PMS Server Service. Digital Content files are streamed from VOD Server by getting unique objects AXOID code from AXDB through VOD Access Service.

3.1.2.4 Detailed description of the functionalities and Screenshots

AXSTBPlayer utilizes AXMEDIS Object Model and Manager to access and play resources. The original AXMEDIS object from VRS is never decrypted in TEO VOD servers. The video content reaches client STB in scrambled and untouched form. In order to be able to decrypt the scrambled audio/video content, Player has to utilize AxObjectManager and protection processor to gain Control Words. Without control words it is impossible to gain access to scrambled stream data. This solution utilizes hardware to achieve max performance and AXOM to achieve max AXMEDIS DRM compliance.

Detailed AXSTB Player usage description and screenshots can be found in End User Manual.

3.1.3 MPEGTSAdaptationPlugin

3.1.3.1 General description

MPEGTSAdaptationPlugin was developed for content preparation in suitable format of VRS content preparation, which is used for streaming from VOD Server, in AXELTEO demonstrator. Plugin is an AXMEDIS library made to work from AXCP tools.

3.1.3.2 Main functionalities

MPEGTSAdaptationPlugin performs two tasks:

- Scrambles MPEG-2 Transport Stream (TS) resource using DVB-CSA algorithm so that content is ready for streaming over IP and protected. The MPEGTSAdaptationPlugin must encrypt all video

and audio channels of stream and leave unencrypted frames containing Program Clock Reference (PCR) which is critical for streaming control. Each scrambled frame of transport stream, has to be marked as scrambled according to ISO13818-1 standard.

- The second task of plugin is to collect information about all scrambled elementary MPEG-2 TS streams (ES). This task associates each ES with DVB-CSA Control Word (CW) which was used for scrambling the ES. This information is returned by the plugin as a new RESOURCE which is appended to the transformed AXMEDIS Object.

After adaption the transformed AXMEDIS Object consists of:

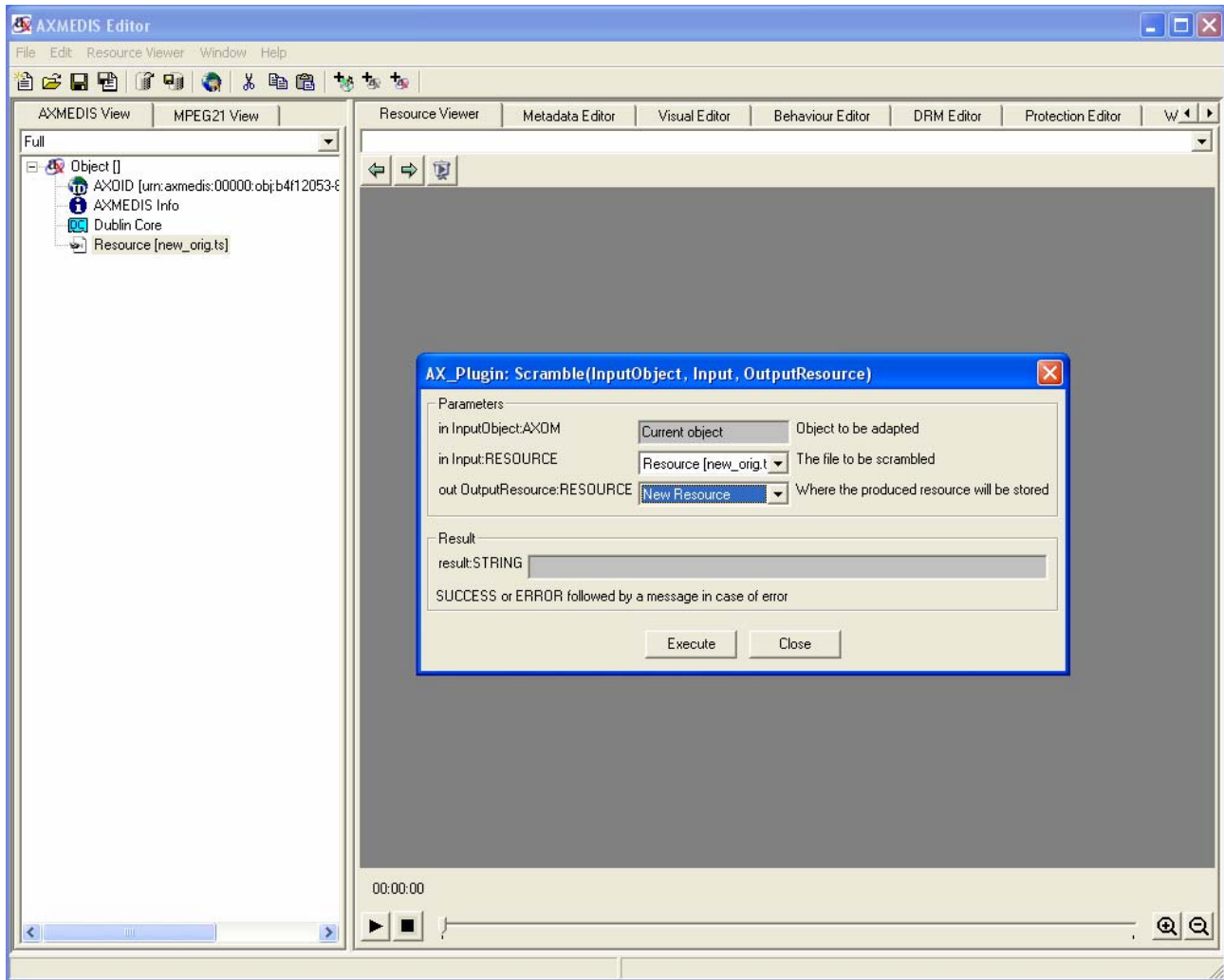
1. Scrambled MPEG-2 Transport Stream;
2. Information about scrambled MPEG-2 TS elementary streams and DVB-CSA CWs in resource AxMPEGStreamInfo.

3.1.3.3 Relationship with other tools

MPEGTSAdaptationPlugin was developed as plugin for AXMEDIS Editor library and can not run as a standalone application. Detailed functionalities with screenshots are described in next section. Also MPEGTSAdaptationPlugin can be executed through AXMEDIS script executing tools AXMEDIS Content Processing Rule Editor, AXMEDIS Content Processing Rule Executor and also can be scheduled to run on AXMEDIS Content Processing Rule Scheduler. Detailed description is explained in the next section.

3.1.3.4 Detailed description of the functionalities and Screenshots

After embedding MPEG2TS resource into AXMEDIS Editor, MPEGTSAdaptationPlugin can be executed as displayed in picture below. In this example MPEGTSAdaptationPlugin takes MPEG2TS as input resource (2 field) and makes new scrambled resource (3 field) in existing AXMEDIS object (1 field).



Also other AXMEDIS protected object is created in temp directory with MPEG-TS streaming information file with descrambler control words, and saves this info into XML , which example is presented below:

```
<?xml version="1.0" encoding="UTF-8"?>
<MPEGTSAdaptationInfo>
<resource>
  <audio-track pid="18">
    <encryption-method>clear</encryption-method>
  </audio-track>
  <video-track pid="17">
    <encryption-method>RC4</encryption-method>
    <encryption-key>95d232b765187dbf</encryption-key>
  </video-track>
</resource>
</MPEGTSAdaptationInfo>
```

MPEGTSAdaptationPlugin is implemented in VRS Factory and used with AXCP or directly by AXEditor. This plugin can be used in AXCP rule:

```
result = AX_Plugin.Scramble(ax_obj, res_input_ts, res_output_ts);
```

where:

- ax_obj – Axmedis object
- res_input_ts – input MPEG2 TS AxResource
- res_output_ts – scrambled MPEG2 TS AxResource

In TEO demonstrator non-skipping ads is implemented. In this case in MPEG_TS streaming information file all records about ads in stream are stored as presented in example below:

```
<?xml version="1.0"?><MPEGTSAdaptationInfo>
  <resource>
    <audio-track pid="0">
      <encryption-method>clear</encryption-method>
    </audio-track>
    <video-track pid="0">
      <encryption-method>RC4</encryption-method>
      <encryption-key>fea935d65716c2f3</encryption-key>
    </video-track>
  </resource>
  <Regions Count="5">
    <Region>
      <Position Nanos="328000000">00:00:32,20</Position>
      <Length Nanos="300400000">00:00:30,01</Length>
      <End Nanos="628400000">00:01:02,21</End>
      <Label></Label>
    </Region>
    <Region>
      <Position Nanos="1385600000">00:02:18,14</Position>
      <Length Nanos="300400000">00:00:30,01</Length>
      <End Nanos="1686000000">00:02:48,15</End>
      <Label></Label>
    </Region>
    <Region>
      <Position Nanos="2674800000">00:04:27,12</Position>
      <Length Nanos="300400000">00:00:30,01</Length>
      <End Nanos="2975200000">00:04:57,13</End>
      <Label></Label>
    </Region>
    <Region>
      <Position Nanos="3736800000">00:06:13,17</Position>
      <Length Nanos="300400000">00:00:30,01</Length>
      <End Nanos="4037200000">00:06:43,18</End>
      <Label></Label>
    </Region>
    <Region>
      <Position Nanos="4578400000">00:07:37,21</Position>
      <Length Nanos="300400000">00:00:30,01</Length>
      <End Nanos="4878800000">00:08:07,22</End>
      <Label></Label>
    </Region>
  </Regions>
</MPEGTSAdaptationInfo>
```

In this file ads are marked as <Region> with start time, length and end time.

3.1.4 VOD Access Service

3.1.4.1 General description

VOD Access Service package is middleware server component responsible for proper AXSTB Player, IPTV Content and User Management Portal communication with VOD server, Billing DB, IPTV DB, AXDB, and AXMEDIS PMS. Also VOD Access Service is interface for any application to use its functionalities listed in the next section. VOD Access Service is implemented as web service on Microsoft .NET platform.

3.1.4.2 Main functionalities

Main VOD Access Service function to act in a middleware server between VOD server, Billing DB, IPTV DB, AXDB, and AXMEDIS PMS, also providing interface for all applications such as IPTV Content and User Management Portal. Its main functionalities include:

- User pin code checking – used when user confirms pay for chargeable objects on AXMEDIS STB Player.
- User validity checking – checks if users registration time is valid to access AXMEDIS content directory.
- Final User Play License Generation – generates final user play license, for objects published by VRS for TEO Demonstrator.
- Object list from database retrieval- retrieves available objects list from AXMEDIS content database, displaying content in appropriate categories
- Objects info from the object list retrieval – retrieves information about object including title and description.
- Objects price from the object list retrieval – retrieves information about objects cahrgability, if object is free, function returns 0.
- STB registration- used when End User connects to VOD Server first time to register him to user database using information received from service provider.
- UDR update – updates users' data records in IPTV database including AXMEDIS objects viewing, when user plays object and user's billing information if viewed object was chargeable.

3.1.4.3 Relationship with other tools

VOD Access Service use various set of other tools, it connects to Billing DB, IPTV DB, AXDB databases, provides interface to other applications using those databases. AXMEDIS Content Processing Rule Executor is used with needed rules to complete tasks with AXMEDIS objects and resources. Example of rule used by VOD access server to create final licenses for objects is listed below.

```
function ProduceLicense(TYPE,objId,distributorId,userId)
{
    var lic;
    var grant = createAGrant(objId,"mx:play");
    lic = createBxLicense(distributorId,userId,grant)
    return lic;
}

function PostLic(lic)
{
    var pms = new
    PMSClient(PMSEndpoint,PMSCertificate,PMSCertificatePsw,PMSCA);
    var ret = pms.sendLicense(lic.getXMLLicense());
    print ("License posted on PMS");
    print ("PMS return: "+ret);
}

function main()
{
    if (!existsFile("c:\\ax\\temp\\" + Title + ".axm")) // check that the
    directory exists
        return false;
    var filelist = getfilelist("c:\\ax\\temp", "axm")
    var lic = ProduceLicense("A1",AXOID,AXDID,AXIUD);
    PostLic(lic);
    path = "c:\\ax\\temp\\" + Title + ".axm"
    var axob = new AxmedisObject(path);
```



```

        var res = axob.getContent();
        protobAXOID = res[0].getAXOID();
        var licl = ProduceLicense("A1",protobAXOID,AXDID,AXIUD);
        PostLic(licl);
        return true;
    }

    var PMSEndpoint="https://axpms.axmedis.org:8502/PMS";
    var PMSCertificate="client.pem";
    var PMSCertificatePsw="axmedis";
    var PMSCA="cacert.pem";

    a = main();

```

3.1.4.4 Detailed description of the functionalities and Screenshots

WSDL specification of VOD Access Service web service is presented below. This specification was appended to initial version during implementation stage of the module.

```

<?xml version="1.0" encoding="utf-8"?>
<wsdl:definitions xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/"
xmlns:tm="http://microsoft.com/wsdl/mime/textMatching/"
xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/"
xmlns:mime="http://schemas.xmlsoap.org/wsdl/mime/"
xmlns:tns="http://elteo.lt/webservices/"
xmlns:s="http://www.w3.org/2001/XMLSchema"
xmlns:soap12="http://schemas.xmlsoap.org/wsdl/soap12/"
xmlns:http="http://schemas.xmlsoap.org/wsdl/http/"
targetNamespace="http://elteo.lt/webservices/"
xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/">
    <wsdl:types>
        <s:schema elementFormDefault="qualified"
targetNamespace="http://elteo.lt/webservices/">
            <s:element name="getObjectPrice">
                <s:complexType>
                    <s:sequence>
                        <s:element minOccurs="0" maxOccurs="1" name="AXOID" type="s:string"
/>
                    </s:sequence>
                </s:complexType>
            </s:element>
            <s:element name="getObjectPriceResponse">
                <s:complexType>
                    <s:sequence>
                        <s:element minOccurs="1" maxOccurs="1" name="getObjectPriceResult"
type="s:float" />
                    </s:sequence>
                </s:complexType>
            </s:element>
            <s:element name="getObject">
                <s:complexType />
            </s:element>
            <s:element name="getObjectResponse">
                <s:complexType>
                    <s:sequence>
                        <s:element minOccurs="0" maxOccurs="1" name="getObjectResult"
type="s:string" />
                    </s:sequence>
                </s:complexType>
            </s:element>
            <s:element name="registerSTB">

```

```

    <s:complexType>
      <s:sequence>
        <s:element minOccurs="1" maxOccurs="1" name="dslID" type="s:int" />
        <s:element minOccurs="0" maxOccurs="1" name="pass" type="s:string"
/>
        <s:element minOccurs="0" maxOccurs="1" name="PIN" type="s:string" />
        <s:element minOccurs="0" maxOccurs="1" name="serial" type="s:string"
/>
        <s:element minOccurs="0" maxOccurs="1" name="IP" type="s:string" />
        <s:element minOccurs="0" maxOccurs="1" name="MAC" type="s:string" />
      </s:sequence>
    </s:complexType>
  </s:element>
  <s:element name="registerSTBResponse">
    <s:complexType>
      <s:sequence>
        <s:element minOccurs="0" maxOccurs="1" name="registerSTBResult"
type="s:string" />
      </s:sequence>
    </s:complexType>
  </s:element>
  <s:element name="getObjectInfo">
    <s:complexType>
      <s:sequence>
        <s:element minOccurs="0" maxOccurs="1" name="ss" type="s:string" />
      </s:sequence>
    </s:complexType>
  </s:element>
  <s:element name="getObjectInfoResponse">
    <s:complexType>
      <s:sequence>
        <s:element minOccurs="0" maxOccurs="1" name="getObjectInfoResult"
type="s:string" />
      </s:sequence>
    </s:complexType>
  </s:element>
  <s:element name="checkUser">
    <s:complexType>
      <s:sequence>
        <s:element minOccurs="0" maxOccurs="1" name="mac" type="s:string" />
      </s:sequence>
    </s:complexType>
  </s:element>
  <s:element name="checkUserResponse">
    <s:complexType>
      <s:sequence>
        <s:element minOccurs="1" maxOccurs="1" name="checkUserResult"
type="s:int" />
      </s:sequence>
    </s:complexType>
  </s:element>
  <s:element name="delete">
    <s:complexType>
      <s:sequence>
        <s:element minOccurs="0" maxOccurs="1" name="axoid" type="s:string"
/>
        <s:element minOccurs="1" maxOccurs="1" name="version" type="s:int"
/>
      </s:sequence>
    </s:complexType>
  </s:element>

```

```

    <s:element name="deleteResponse">
      <s:complexType>
        <s:sequence>
          <s:element minOccurs="0" maxOccurs="1" name="deleteResult"
type="s:string" />
        </s:sequence>
      </s:complexType>
    </s:element>
    <s:element name="getListObject">
      <s:complexType>
        <s:sequence>
          <s:element minOccurs="0" maxOccurs="1" name="category"
type="s:string" />
        </s:sequence>
      </s:complexType>
    </s:element>
    <s:element name="getListObjectResponse">
      <s:complexType>
        <s:sequence>
          <s:element minOccurs="0" maxOccurs="1" name="getListObjectResult"
type="tns:ArrayOfString" />
        </s:sequence>
      </s:complexType>
    </s:element>
    <s:complexType name="ArrayOfString">
      <s:sequence>
        <s:element minOccurs="0" maxOccurs="unbounded" name="string"
nillable="true" type="s:string" />
      </s:sequence>
    </s:complexType>
    <s:element name="getListObjectFull">
      <s:complexType>
        <s:sequence>
          <s:element minOccurs="0" maxOccurs="1" name="category"
type="s:string" />
        </s:sequence>
      </s:complexType>
    </s:element>
    <s:element name="getListObjectFullResponse">
      <s:complexType>
        <s:sequence>
          <s:element minOccurs="0" maxOccurs="1"
name="getListObjectFullResult" type="s:string" />
        </s:sequence>
      </s:complexType>
    </s:element>
    <s:element name="updateUDR">
      <s:complexType>
        <s:sequence>
          <s:element minOccurs="0" maxOccurs="1" name="mac" type="s:string" />
          <s:element minOccurs="0" maxOccurs="1" name="AXOID" type="s:string"
/>
        </s:sequence>
      </s:complexType>
    </s:element>
    <s:element name="updateUDRResponse">
      <s:complexType>
        <s:sequence>
          <s:element minOccurs="1" maxOccurs="1" name="updateUDRResult"
type="s:int" />
        </s:sequence>

```

```

        </s:complexType>
    </s:element>
    <s:element name="checkPIN">
        <s:complexType>
            <s:sequence>
                <s:element minOccurs="0" maxOccurs="1" name="mac" type="s:string" />
                <s:element minOccurs="0" maxOccurs="1" name="pin" type="s:string" />
            </s:sequence>
        </s:complexType>
    </s:element>
    <s:element name="checkPINResponse">
        <s:complexType>
            <s:sequence>
                <s:element minOccurs="1" maxOccurs="1" name="checkPINResult"
type="s:int" />
            </s:sequence>
        </s:complexType>
    </s:element>
    <s:element name="generateFinalUserPlayLicense">
        <s:complexType>
            <s:sequence>
                <s:element minOccurs="0" maxOccurs="1" name="mac" type="s:string" />
                <s:element minOccurs="0" maxOccurs="1" name="axoid" type="s:string"
/>
                <s:element minOccurs="0" maxOccurs="1" name="title" type="s:string"
/>
            </s:sequence>
        </s:complexType>
    </s:element>
    <s:element name="generateFinalUserPlayLicenseResponse">
        <s:complexType>
            <s:sequence>
                <s:element minOccurs="0" maxOccurs="1"
name="generateFinalUserPlayLicenseResult" type="s:string" />
            </s:sequence>
        </s:complexType>
    </s:element>
</s:schema>
</wsdl:types>
<wsdl:message name="getObjectPriceSoapIn">
    <wsdl:part name="parameters" element="tns:getObjectPrice" />
</wsdl:message>
<wsdl:message name="getObjectPriceSoapOut">
    <wsdl:part name="parameters" element="tns:getObjectPriceResponse" />
</wsdl:message>
<wsdl:message name="getObjectSoapIn">
    <wsdl:part name="parameters" element="tns:getObject" />
</wsdl:message>
<wsdl:message name="getObjectSoapOut">
    <wsdl:part name="parameters" element="tns:getObjectResponse" />
</wsdl:message>
<wsdl:message name="registerSTBSoapIn">
    <wsdl:part name="parameters" element="tns:registerSTB" />
</wsdl:message>
<wsdl:message name="registerSTBSoapOut">
    <wsdl:part name="parameters" element="tns:registerSTBResponse" />
</wsdl:message>
<wsdl:message name="getObjectInfoSoapIn">
    <wsdl:part name="parameters" element="tns:getObjectInfo" />
</wsdl:message>
<wsdl:message name="getObjectInfoSoapOut">

```

```

    <wsdl:part name="parameters" element="tns:getObjectInfoResponse" />
</wsdl:message>
<wsdl:message name="checkUserSoapIn">
    <wsdl:part name="parameters" element="tns:checkUser" />
</wsdl:message>
<wsdl:message name="checkUserSoapOut">
    <wsdl:part name="parameters" element="tns:checkUserResponse" />
</wsdl:message>
<wsdl:message name="deleteSoapIn">
    <wsdl:part name="parameters" element="tns:delete" />
</wsdl:message>
<wsdl:message name="deleteSoapOut">
    <wsdl:part name="parameters" element="tns:deleteResponse" />
</wsdl:message>
<wsdl:message name="getListObjectSoapIn">
    <wsdl:part name="parameters" element="tns:getListObject" />
</wsdl:message>
<wsdl:message name="getListObjectSoapOut">
    <wsdl:part name="parameters" element="tns:getListObjectResponse" />
</wsdl:message>
<wsdl:message name="getListObjectFullSoapIn">
    <wsdl:part name="parameters" element="tns:getListObjectFull" />
</wsdl:message>
<wsdl:message name="getListObjectFullSoapOut">
    <wsdl:part name="parameters" element="tns:getListObjectFullResponse" />
</wsdl:message>
<wsdl:message name="updateUDRSoapIn">
    <wsdl:part name="parameters" element="tns:updateUDR" />
</wsdl:message>
<wsdl:message name="updateUDRSoapOut">
    <wsdl:part name="parameters" element="tns:updateUDRResponse" />
</wsdl:message>
<wsdl:message name="checkPINSoapIn">
    <wsdl:part name="parameters" element="tns:checkPIN" />
</wsdl:message>
<wsdl:message name="checkPINSoapOut">
    <wsdl:part name="parameters" element="tns:checkPINResponse" />
</wsdl:message>
<wsdl:message name="generateFinalUserPlayLicenseSoapIn">
    <wsdl:part name="parameters" element="tns:generateFinalUserPlayLicense" />
</wsdl:message>
<wsdl:message name="generateFinalUserPlayLicenseSoapOut">
    <wsdl:part name="parameters"
element="tns:generateFinalUserPlayLicenseResponse" />
</wsdl:message>
<wsdl:portType name="VODAccessServiceSoap">
    <wsdl:operation name="getObjectPrice">
        <wsdl:input message="tns:getObjectPriceSoapIn" />
        <wsdl:output message="tns:getObjectPriceSoapOut" />
    </wsdl:operation>
    <wsdl:operation name="getObject">
        <wsdl:input message="tns:getObjectSoapIn" />
        <wsdl:output message="tns:getObjectSoapOut" />
    </wsdl:operation>
    <wsdl:operation name="registerSTB">
        <wsdl:input message="tns:registerSTBSoapIn" />
        <wsdl:output message="tns:registerSTBSoapOut" />
    </wsdl:operation>
    <wsdl:operation name="getObjectInfo">
        <wsdl:input message="tns:getObjectInfoSoapIn" />
        <wsdl:output message="tns:getObjectInfoSoapOut" />
    </wsdl:operation>

```

```

</wsdl:operation>
<wsdl:operation name="checkUser">
  <wsdl:input message="tns:checkUserSoapIn" />
  <wsdl:output message="tns:checkUserSoapOut" />
</wsdl:operation>
<wsdl:operation name="delete">
  <wsdl:input message="tns:deleteSoapIn" />
  <wsdl:output message="tns:deleteSoapOut" />
</wsdl:operation>
<wsdl:operation name="getListObject">
  <wsdl:input message="tns:getListObjectSoapIn" />
  <wsdl:output message="tns:getListObjectSoapOut" />
</wsdl:operation>
<wsdl:operation name="getListObjectFull">
  <wsdl:input message="tns:getListObjectFullSoapIn" />
  <wsdl:output message="tns:getListObjectFullSoapOut" />
</wsdl:operation>
<wsdl:operation name="updateUDR">
  <wsdl:input message="tns:updateUDRSoapIn" />
  <wsdl:output message="tns:updateUDRSoapOut" />
</wsdl:operation>
<wsdl:operation name="checkPIN">
  <wsdl:input message="tns:checkPINSoapIn" />
  <wsdl:output message="tns:checkPINSoapOut" />
</wsdl:operation>
<wsdl:operation name="generateFinalUserPlayLicense">
  <wsdl:input message="tns:generateFinalUserPlayLicenseSoapIn" />
  <wsdl:output message="tns:generateFinalUserPlayLicenseSoapOut" />
</wsdl:operation>
</wsdl:portType>
<wsdl:binding name="VODAccessServiceSoap" type="tns:VODAccessServiceSoap">
  <soap:binding transport="http://schemas.xmlsoap.org/soap/http" />
  <wsdl:operation name="getObjectPrice">
    <soap:operation soapAction="http://elteo.lt/webservices/getObjectPrice"
style="document" />
    <wsdl:input>
      <soap:body use="literal" />
    </wsdl:input>
    <wsdl:output>
      <soap:body use="literal" />
    </wsdl:output>
  </wsdl:operation>
  <wsdl:operation name="getObject">
    <soap:operation soapAction="http://elteo.lt/webservices/getObject"
style="document" />
    <wsdl:input>
      <soap:body use="literal" />
    </wsdl:input>
    <wsdl:output>
      <soap:body use="literal" />
    </wsdl:output>
  </wsdl:operation>
  <wsdl:operation name="registerSTB">
    <soap:operation soapAction="http://elteo.lt/webservices/registerSTB"
style="document" />
    <wsdl:input>
      <soap:body use="literal" />
    </wsdl:input>
    <wsdl:output>
      <soap:body use="literal" />
    </wsdl:output>
  </wsdl:operation>

```

```

    </wsdl:operation>
    <wsdl:operation name="getObjectInfo">
      <soap:operation soapAction="http://elteo.lt/webservices/getObjectInfo"
style="document" />
      <wsdl:input>
        <soap:body use="literal" />
      </wsdl:input>
      <wsdl:output>
        <soap:body use="literal" />
      </wsdl:output>
    </wsdl:operation>
    <wsdl:operation name="checkUser">
      <soap:operation soapAction="http://elteo.lt/webservices/checkUser"
style="document" />
      <wsdl:input>
        <soap:body use="literal" />
      </wsdl:input>
      <wsdl:output>
        <soap:body use="literal" />
      </wsdl:output>
    </wsdl:operation>
    <wsdl:operation name="delete">
      <soap:operation soapAction="http://elteo.lt/webservices/delete"
style="document" />
      <wsdl:input>
        <soap:body use="literal" />
      </wsdl:input>
      <wsdl:output>
        <soap:body use="literal" />
      </wsdl:output>
    </wsdl:operation>
    <wsdl:operation name="getListObject">
      <soap:operation soapAction="http://elteo.lt/webservices/getListObject"
style="document" />
      <wsdl:input>
        <soap:body use="literal" />
      </wsdl:input>
      <wsdl:output>
        <soap:body use="literal" />
      </wsdl:output>
    </wsdl:operation>
    <wsdl:operation name="getListObjectFull">
      <soap:operation soapAction="http://elteo.lt/webservices/getListObjectFull"
style="document" />
      <wsdl:input>
        <soap:body use="literal" />
      </wsdl:input>
      <wsdl:output>
        <soap:body use="literal" />
      </wsdl:output>
    </wsdl:operation>
    <wsdl:operation name="updateUDR">
      <soap:operation soapAction="http://elteo.lt/webservices/updateUDR"
style="document" />
      <wsdl:input>
        <soap:body use="literal" />
      </wsdl:input>
      <wsdl:output>
        <soap:body use="literal" />
      </wsdl:output>
    </wsdl:operation>

```

```

    <wsdl:operation name="checkPIN">
      <soap:operation soapAction="http://elteo.lt/webservices/checkPIN"
style="document" />
      <wsdl:input>
        <soap:body use="literal" />
      </wsdl:input>
      <wsdl:output>
        <soap:body use="literal" />
      </wsdl:output>
    </wsdl:operation>
    <wsdl:operation name="generateFinalUserPlayLicense">
      <soap:operation
soapAction="http://elteo.lt/webservices/generateFinalUserPlayLicense"
style="document" />
      <wsdl:input>
        <soap:body use="literal" />
      </wsdl:input>
      <wsdl:output>
        <soap:body use="literal" />
      </wsdl:output>
    </wsdl:operation>
  </wsdl:binding>
  <wsdl:binding name="VODAccessServiceSoap12" type="tns:VODAccessServiceSoap">
    <soap12:binding transport="http://schemas.xmlsoap.org/soap/http" />
    <wsdl:operation name="getObjectPrice">
      <soap12:operation soapAction="http://elteo.lt/webservices/getObjectPrice"
style="document" />
      <wsdl:input>
        <soap12:body use="literal" />
      </wsdl:input>
      <wsdl:output>
        <soap12:body use="literal" />
      </wsdl:output>
    </wsdl:operation>
    <wsdl:operation name="getObject">
      <soap12:operation soapAction="http://elteo.lt/webservices/getObject"
style="document" />
      <wsdl:input>
        <soap12:body use="literal" />
      </wsdl:input>
      <wsdl:output>
        <soap12:body use="literal" />
      </wsdl:output>
    </wsdl:operation>
    <wsdl:operation name="registerSTB">
      <soap12:operation soapAction="http://elteo.lt/webservices/registerSTB"
style="document" />
      <wsdl:input>
        <soap12:body use="literal" />
      </wsdl:input>
      <wsdl:output>
        <soap12:body use="literal" />
      </wsdl:output>
    </wsdl:operation>
    <wsdl:operation name="getObjectInfo">
      <soap12:operation soapAction="http://elteo.lt/webservices/getObjectInfo"
style="document" />
      <wsdl:input>
        <soap12:body use="literal" />
      </wsdl:input>
      <wsdl:output>

```



```

        <soap12:body use="literal" />
    </wsdl:output>
</wsdl:operation>
<wsdl:operation name="checkUser">
    <soap12:operation soapAction="http://elteo.lt/webservices/checkUser"
style="document" />
    <wsdl:input>
        <soap12:body use="literal" />
    </wsdl:input>
    <wsdl:output>
        <soap12:body use="literal" />
    </wsdl:output>
</wsdl:operation>
<wsdl:operation name="delete">
    <soap12:operation soapAction="http://elteo.lt/webservices/delete"
style="document" />
    <wsdl:input>
        <soap12:body use="literal" />
    </wsdl:input>
    <wsdl:output>
        <soap12:body use="literal" />
    </wsdl:output>
</wsdl:operation>
<wsdl:operation name="getListObject">
    <soap12:operation soapAction="http://elteo.lt/webservices/getListObject"
style="document" />
    <wsdl:input>
        <soap12:body use="literal" />
    </wsdl:input>
    <wsdl:output>
        <soap12:body use="literal" />
    </wsdl:output>
</wsdl:operation>
<wsdl:operation name="getListObjectFull">
    <soap12:operation
soapAction="http://elteo.lt/webservices/getListObjectFull" style="document" />
    <wsdl:input>
        <soap12:body use="literal" />
    </wsdl:input>
    <wsdl:output>
        <soap12:body use="literal" />
    </wsdl:output>
</wsdl:operation>
<wsdl:operation name="updateUDR">
    <soap12:operation soapAction="http://elteo.lt/webservices/updateUDR"
style="document" />
    <wsdl:input>
        <soap12:body use="literal" />
    </wsdl:input>
    <wsdl:output>
        <soap12:body use="literal" />
    </wsdl:output>
</wsdl:operation>
<wsdl:operation name="checkPIN">
    <soap12:operation soapAction="http://elteo.lt/webservices/checkPIN"
style="document" />
    <wsdl:input>
        <soap12:body use="literal" />
    </wsdl:input>
    <wsdl:output>
        <soap12:body use="literal" />
    </wsdl:output>
</wsdl:operation>

```

```

        </wsdl:output>
    </wsdl:operation>
    <wsdl:operation name="generateFinalUserPlayLicense">
        <soap12:operation
soapAction="http://elteo.lt/webservices/generateFinalUserPlayLicense"
style="document" />
        <wsdl:input>
            <soap12:body use="literal" />
        </wsdl:input>
        <wsdl:output>
            <soap12:body use="literal" />
        </wsdl:output>
    </wsdl:operation>
</wsdl:binding>
<wsdl:service name="VODAccessService">
    <wsdl:port name="VODAccessServiceSoap" binding="tns:VODAccessServiceSoap">
        <soap:address location="http://10.0.6.62/vod/VODaccessservice.asmx" />
    </wsdl:port>
    <wsdl:port name="VODAccessServiceSoap12"
binding="tns:VODAccessServiceSoap12">
        <soap12:address location="http://10.0.6.62/vod/VODaccessservice.asmx" />
    </wsdl:port>
</wsdl:service>
</wsdl:definitions>

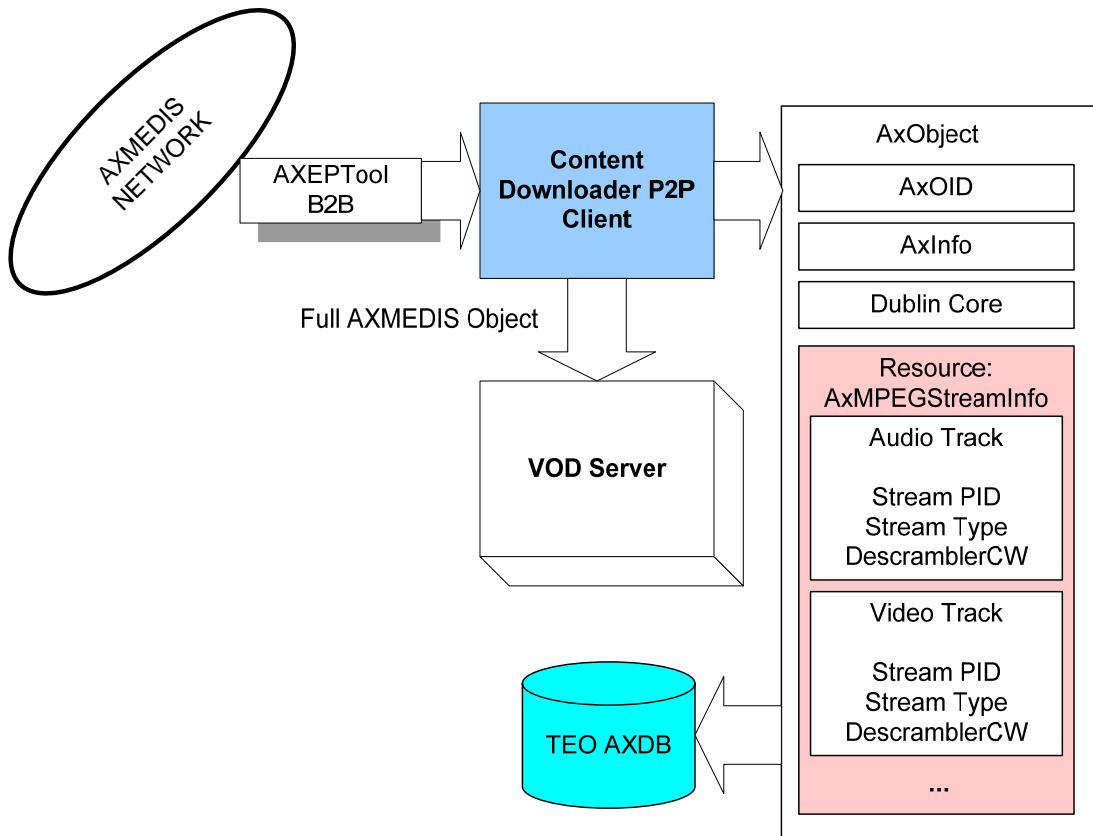
```

VOD Access Service web service has no user interface and is used in AXSTBPlayer and IPTV Content and User Management Portal.

3.1.5 Content Downloader P2P client

3.1.5.1 General description

Content downloader P2P client is developed component for placing downloaded AXMEDIS object to VOD server and extracting AXMEDIS object metadata and placing metadata and stream information into AXDB. This component is part of AXMEDIS Content & User Management Portal and will be used by TEO VOD Manager for content management purposes.



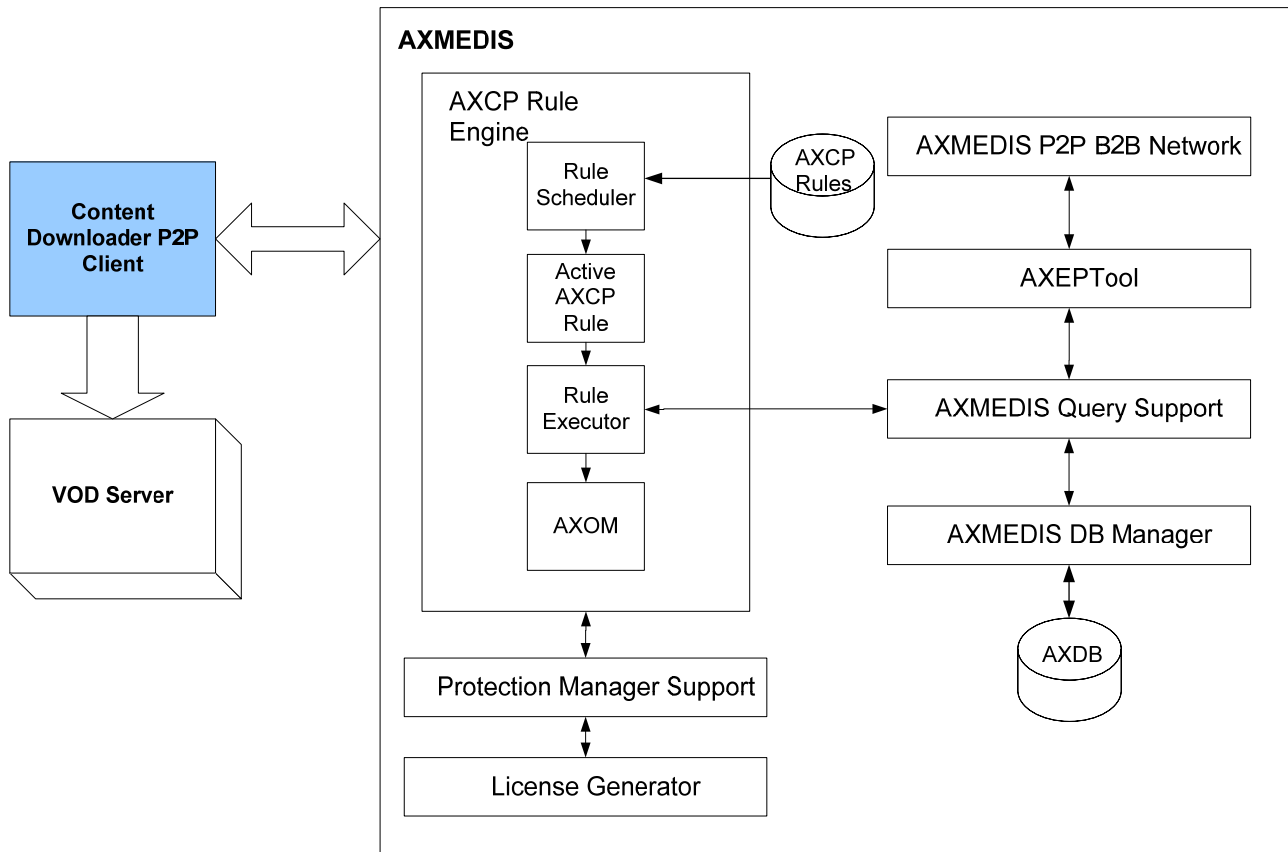
3.1.5.2 Main functionalities

Content Downloader P2P Client has these functionalities:

- Downloading required content from Axmedis P2P network
- Extracting metadata information
- Saving metadata information into local AXDB
- Uploading full Axmedis object into VOD Server

3.1.5.3 Relationship with other tools

Content Downloader P2P Client uses AXEPTol for automatically/manualy Axmedis objects downloading from AXMEDIS P2P B2B Network. Data retrieving from AXMEDIS P2P B2B Network in TEO Demonstrator setup can be performed automatically using AXCP Rule Engine. In this case AXCP rule is executed by Rule Scheduler and Rule Executor for searching objects in global AXMEDIS network. Rules contain conditions for searching objects, which are created especially for TEO Demonstrator.



For saving objects into local AXDB using LoaderSaverWS web service is used.

3.1.5.4 Detailed description of the functionalities and Screenshots

For downloading selected object, Content Downloader P2P Client uses AXEPTTool. AXCP rule (presented below) is executed using Axmedis rule executor.

```
var start = true;
var axeptoolUri = "http://localhost:7780/WebServices/P2PMonitoring";
var trackerUri = "http://axtrk.axmedis.org:8080/AXTrackv2/";
var manager = new AXP2PManager(axeptoolUri, trackerUri);
var Uri = "urn:axmedis:00000:obj:d79fe054-3d44-4df6-99b6-8fb36a164cc0";
manager.downloadObject(Uri);
0
```

After execution of presented rule, AXEPTTool starts downloading Axmedis object. Teo VOD Manager can see downloading status, as described in Content Management Manual in this document. This is done by using P2PMonitoring web service in local AXEPTTool installation (<http://localaxeptool:7780/WebServices/P2PMonitoring?wsdl>).

For extracting metadata information from Axmedis object and saving as separate object AXCP rule (presented below) is used:

```
var path = "c:\\ax";
var xml = "c:\\ax\\temp";
var obj = new AxmedisObject();
files = getfilelist(path, "*.axm");
for (i in files)
{
    test = getfilelist(xml, "*.axm");
```

```

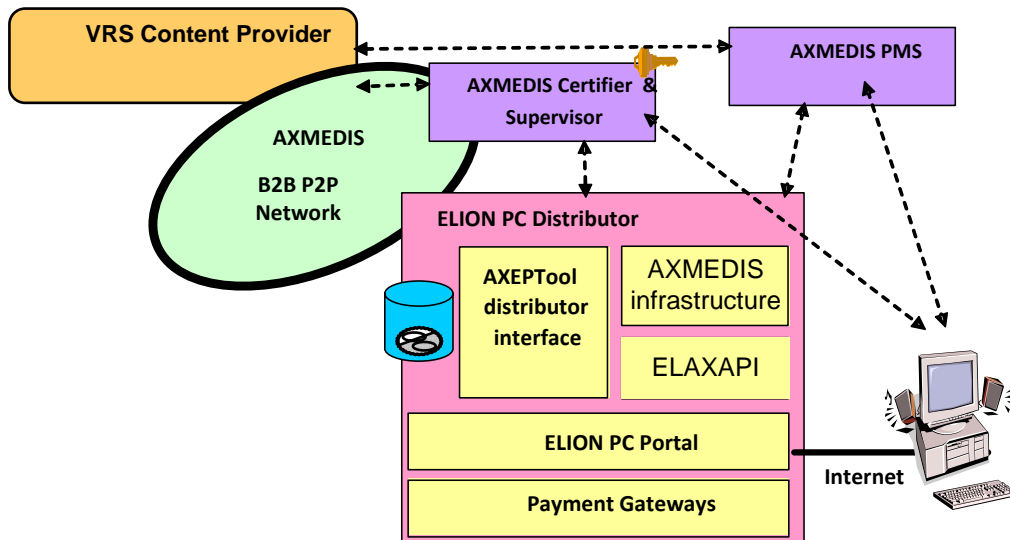
        var exists = 0;
        var end = files[i].length -4;
        file = files[i].substring("6",end);
        for (x in test)
        {
            if (xml + "\\\" + file + ".axm" == test[x])
                exists = 1;
        }
        if (exists == 0)
        {
            var axob = new AxmedisObject(files[i]);
            var res = axob.getContent();
            for (j in res)
            {
                if (res[j].mimeType == "video/mp2t")
                    axob.removeContent(res[j]);
            }
            axob.save(xml + "\\\" + file + ".axm");
        }
    }
    true;

```

After metadata extraction new object is saved into local AXDB using LoaderSaverWS web service. Axmedis object with video content is uploaded into VOD server using FTP protocol. Content Downloader P2P Client has no user interface and is used in IPTV Content and User Management Portal.

4 Elion demonstrator prototype architecture

The scheme below depicts the general components of an integrated Elion demonstrator. Components depicted in yellow background are software components developed by consortium partners specifically for PC distributor solution.

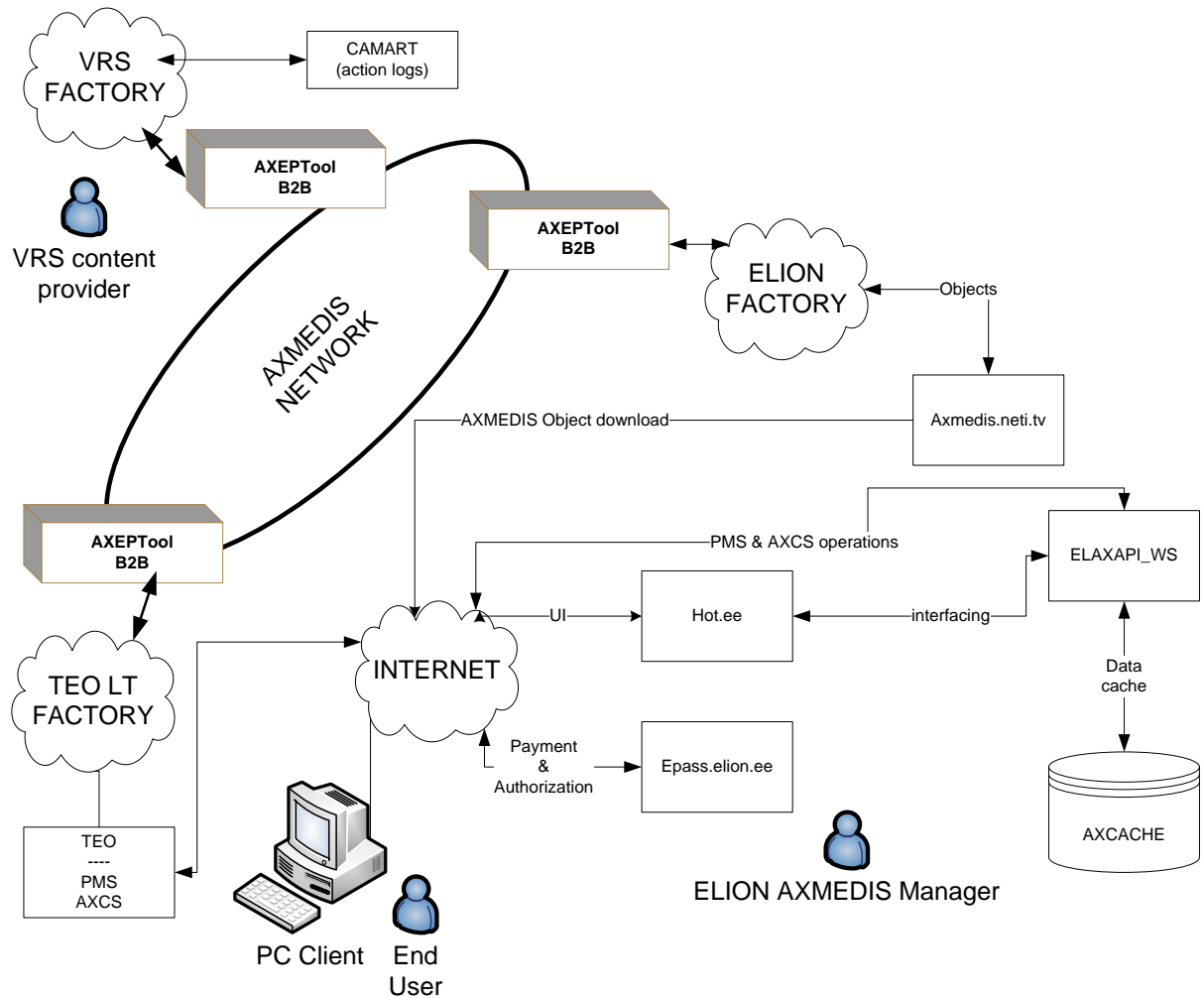


In this demo of B2B automatic content production and distribution for PC, content producer VRS produces and makes available some trial video content for Elion internet service. The videos are formatted as AxObjects for Elion, with pre-set usage rights and conditions and defined metadata. VRS places these AXMEDIS objects into P2P network (AXEPTOOL).

In Elion system the AXMEDIS content ready for distribution is stored in delivery server at Elion site. The content is downloaded from AXMEDIS network using content downloader P2P client. Then the content is prepared with AXMEDIS Editor for distribution. After content is prepared it will be made available for download over web server using public networks.

4.1 Detailed system description

Elion AXMEDIS Video on demand distributor for PC is based on existing Elion's Hot.ee community portal to enable content listing and usage. It uses existing broadband network architecture components in addition with some newly developed components for AXMEDIS integration.



Elion AXMEDIS demonstrator is comprised of:

- **Axmedis.neti.tv virtual sever** node including:
 - AXEPTool B2B node for content download and sharing on AXMEDIS B2B Network
 - ELAXAPI_WS interfacing web service for end user UI representation on hot.ee
 - IIS web folder share for AXMEDIS object downloads to end user
 - IIS web folder share to distribute AXMEDIS PC Player
 - AXCACHE database for ELAXAPI_WS web service data store
 - SQL Server manager express for AXCACHE.

- www.hot.ee portal – hot.ee portal is Elion's existing proprietary community & communication portal that will be featuring additional menu option to enable AXMEDIS object distribution and marketing.
- **Epass.elion.ee** – epass is ELION's proprietary account services and billing system serving as single shared resource between several solutions.



Elion will use global PMS & AXCS servers. Elion Manager will use axmedis.neti.tv node to manage AXMEDIS object distribution and statistics gathering.

4.2 Elion demonstrator developed components

Existing components are:

- Epass - Elion's membership, authorization, subscription and payment system.
- Hot.ee - Elion's community portal.

Developed solutions;

- ELAXAPI_WS; Web Service designed for providing single independent interface for AXMEDIS functionality and business logic for easy and rapid integration of any web portal.
- Payment channels extension; payment logic was extended to include credit card payment to support global markets.

4.2.1 Portal Integration Model ELAXAPI_WS

4.2.1.1 General description

The web service model was chosen due to nature of Elion's business line; housing and hosting. Web service model allows the solution to function both as single dedicated host node as well as function as part of our hosting environment, for simplicity the demonstration is based on single dedicated node and does not include full hosting features.

4.2.1.2 Main functionalities

Main functionalities are related to following groups;

- User management- basic user information and methods, the real user accounts are stored and managed by two external solutions as such the management options available here are limited to the goals of main functions in the solution.
- Content management
 - Content handling including; creation, update and deletion of content on the node.
 - Content handling including; search and download from AXMEDIS B2B P2P networks
- Logistics
 - Sample logistics including license issuing logs, detailed action logs can be downloaded by native AXMEDIS tools
- End user portal functionalities
 - All needed functions for allowing the end user portal data exchange.

4.2.1.3 Relationship with other tools

Web service is the core component binding the whole solution as single unit.

Tools on the AXMEDIS node (behind web service):

- AXEPTOOL
 - Content download from P2P network over internal web service
- AXCP
 - License issuing
 - Content searches.
- AXCACHE database.
 - Local data cache for published media items and license transactions for fast speed.
- HOT.EE
 - Functions for displaying content
- EPASS
 - Functions for checking status on EPASS account binding on AXMEDIS network.

4.2.1.4 Detailed description of the functionalities and Screenshots

Web service definition file can be accessed on address;

<http://axmedis.neti.tv:42123/elaxapi.asmx?WSDL>

Web service has no human interface; available functionality is shown as sample user and manager pages under the user manual.

4.2.2 Content & user management portal

4.2.2.1 General description

The management portal is sample page application based on the functional core from ELAXAPI_WS. These pages are provided to demonstrate basic management options for the service.

4.2.2.2 Main functionalities

Main functionalities are related to following groups;

- User management- basic user information and methods, the real user accounts are stored and managed by two external solutions as such the management options available here are limited to the goals of main functions in the solution.
- Content management
 - Content handling including; creation, update and deletion of content on the node.
 - Content handling including; search and download from AXMEDIS B2B P2P networks
- Logistics
 - Sample logistics including license issuing logs, detailed action logs can be downloaded by native AXMEDIS tools

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 - License issuing
- AXCACHE database.
 - Local data cache for published media items and license transactions for fast speed.
- HOT.EE
 - Functions for displaying content
- EPASS
 - Functions for checking status on EPASS account binding on AXMEDIS network.

4.2.2.4 Detailed description of the functionalities and Screenshots

Functions and sample screenshots are available in user manual section at the end of the document.

4.2.3 Credit card, bank and mobile payment gateways

4.2.3.1 General description

Payment gateway is part of ELION's user membership and service system; EPASS. Gateway functions as service broker between business consumer (end user portal) and payment provider hiding the complexity of different provider methods and also providing end user with centralized view of transactions made with EPASS account. This system is propriety.

4.2.3.2 Main functionalities

Payment methods are invoked by hot.ee portal based on the information from ELAXAPI_WS, the user has choice of several payment methods and after the transaction is done the hot.ee portal instructs ELAXAPI_WS to issue the license.

4.2.3.3 Relationship with other tools

Payment system has no direct relationship with AXMEDIS tools.

4.2.3.4 Detailed description of the functionalities and Screenshots

Payment channels are dependent on payment channel provider and include sensitive information; as such no screenshots can be provided and the distinct payment channel protocols are not related to AXMEDIS project and as such are irrelevant.

5 User Manuals

In this section user manuals for newly created or adopted components are presented.

5.1 TEO Content & User Management Portal Manual

This manual is intended for user who can act as VOD Manager and IPTV Administrator. To access Content & User Management Portal user must enter user name and password in the login page.

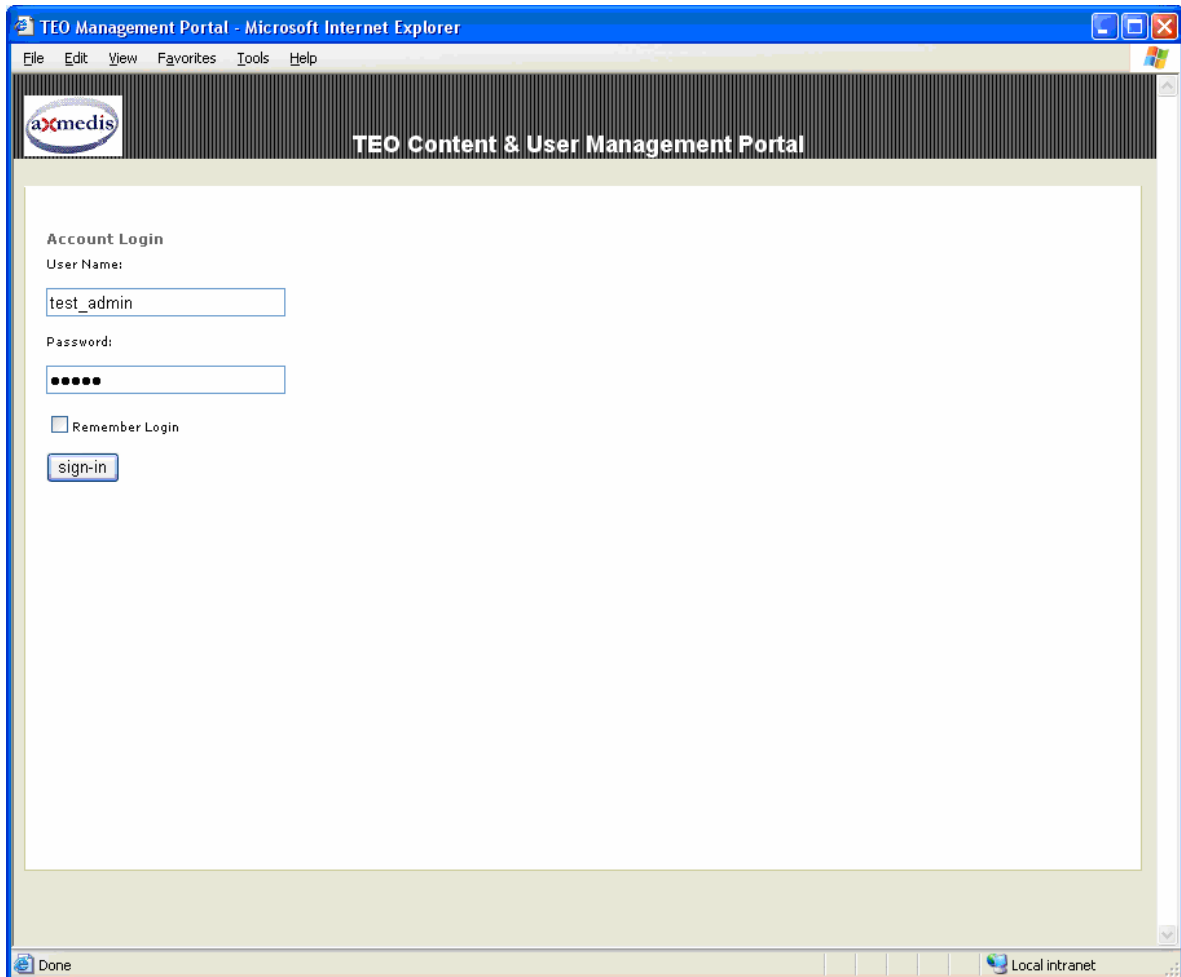
As VOD Manager connected user can manage local AXMEDIS content in VOD server:

- Download AXMEDIS content from global AXMEDIS DB, using AXEPTool and place into VOD Server and AXDB;
- Delete content from local TEO AXDB;
- Make and view reports about usage of AXMEDIS content in TEO IPTV network.

As IPTV Administrator user can manage end users:

- Add user to TEO AXMEDIS DB;
- Delete user from TEO AXMEDIS DB;
- Set user rights to use AXMEDIS content in TEO IPTV network;
- Make and view reports about user actions in TEO AXMEDIS DB.

In picture below login screen is displayed. User must enter username and password to sign in. "Remember Login" check-box is optional.

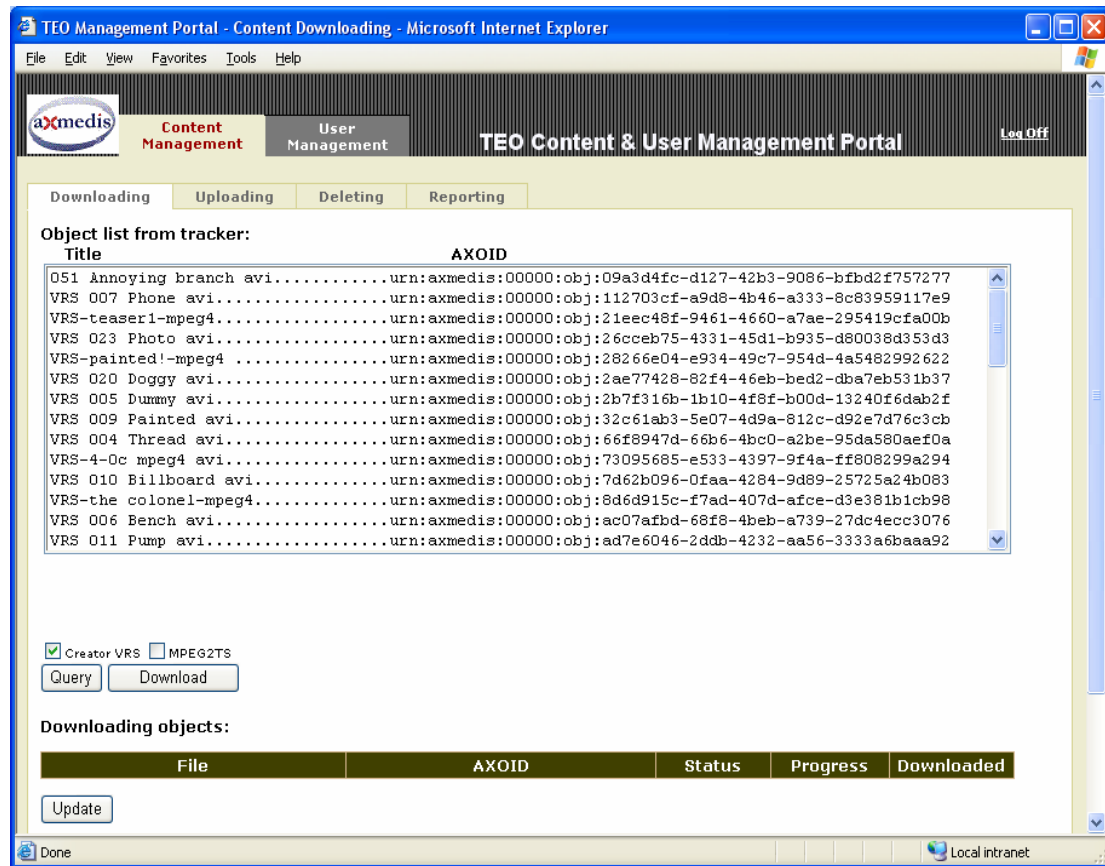


5.1.1 Content Management Manual

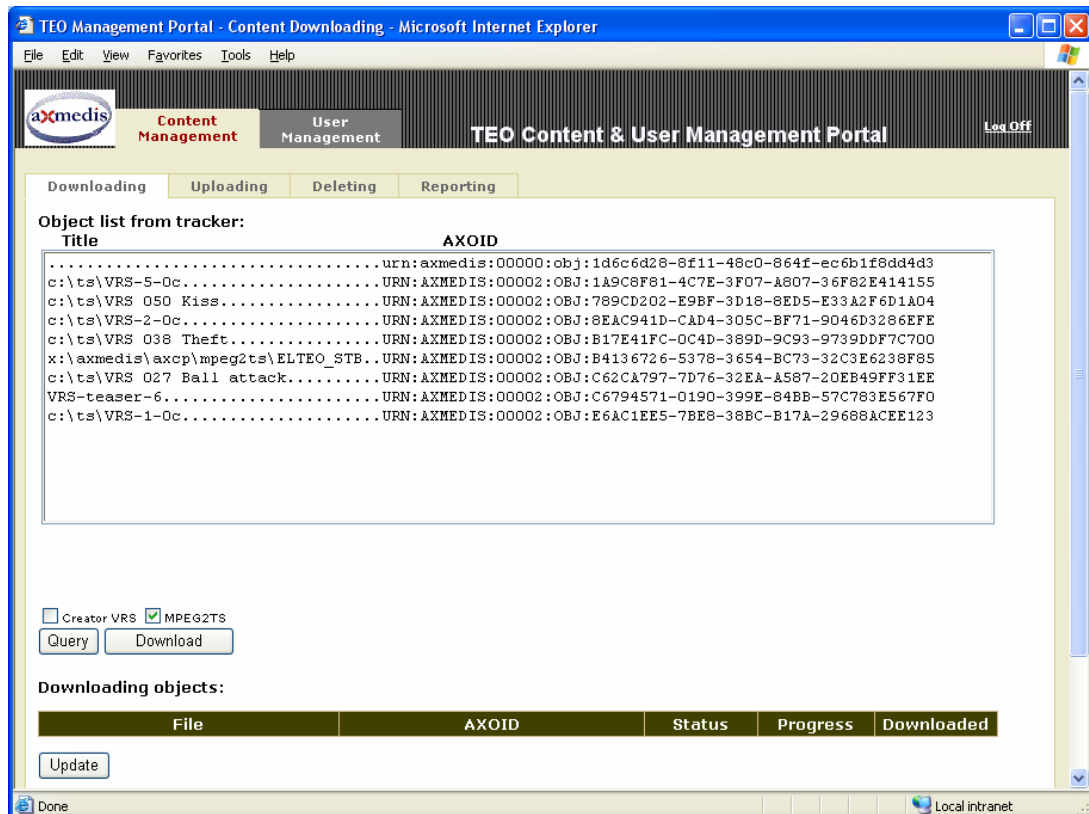
Right after signing in, content download page is displayed in Content Management tab. In order to search required content in Axmedis P2P network content manager has to check one or more query check boxes and press “Query” button. Object list from tracker is displayed, showing objects title and unique to each object code – AXOID.

To download required object, Content Manager has first to select object in returned object list and then press “Download” button. After pressing the button user is notified about download status. At any time local AXEPTool status can be viewed by pressing “Update” button.

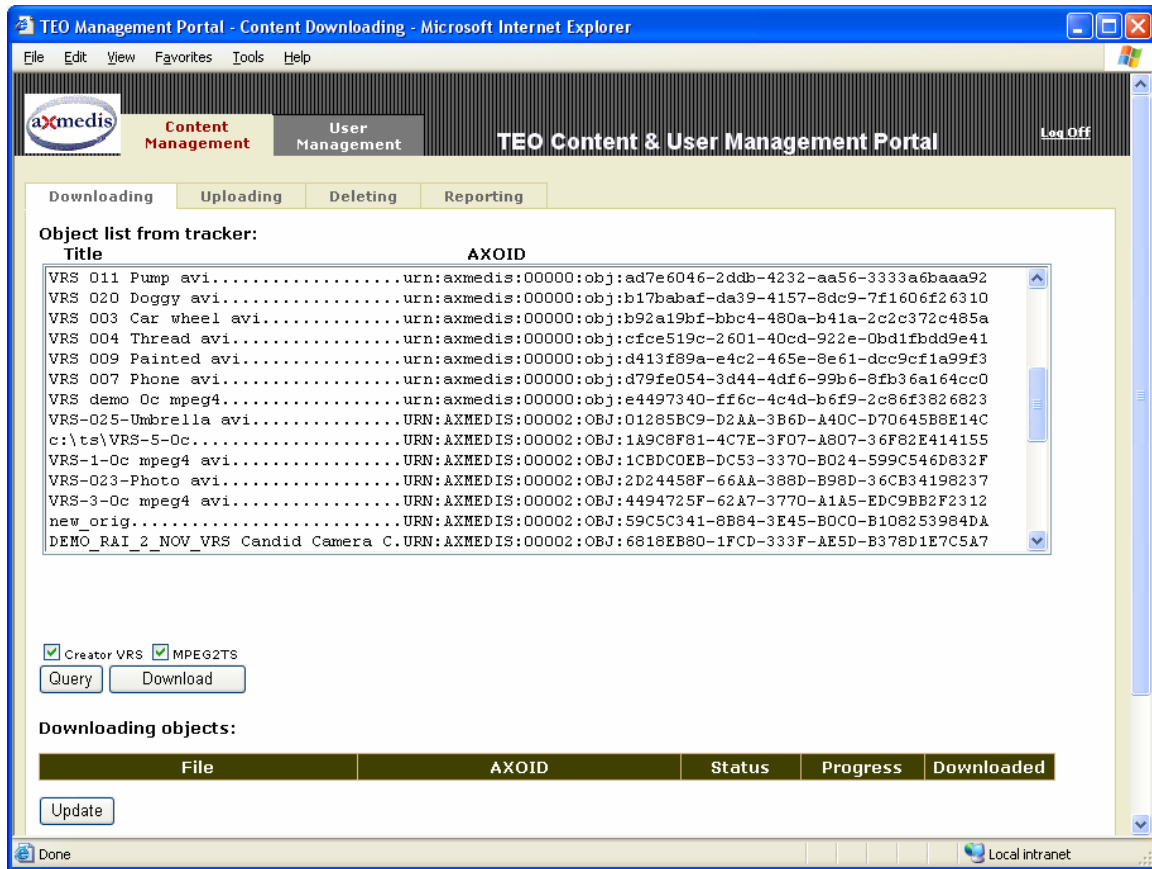
In picture below is page with option “Creator VRS” set and button “Query” pushed. In this case only content created by VRS is displayed.



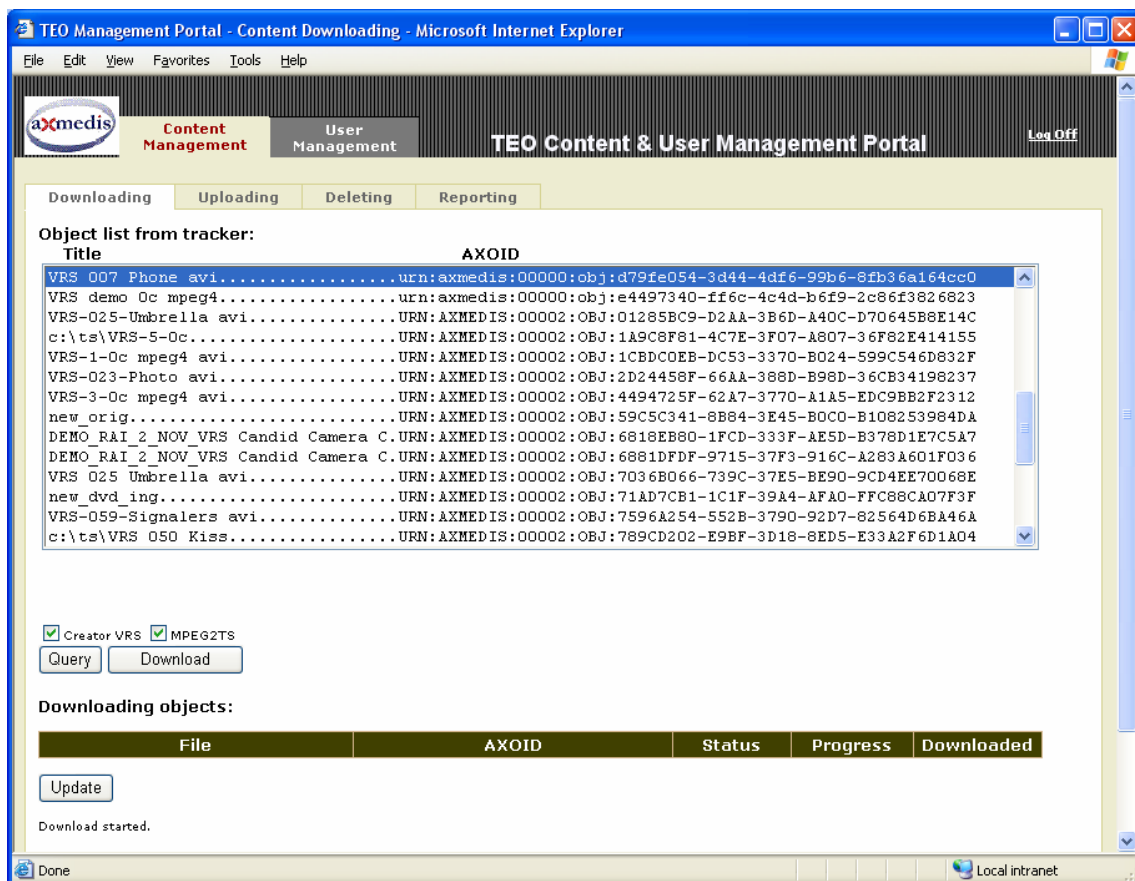
In TEO AXMEDIS Demonstrator only MPEG2TS files are used, therefore in picture below is page with option “MPEG2TS” set and button “Query” pushed. In this case only content with mpeg2ts files is displayed.



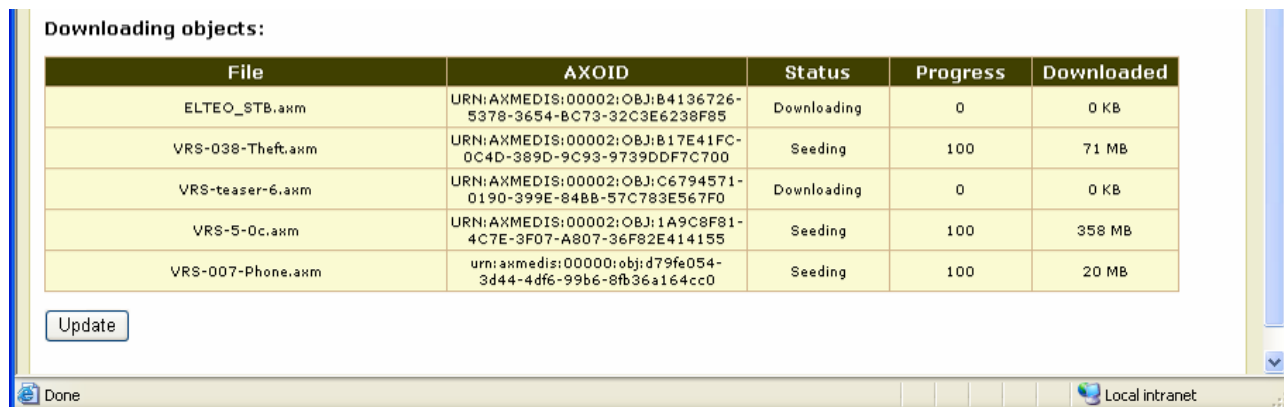
Multiple queries selection is available as in the following picture both options from TEO Demonstrator are checked. In this case all files with MPEG2TS objects and objects created by VRS were displayed in object list for downloading options.



After selecting content and pressing the “Download” button status text “Download started” appears as displayed in a picture below. Download also can be done through AXEPTool, its user manual can be found in “AXEPTool User Manual & Installation Guide”.

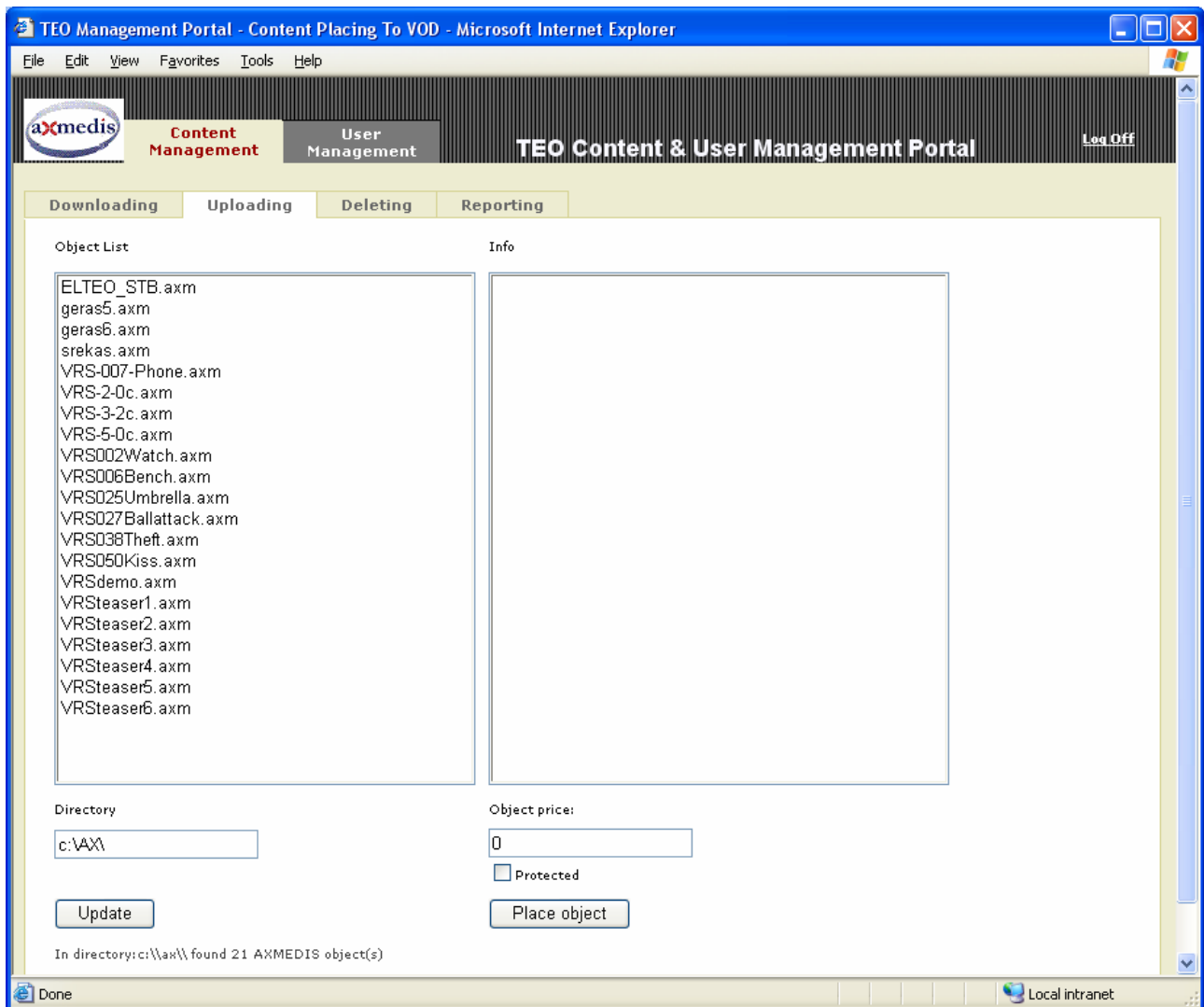


At any time Content Manager can view status of objects that are already downloading by pressing “Update” button. After “Update” button is pressed, current objects status is displayed like in a picture below taken from Demonstrator page.



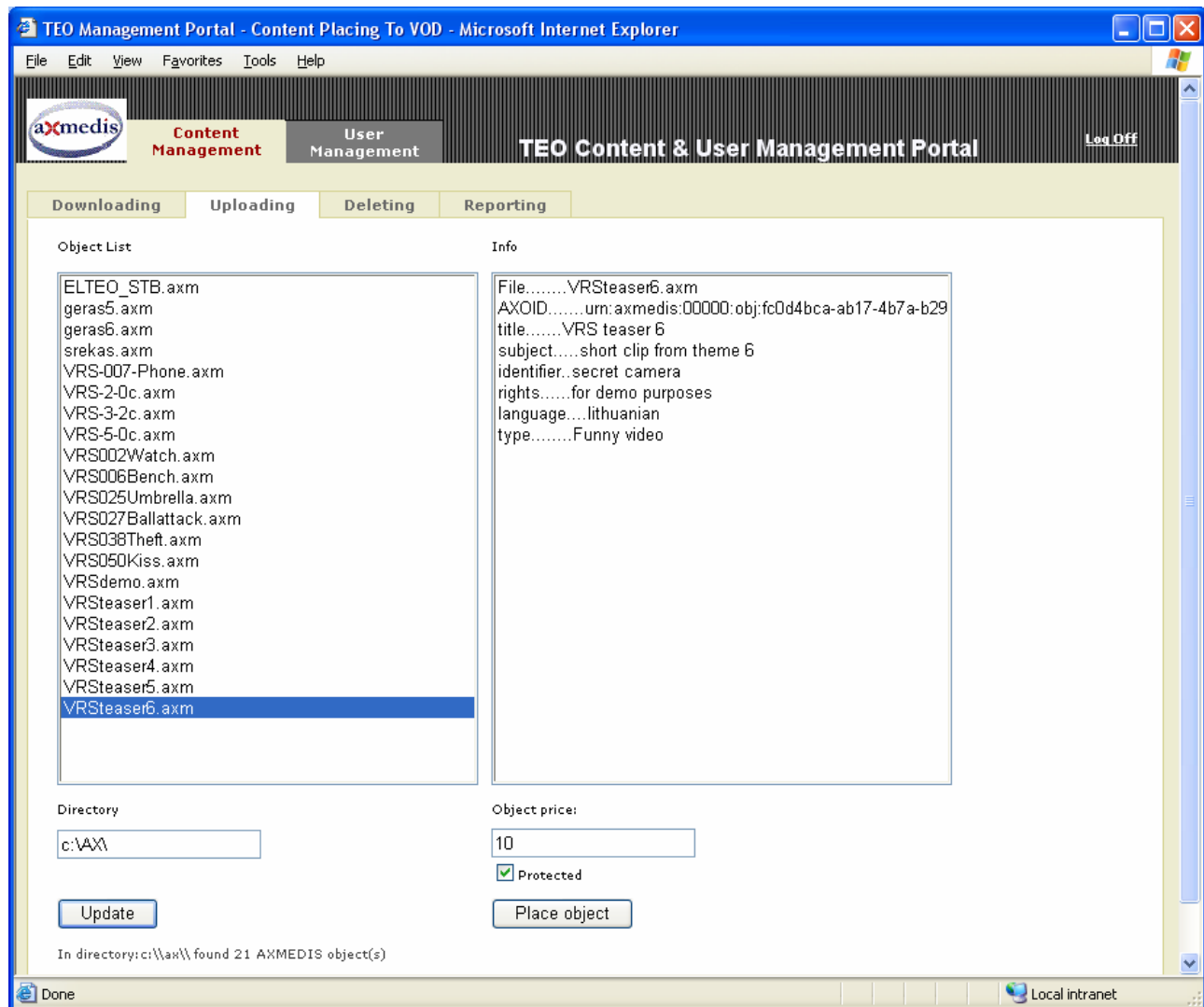
Next tab in Content Management is content upload page, where downloaded content can be uploaded to VOD server defining its price and protection. Price is defined when object is not viewed for free entering price per view in Euros. Protection check box defines if that object’s content is protected before placing it to VOD. In Demonstrator setup Caesar cipher protection is used.

In a picture below page content displayed after pressing “Update” button.



To upload required object into VOD server, user must select object in object list. After selecting an object its info from AxInfo metadata is displayed on the right side of the page. Then object price and protection can be defined as in a picture below.

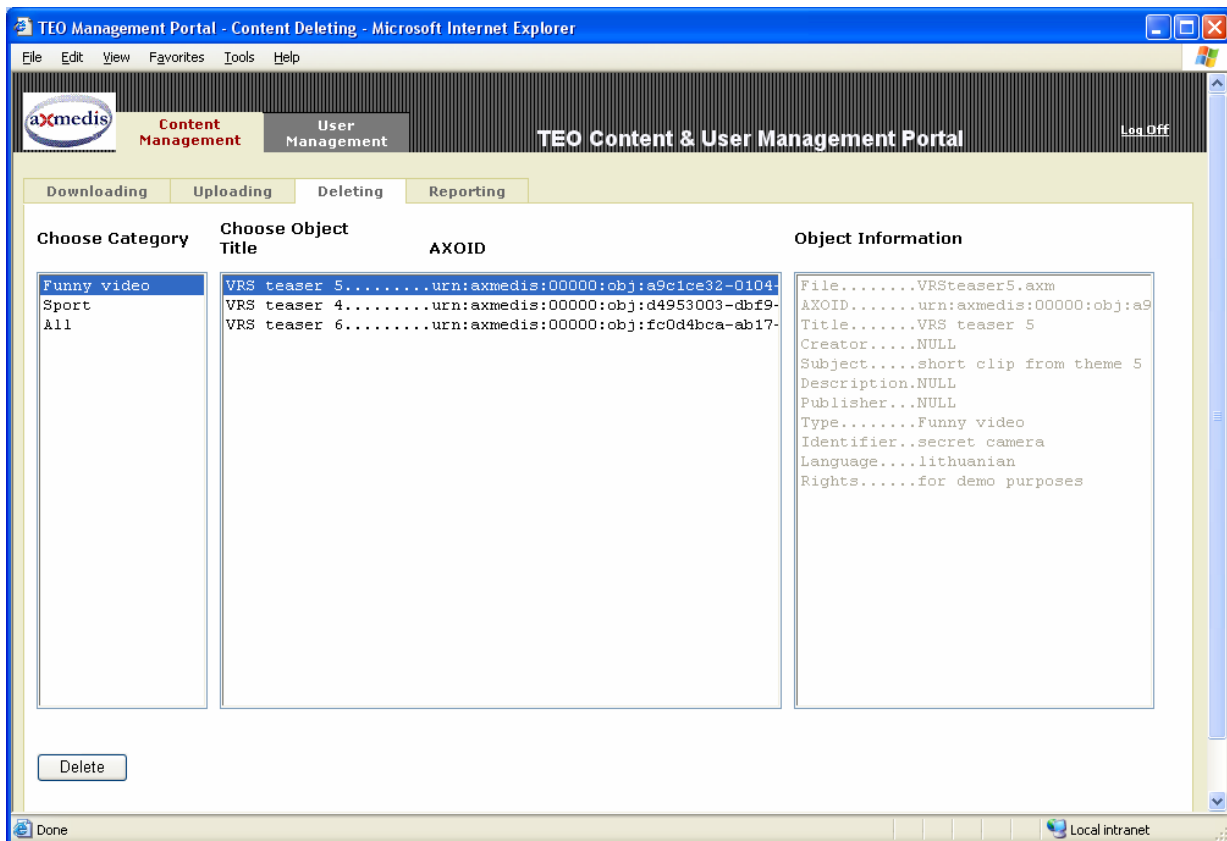
Price is defined per one view of the object, in Euros. Current protection is based on Caesar cipher algorithm. When Content Manager presses “Place object” button, new content from selected object is uploaded to VOD server and metadata info is placed to AXDB. Message on the bottom of a page appears stating that upload was successful.



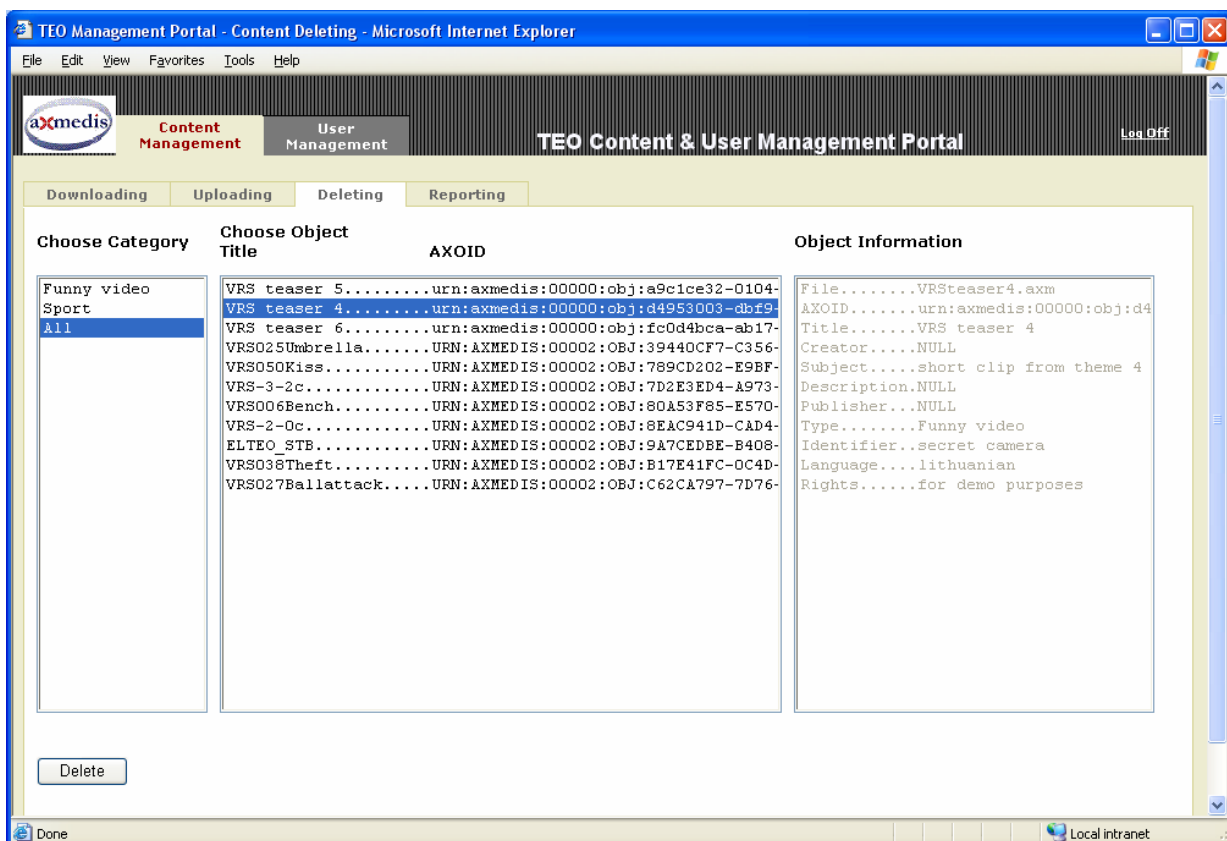
Next tab in Content Management is content deletion page, where Content Manager can delete selected object from VOD server and remove it from local AXDB.

All content are grouped into several categories. Content Manager primarily must select object category from categories list. In following picture there are 3 categories: Funny Video, Sport and All.

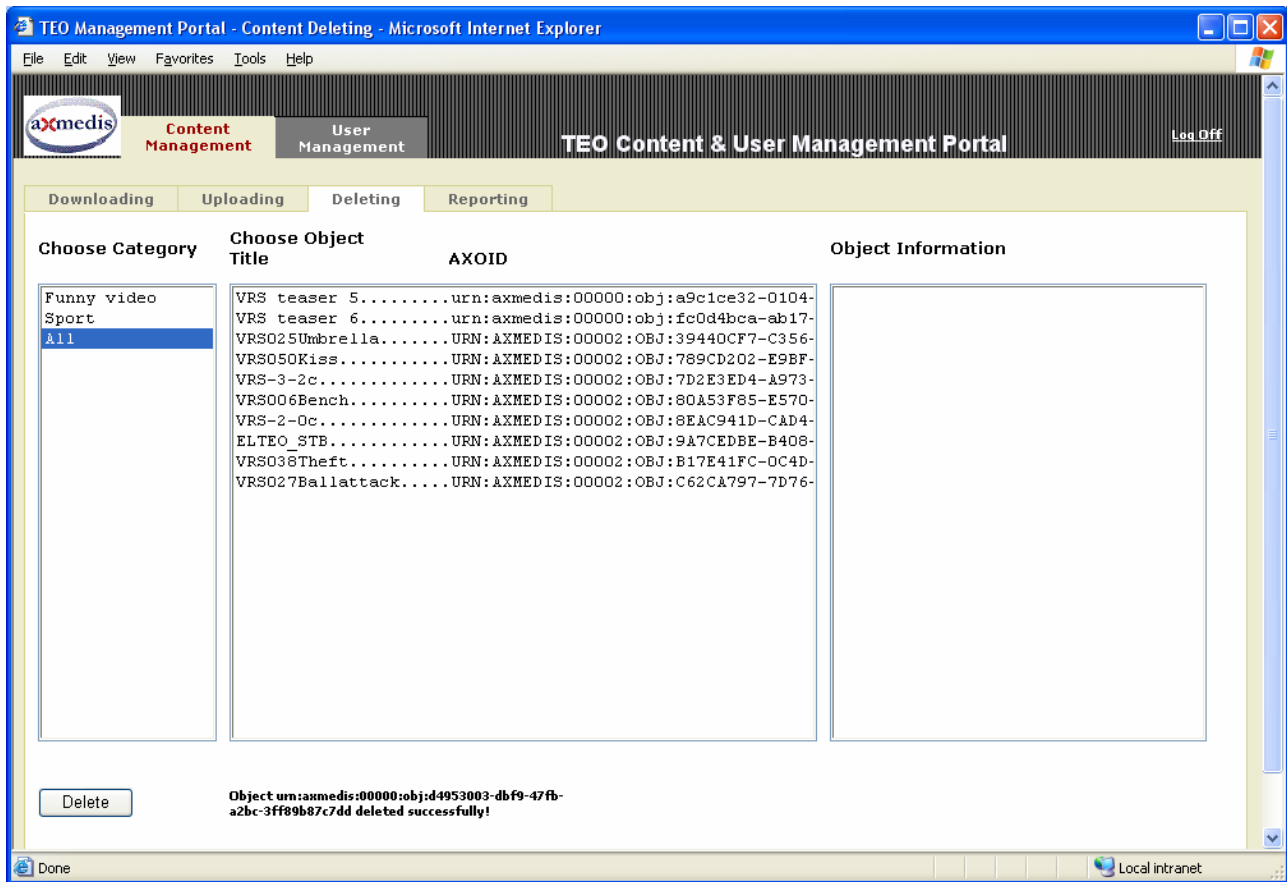
In following picture “Funny video” category is selected and only its content displayed in object list. After selecting category, user must select object in object list. After selecting object its info is displayed on the right side of page in Object Information panel.



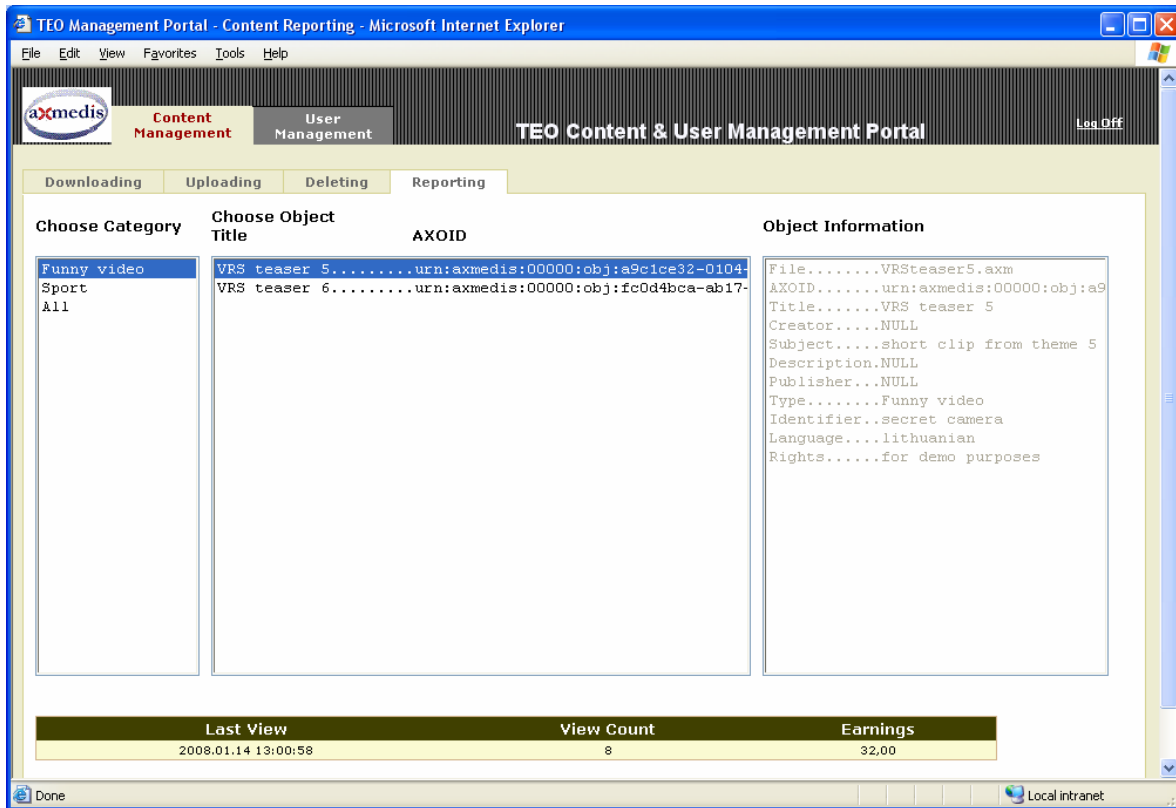
If Content Manager wants to see all objects on VOD server he can pick category All as displayed in picture below.



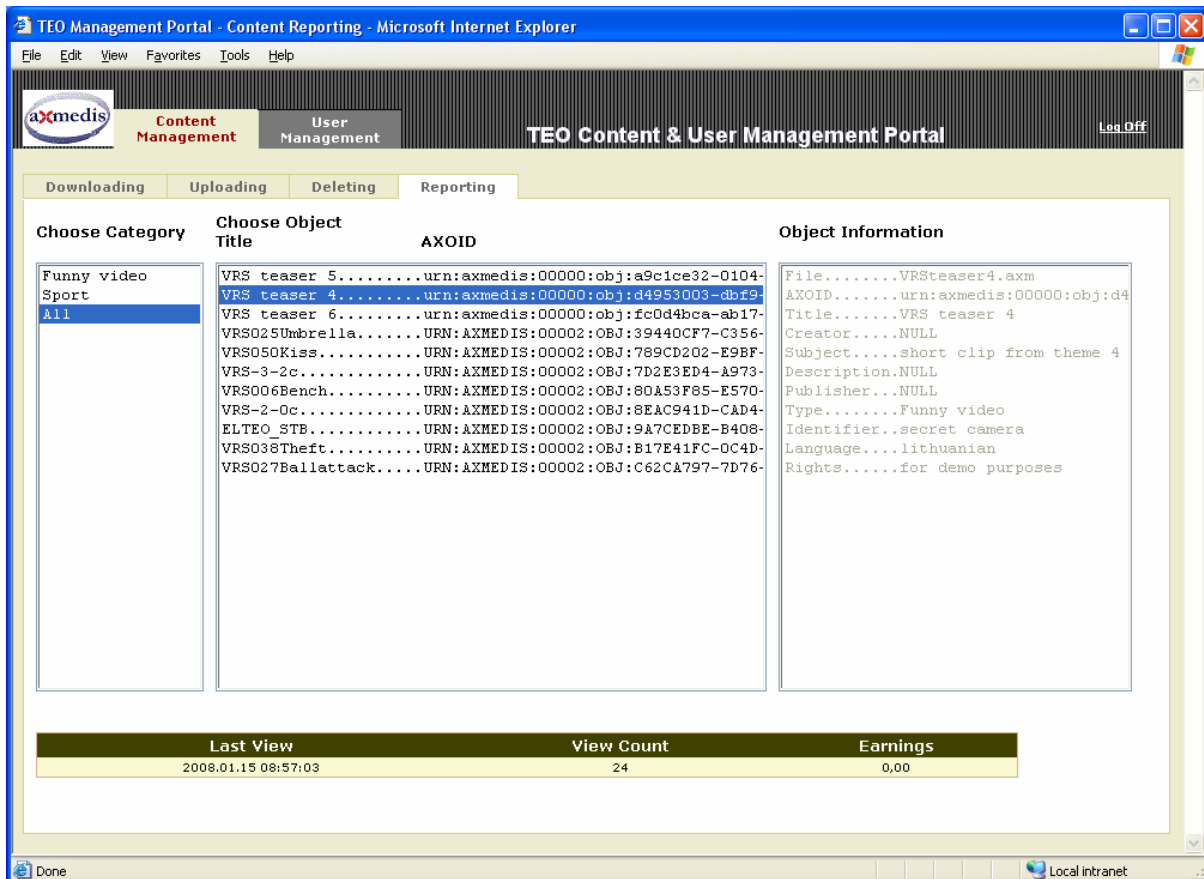
After picking object and pressing “Delete” button, content is deleted from VOD server and removed from local AXDB. After successful deleting operation appropriate message also appears on the bottom of the page as shown in a following picture.



Next tab in Content Management is content reporting page. There Content Manager can view information about content usage and billing. After selecting desired category and picking object from selected category, object information is displayed in a following order: a last view of object, view count and earnings. Example of this information is displayed as in picture below.



In case of free object, earnings are zero as in picture from AXMEDIS TEO Demonstrator below, when category “All” and object “VRS Teaser 4” is selected by Content Manager.



5.1.2 User Management Manual

After connection to User management portal IPTV Administrator can:


- Add user to TEO AXMEDIS DB;
- Delete user from TEO AXMEDIS DB;
- Set user rights to use AXMEDIS content in TEO IPTV network;
- Make and view reports about user actions in TEO AXMEDIS DB.

Right after pressing on User Management tab user adding page is displayed. In a following picture user adding is displayed. Button Add adds new user, button clear – clears all fields. Registration information is as follows:

- DSL ID – user's phone number
- First name - user's first name
- Last name - user's last name
- Password - user's password (numeric)
- Start date – user's availability to use IPTV services start date
- End date- user's availability to use IPTV services end date
- Address – user's home address
- City – city user resides in
- Axmedis – checked box lets user to access Axmedis content
- Pin – initial pin code of user to access chargeable content (must be changed during STB registration)
- AXUID –unique internal user id, received from Axmedis user registration portal
- Certificate – user certificate file name, which is received from Axmedis user registration portal and placed in appropriate directory
- Certificate password – password used to decode user certificate received from Axmedis user registration portal

TEO Management Portal - User Adding - Microsoft Internet Explorer

File Edit View Favorites Tools Help

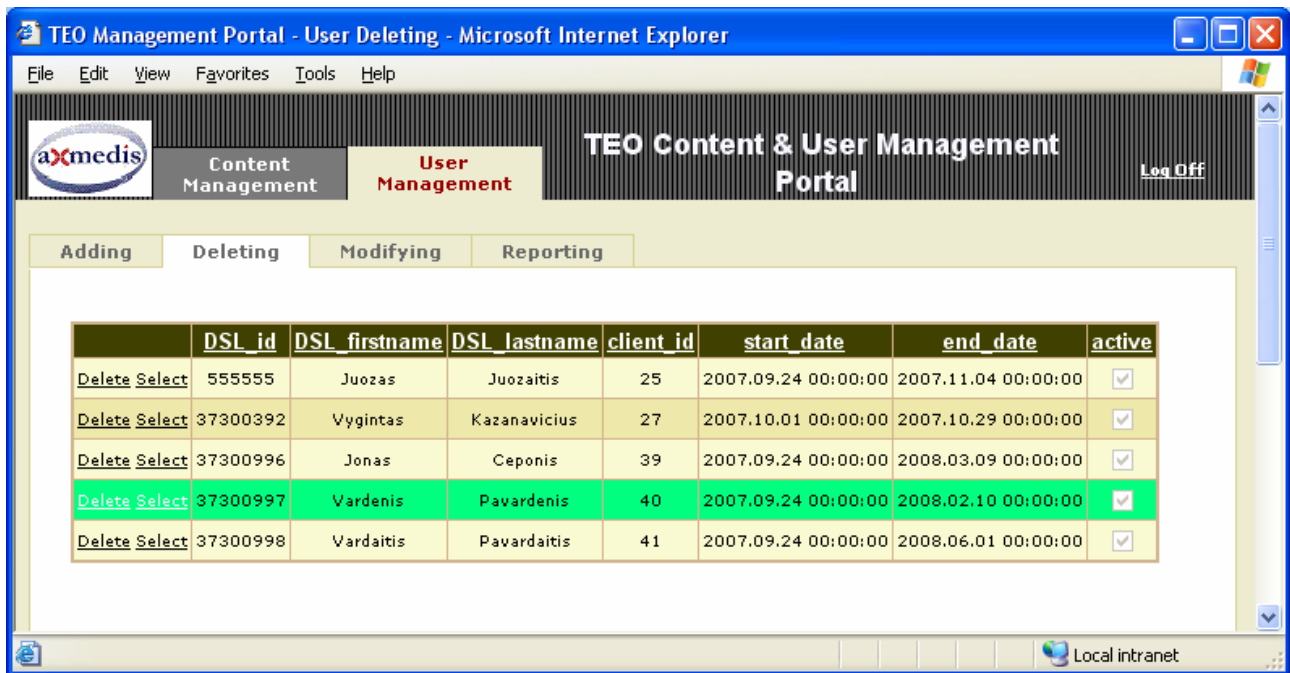
 **Content Management** **User Management** **TEO Content & User Management Portal** [Log Off](#)

Adding **Deleting** **Modifying** **Reporting**

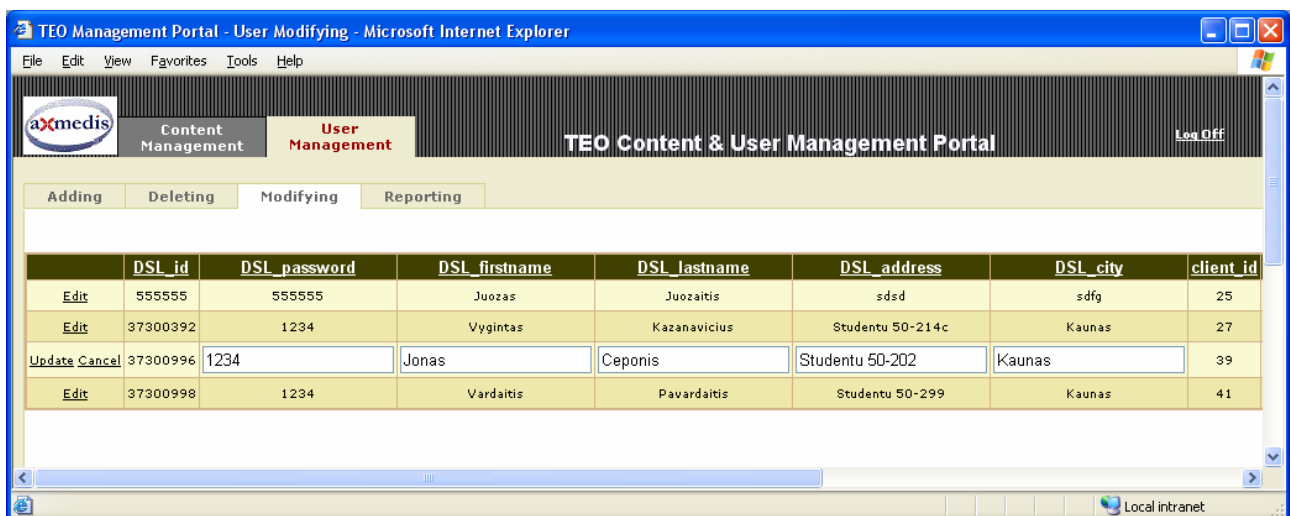
DSL ID	123456																																																	
First name	demo1																																																	
Last name	axmedis1																																																	
Password	*****																																																	
Start date	2008 m. sausio 1 d. ≤ 2008 m. sausis ≥ <table border="1"> <thead> <tr> <th>Pr</th> <th>An</th> <th>Tr</th> <th>Kt</th> <th>Pn</th> <th>Št</th> <th>Sk</th> </tr> </thead> <tbody> <tr><td>31</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr> <tr><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td></tr> <tr><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td></tr> <tr><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td></tr> <tr><td>28</td><td>29</td><td>30</td><td>31</td><td>1</td><td>2</td><td>3</td></tr> <tr><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr> </tbody> </table>	Pr	An	Tr	Kt	Pn	Št	Sk	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10
Pr	An	Tr	Kt	Pn	Št	Sk																																												
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21	22	23	24	25	26	27																																												
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End date	2008 m. kovo 31 d. ≤ 2008 m. kovas ≥ <table border="1"> <thead> <tr> <th>Pr</th> <th>An</th> <th>Tr</th> <th>Kt</th> <th>Pn</th> <th>Št</th> <th>Sk</th> </tr> </thead> <tbody> <tr><td>25</td><td>26</td><td>27</td><td>28</td><td>29</td><td>1</td><td>2</td></tr> <tr><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td></tr> <tr><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td></tr> <tr><td>17</td><td>18</td><td>19</td><td>20</td><td>21</td><td>22</td><td>23</td></tr> <tr><td>24</td><td>25</td><td>26</td><td>27</td><td>28</td><td>29</td><td>30</td></tr> <tr><td>31</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr> </tbody> </table>	Pr	An	Tr	Kt	Pn	Št	Sk	25	26	27	28	29	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6
Pr	An	Tr	Kt	Pn	Št	Sk																																												
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17	18	19	20	21	22	23																																												
24	25	26	27	28	29	30																																												
31	1	2	3	4	5	6																																												
Address	axmedis st. 123																																																	
City	Demo1																																																	
Axmedis	<input checked="" type="checkbox"/>																																																	
PIN	123456																																																	
AXUID	123456																																																	
Certificate	Demo1																																																	
Certificate password	*****																																																	

Local intranet

Next tab in User Management is user deleting page. User deletion is displayed in a picture below, when user is selected and IPTV Administrator than can press “Delete” link to delete user from Demonstrator environment.



Next tab in User Management is user modifying page. IPTV Administrator can modify DSL password, user first and last names, user address and other user information. After pressing “Edit” user information can be changed by IPTV as shown in following picture. Click on “Update” link saves entered changes and click on “Cancel” link leaves information unchanged.



Next tab in User Management is user reporting page. In this page IPTV Administrator can view users usage and billing information. To select a user IPTV Administrator has to press “Select” link by the appropriate users DSL_ID in existing users table. After selection user, his usage and billing information is displayed as in picture below.

Existing users:

	DSL ID	Client ID
Select	555555	25
Select	37300392	27
Select	37300996	39
Select	37300998	41

User information:

DSL ID	DSL Password	First name	Last name	Address	City	PIN	Start date	End date	AXMEDIS
37300392	1234	Vygintas	Kazanavicius	Studentu 50-214c	Kaunas	1111	2007.10.01 00:00:00	2007.10.29 00:00:00	<input checked="" type="checkbox"/>

Usage Information:

AXOID	Price	Played
urn:axmedis:00000:obj:a9c1ce32-0104-45a0-bcf5-f5cc4f34dde4	4,00	2008.01.14 13:00:58
urn:axmedis:00000:obj:d4953003-dbf9-47fb-a2bc-3ff89b87c7dd	0,00	2008.01.11 10:16:55
urn:axmedis:00000:obj:a9c1ce32-0104-45a0-bcf5-f5cc4f34dde4	4,00	2008.01.11 07:57:18
URN:AXMEDIS:00002:OBJ:509B5319-3798-321D-A644-F059CF13CECF	0,00	2007.10.19 09:41:23
urn:axmedis:00000:obj:a9c1ce32-0104-45a0-bcf5-f5cc4f34dde4	4,00	2007.11.19 07:58:08
urn:axmedis:00000:obj:d4953003-dbf9-47fb-a2bc-3ff89b87c7dd	0,00	2008.01.14 12:41:38
urn:axmedis:00000:obj:d4953003-dbf9-47fb-a2bc-3ff89b87c7dd	0,00	2007.11.19 08:17:48
urn:axmedis:00000:obj:d4953003-dbf9-47fb-a2bc-3ff89b87c7dd	0,00	2007.11.19 08:52:04
urn:axmedis:00000:obj:d4953003-dbf9-47fb-a2bc-3ff89b87c7dd	0,00	2008.01.14 11:36:46
URN:AXMEDIS:00002:OBJ:9A7CEDBE-B408-3984-8948-C87F8B67875E	10,00	2008.01.14 07:43:02

1 2 3 4 5

Billing Information:


This month
28,00

5.2 End User Manual for AXSTBPlayer

The AXSTBPlayer is AXMEDIS Object Player developed for the Kreatel Set-top-box. Functionalities available on AXSTBPlayer are as follows:

- Attractive user interface integrated with GALA TV screenshot system;
- STB Remote control enabled user functionality;
- Enable the user to Play, Stop, Pause and Seek the digital content being played;
- Digital formats supported by the AXSTB Player: MPEG2TS.

After End User obtains Set-top-box device from provider, registration for service is required as in example picture below.

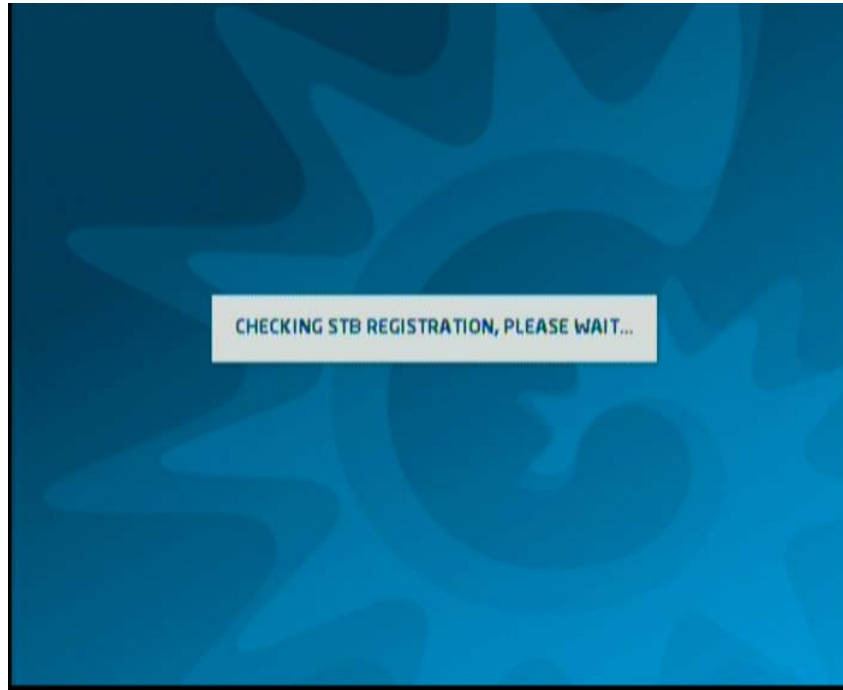


The image shows a service registration screen for the AXMEDIS STB Player. The background is blue with a faint gear pattern. At the top left is the 'Gala' logo, and at the top right is the 'axmedis STB Player' logo. The title 'SERVICE REGISTRATION' is centered at the top. Below the title are four input fields: 'DSL No.' with the value '37300392', 'DSL Password' with masked characters, 'PIN' with masked characters, and 'Confirm PIN' with masked characters. Below these fields is the text 'Please fill the fields for registration'. At the bottom left is a button labeled 'OK Register'.

Registration information, acquired from provider, is entered only by digits, so user can comfortably use remote control which is like one in a following picture.



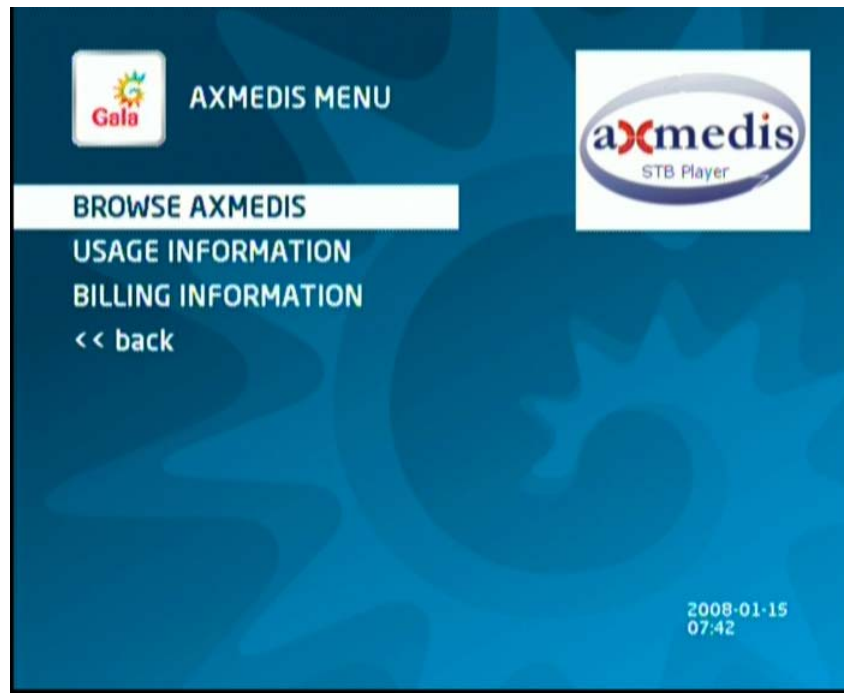
After registering once, user will not be requested to register again, and after turning device on only STB registration checking page will appear as displayed in a picture below.



In registered to VOD server STB main menu is displayed, where End User can select “Axmedis” in menu with direction keys and press “OK” button as in a example picture below.



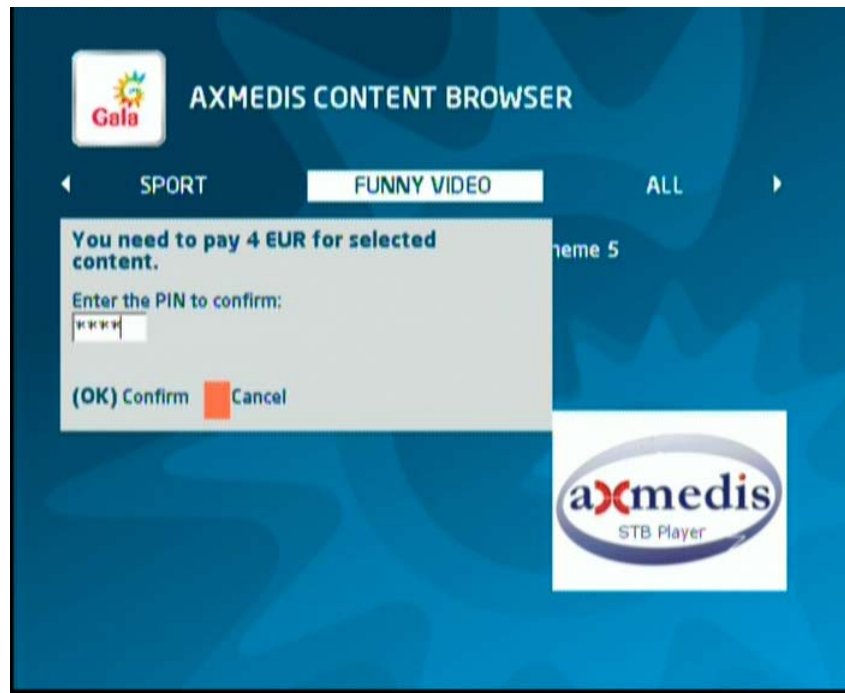
Inside AXMEDIS MENU, End User can select to browse Axmedis content, view usage information and billing information. Selection is made using directional keys “Up” and “Down” and then pressing “OK” button. Example picture of AXMEDIS MENU is below.



Inside AXMEDIS Content Browser User can select different categories using directional keys “Left” and “Right” and then selecting desired object using directional keys “Up” and “Down” as in following picture. Selected object information is displayed on the right side, including price of an object as displayed in following picture.



In case object is not free of charge dialog appears requesting to enter a pin code of user, to confirm purchase of object viewing as in picture below. To cancel dialog End User can press “Red” button and come back to browsing.



After pressing “OK” button and confirming purchase if object was chargeable preview of object appears in right side of screen as displayed in a picture below.



End user can pause, use fast forward and backward playback, view in full screen with menu pressing “Blue” button, view in full screen without menu pressing “Green” and come back from full screen playback pressing “Yellow” button as in a following picture. User can always go back one step up pressing “Back” button.



Picture below is Full screen mode without menu, but user still can pause, skip and come back to picture in picture mode.



In Usage Information screen user can view list of viewed objects displayed in following order: title usage time and price, flipping pages using “right” and “left” buttons. Example of usage information is in picture below.



Title	Time	Price
VRS teaser 5	2007.11.19 07:52:36	4,00
ELTEO_STB	2007.11.19 07:56:21	10,00
VRS teaser 5	2007.11.19 07:58:08	4,00
VRS teaser 4	2007.11.19 08:02:09	0,00
VRS teaser 4	2007.11.19 08:17:48	0,00
VRS teaser 5	2007.11.19 08:18:47	4,00
VRS teaser 5	2007.11.19 08:22:18	4,00
ELTEO_STB	2007.11.19 08:50:47	10,00
VRS teaser 4	2007.11.19 08:52:04	0,00
VRS teaser 4	2007.11.19 10:17:54	0,00
VR5006Bench	2007.11.29 09:54:06	2,00
VRS-2-0c	2007.12.19 08:49:21	4,00

Previous page Page 2 of 4 Next page BACK Menu 2008-01-15 07:50

In billing information screen user can see his current month charge for playing Axmedis objects on STB player in Euros and his subscriber ID next to the sum of money as shown in following picture.



Current Month Bill	Subscriber
42,00	37300392

BACK Menu

5.3 Elion Demonstrator User Manual

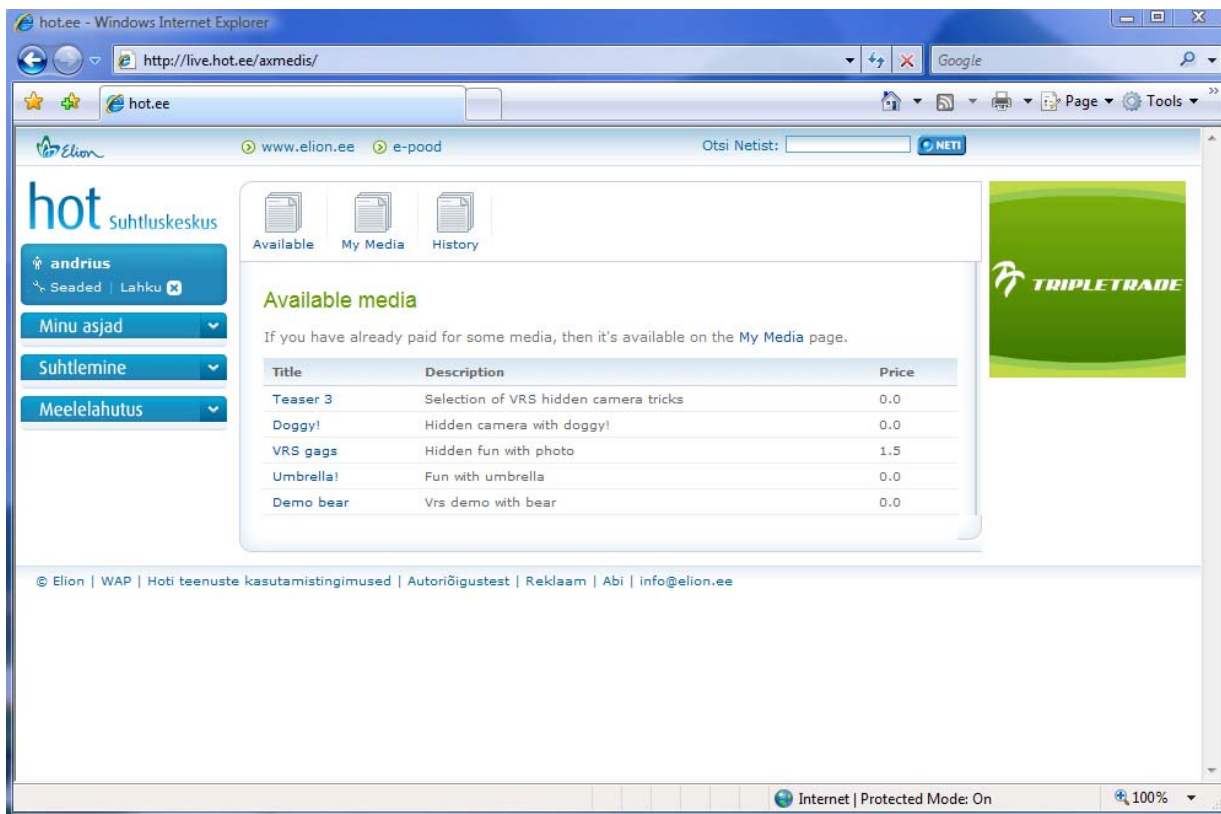
Online user manual and demonstration page can be found at the following web address:
http://www.axmedis.org/com/index.php?option=com_content&task=view&id=75&Itemid=46

The user prerequisites are:

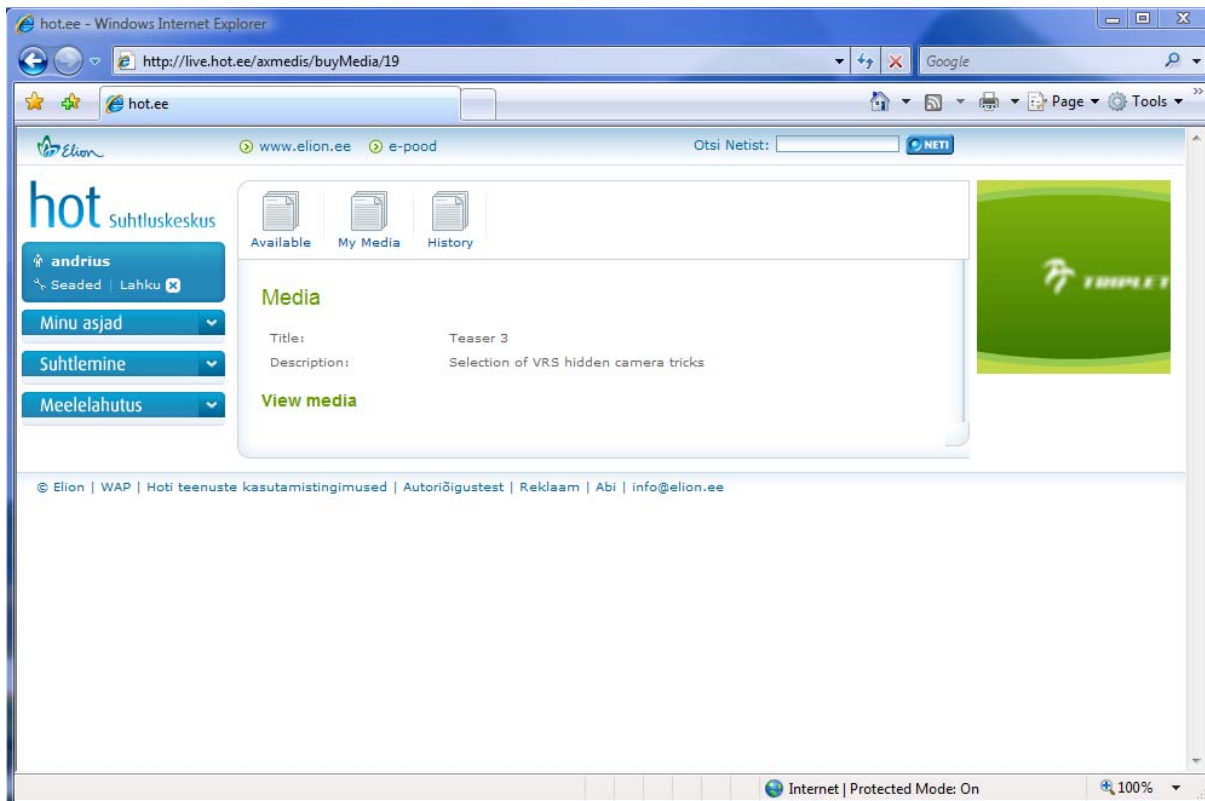
- Broadband connection
- Web browser
- Installed and registered AXMEDIS Player
- Registration on AXMEDIS user network
- EPASS account
- Availability of one supported payment channel.

The end user portal can be accessed on following address; <http://live.hot.ee/axmedis>

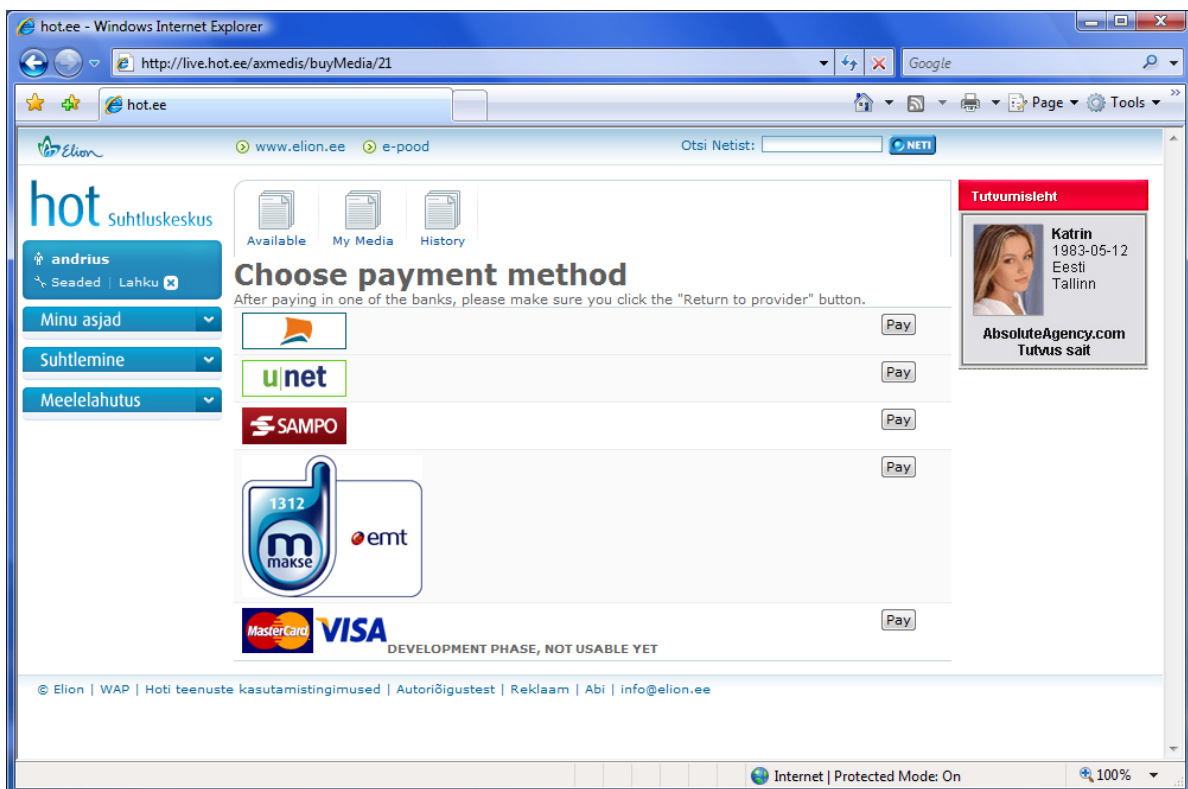
When user has been authenticated and E-PASS account has been tied with AXMEDIS user id the user will be presented with list of available content as shown below:



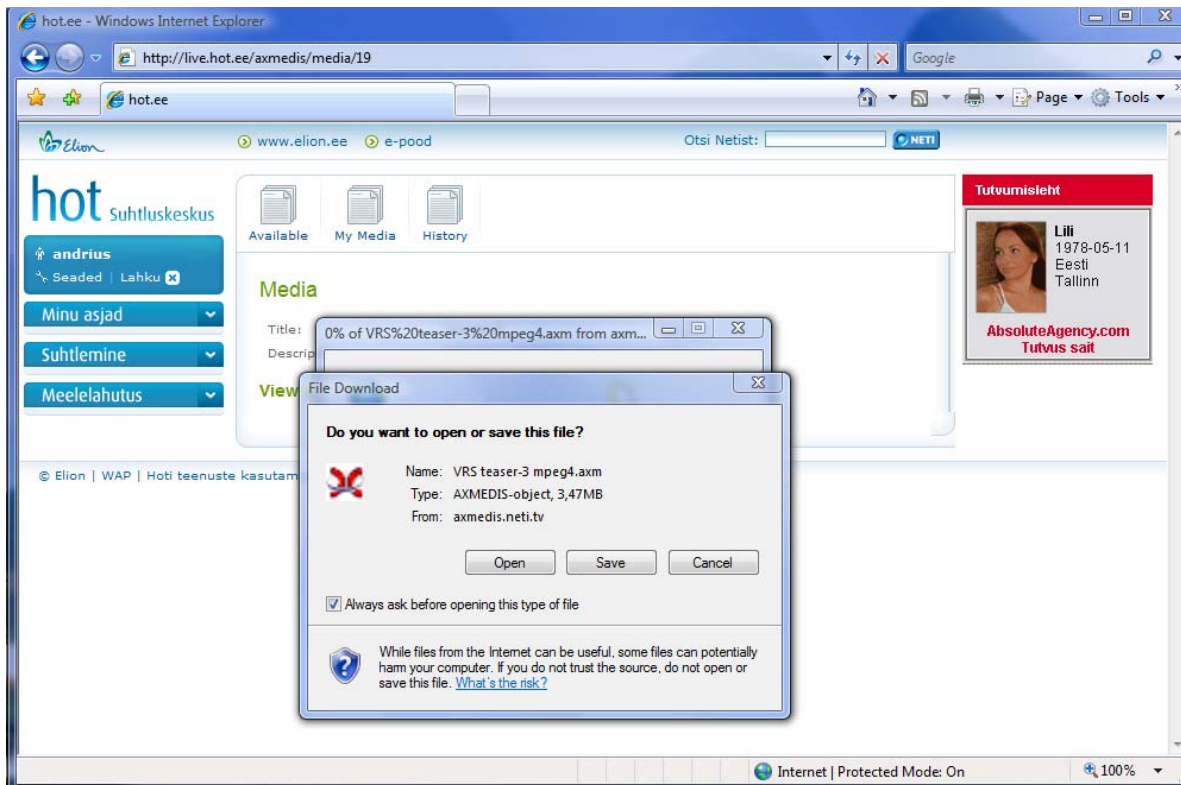
Media details are shown when user clicks on the media item in the list, if media item has no price user can get the license and object by simply clicking "view media".



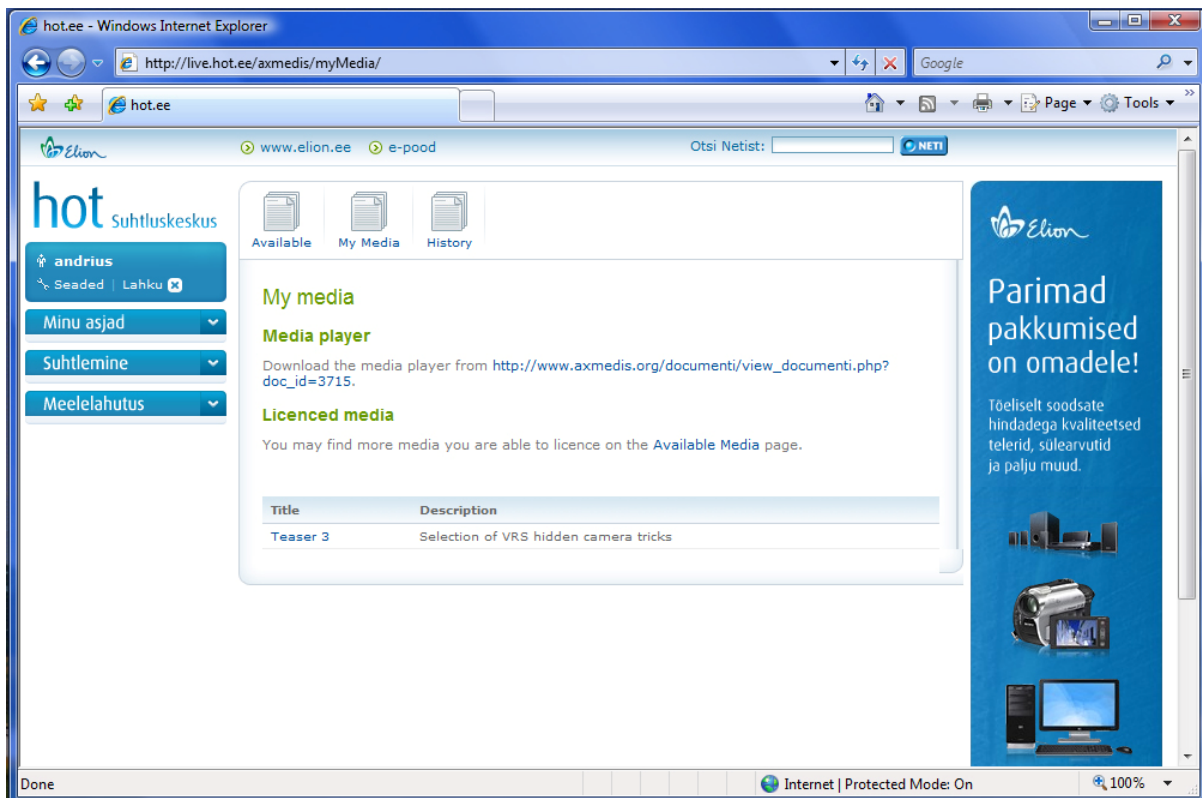
If media object is protected then user will be asked to transfer shown amount of money by any of available payment channels.



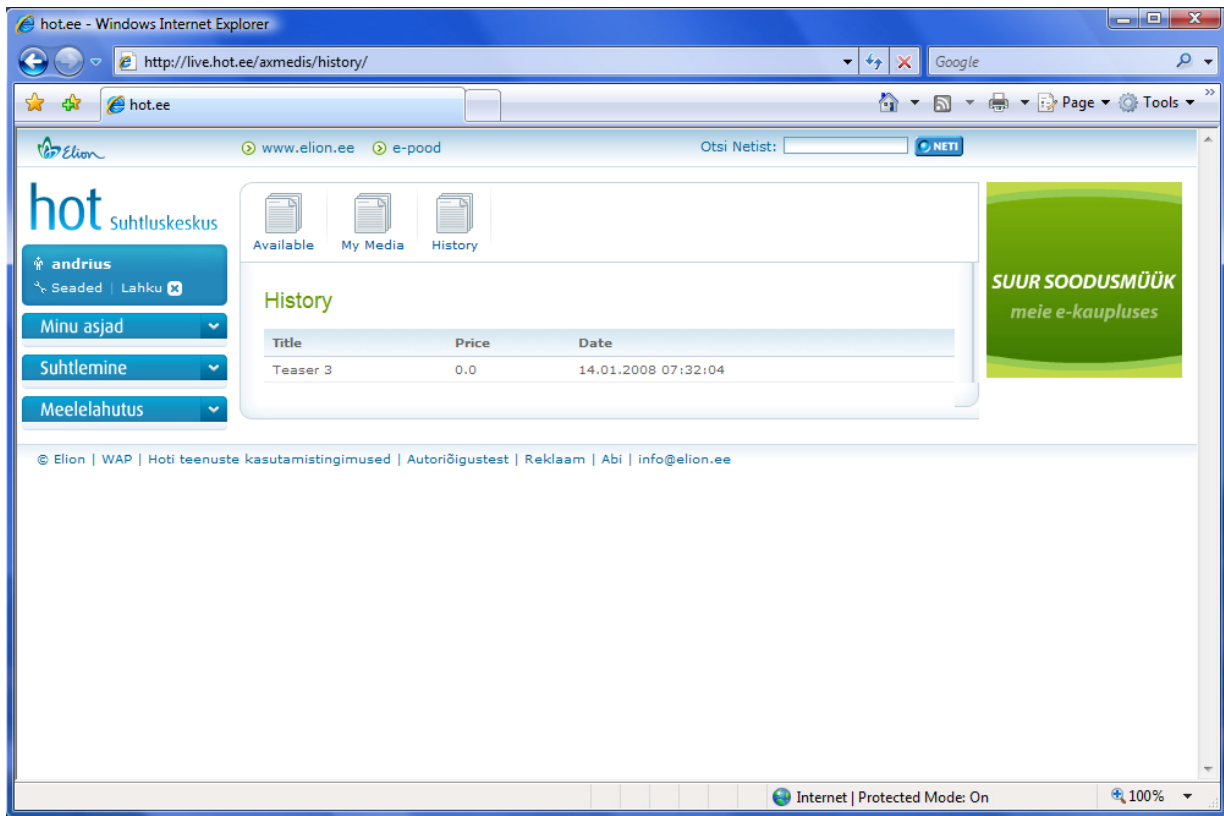
If user has appropriate license the object becomes freely downloadable and user can choose to download it by clicking save or open the download in player by clicking open.



All purchased items are available for unlimited play count within 24 hours, user can click "my media" for list of items that have been licensed for usage.



User can also view activity by checking licensing history.



5.4 Elion demonstrator business client side (administration)

Online user manual and demonstration page can be found at web address:

http://www.axmedis.org/com/index.php?option=com_content&task=view&id=75&Itemid=46

The manager prerequisites are:

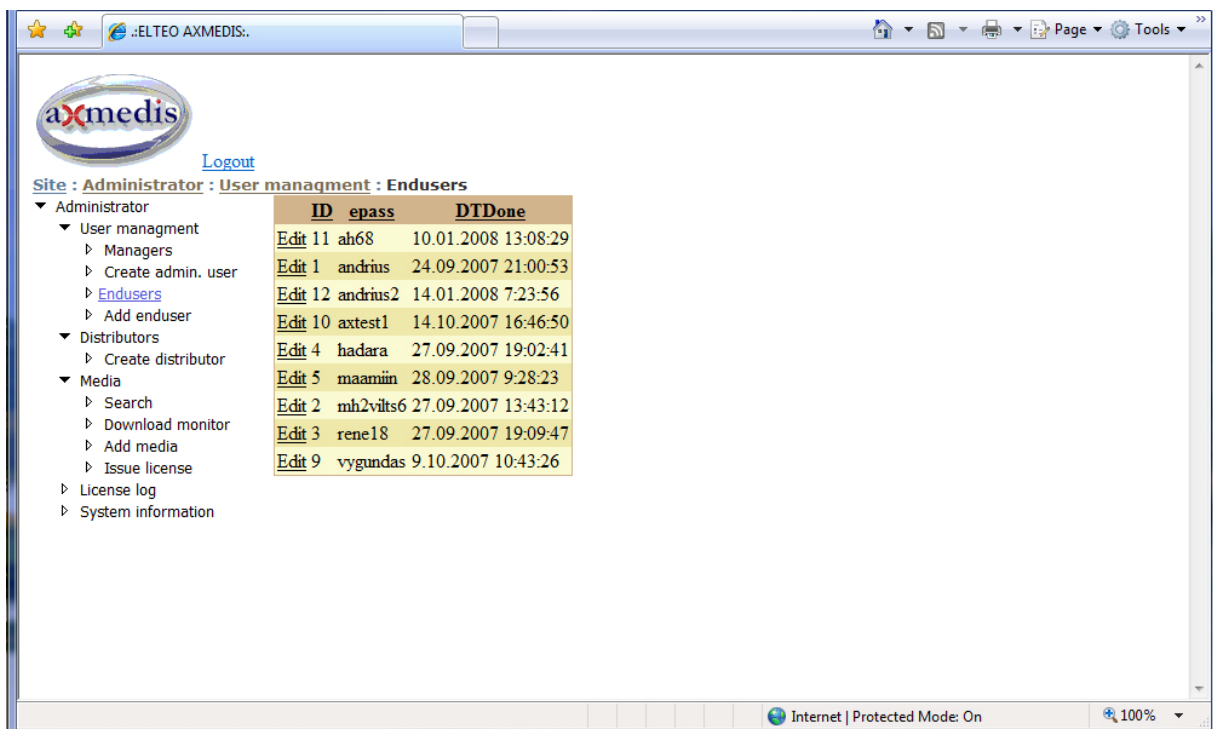
- Broadband connection
- Web browser
- Installed and registered AXMEDIS Player
- Registration on AXMEDIS user network
- EPASS account
- Availability of one supported payment channel.
- Valid management account.

Sample management portal can be accessed by navigating to following address: <http://axmedis.neti.tv:42123/>

Since Elion is creating a distribution service our goals have been to make flexible solution for business partners, as such the administrative side is created by using standard web services and is intended to be integrated into business client web management system to provide unified experience, as such the following sample pages are only examples of few possible options available for a business clients.

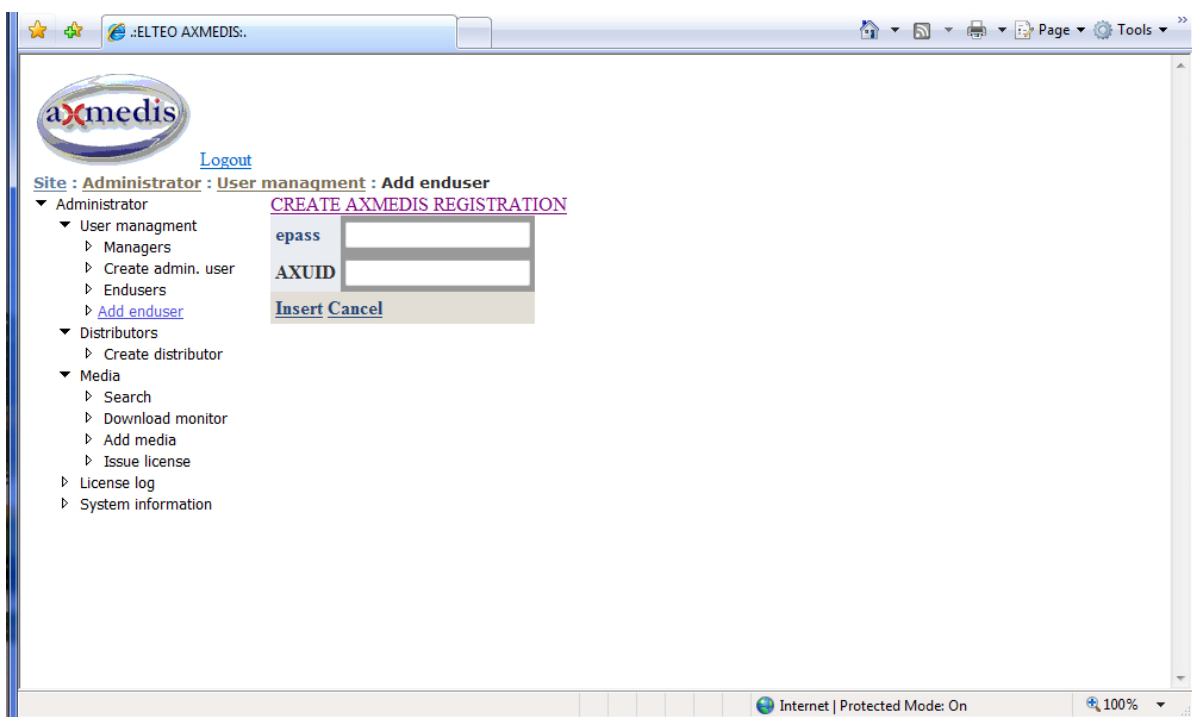
End user management; since all end user functions have been embedded into EPASS accounting system the available options for this administrative service are limited to list of subscribers that activated on demand service and the interface for performing manual activation, both interfaces are shown below:

Image 1. Consumer list



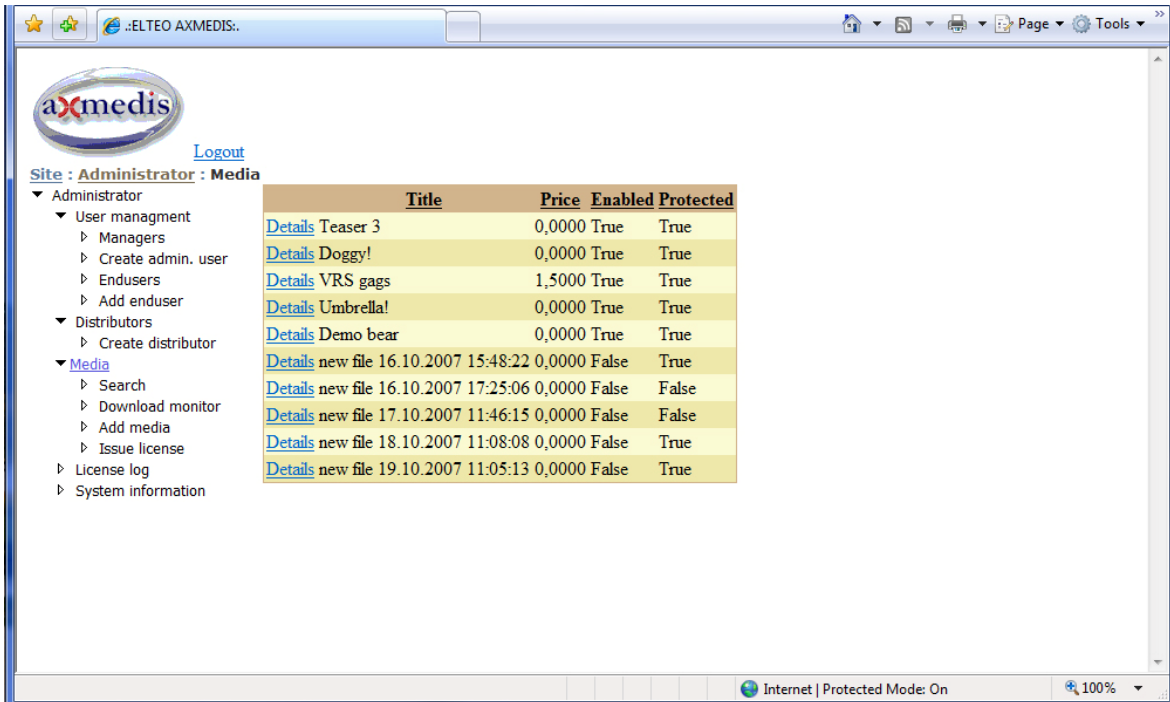
For manual activation a valid AXUID and E-PASS account name must be typed into form.

Image 2. Manual account activation



Media management; this section contains all basics of any content management system.

Following screen shows all objects on the current distributor.

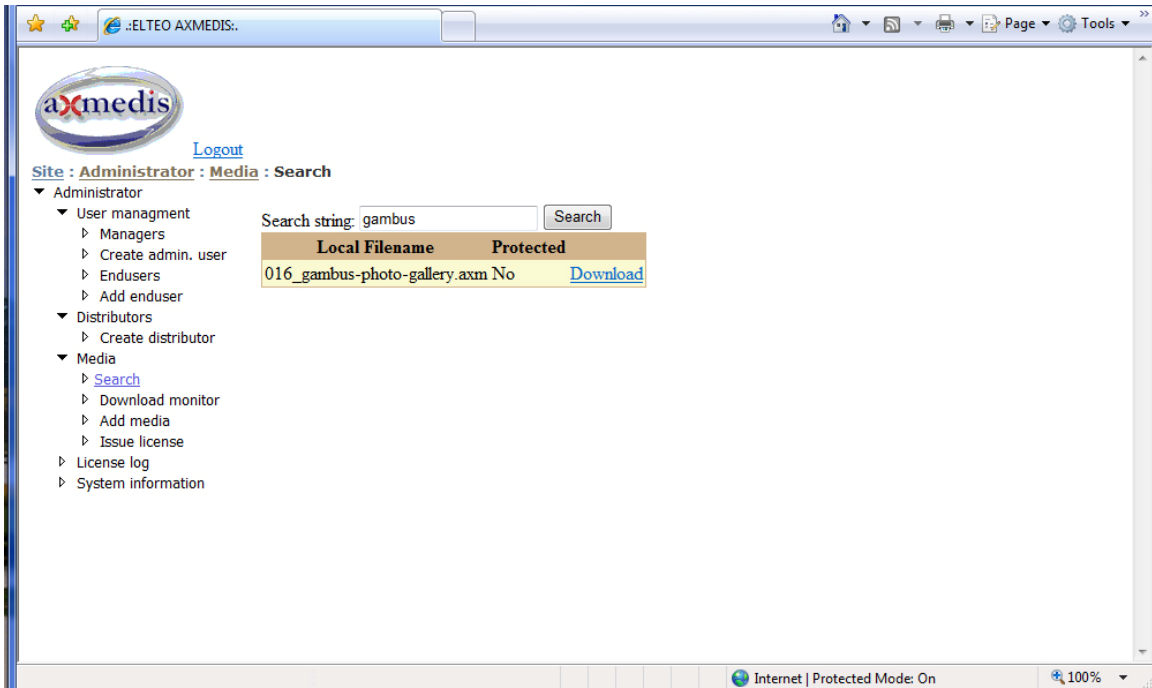


The screenshot shows the AXMEDIS web interface. The top navigation bar includes the AXMEDIS logo, a "Logout" link, and the site path "Site : Administrator : Media". The left sidebar contains a tree view with the following items: Administrator, User management (Managers, Create admin. user, Endusers, Add enduser), Distributors (Create distributor), Media (Search, Download monitor, Add media, Issue license), License log, and System information. The main content area displays a table of media files with the following columns: Title, Price, Enabled, and Protected.

Title	Price	Enabled	Protected
Details Teaser 3	0,0000	True	True
Details Doggy!	0,0000	True	True
Details VRS gags	1,5000	True	True
Details Umbrella!	0,0000	True	True
Details Demo bear	0,0000	True	True
Details new file 16.10.2007 15:48:22	0,0000	False	True
Details new file 16.10.2007 17:25:06	0,0000	False	False
Details new file 17.10.2007 11:46:15	0,0000	False	False
Details new file 18.10.2007 11:08:08	0,0000	False	True
Details new file 19.10.2007 11:05:13	0,0000	False	True

The bottom status bar indicates "Internet | Protected Mode: On" and a zoom level of "100%".

Managers can submit searches on AXMEDIS B2B P2P networks.

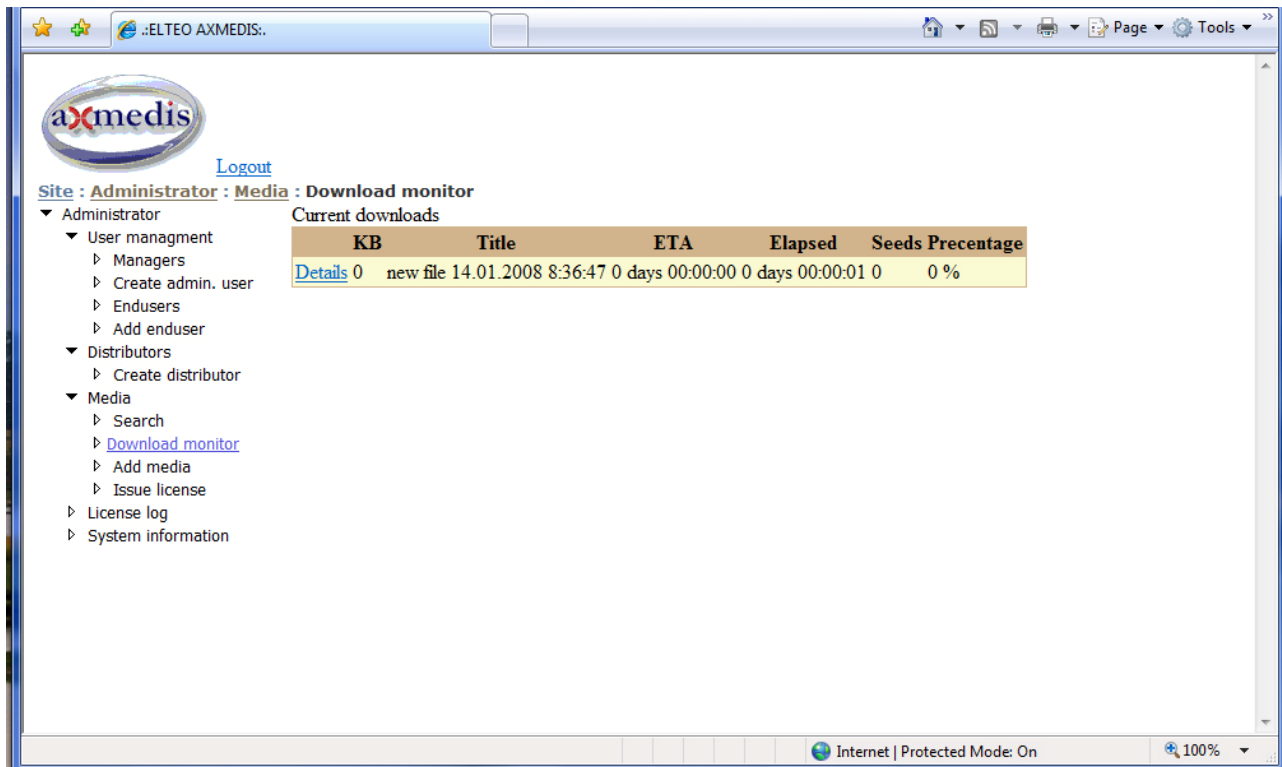


The screenshot shows the AXMEDIS web interface with the "Search" option selected in the Media section of the left sidebar. The main content area displays a search result for the string "gambus". The search string is entered in a text box, and a "Search" button is visible. The results are shown in a table with the following columns: Local Filename and Protected.

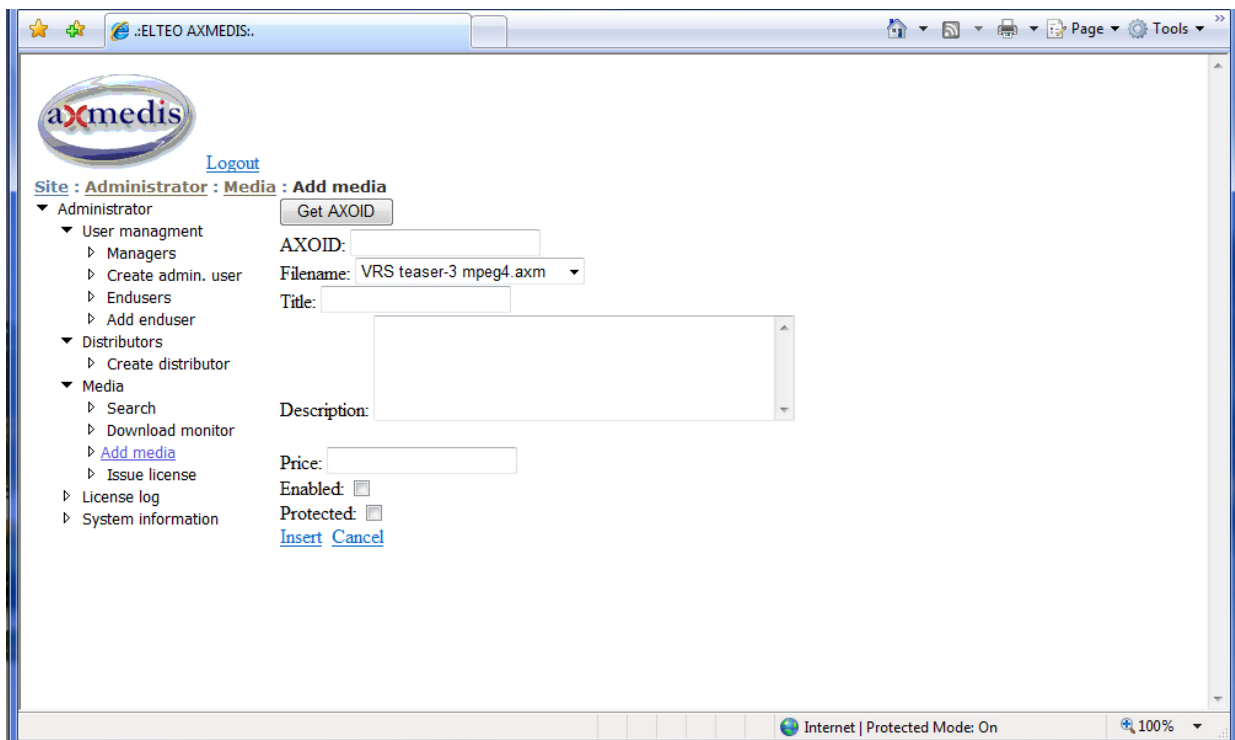
Local Filename	Protected
016_gambus-photo-gallery.axm	No

A "Download" link is provided for the first result. The bottom status bar indicates "Internet | Protected Mode: On" and a zoom level of "100%".

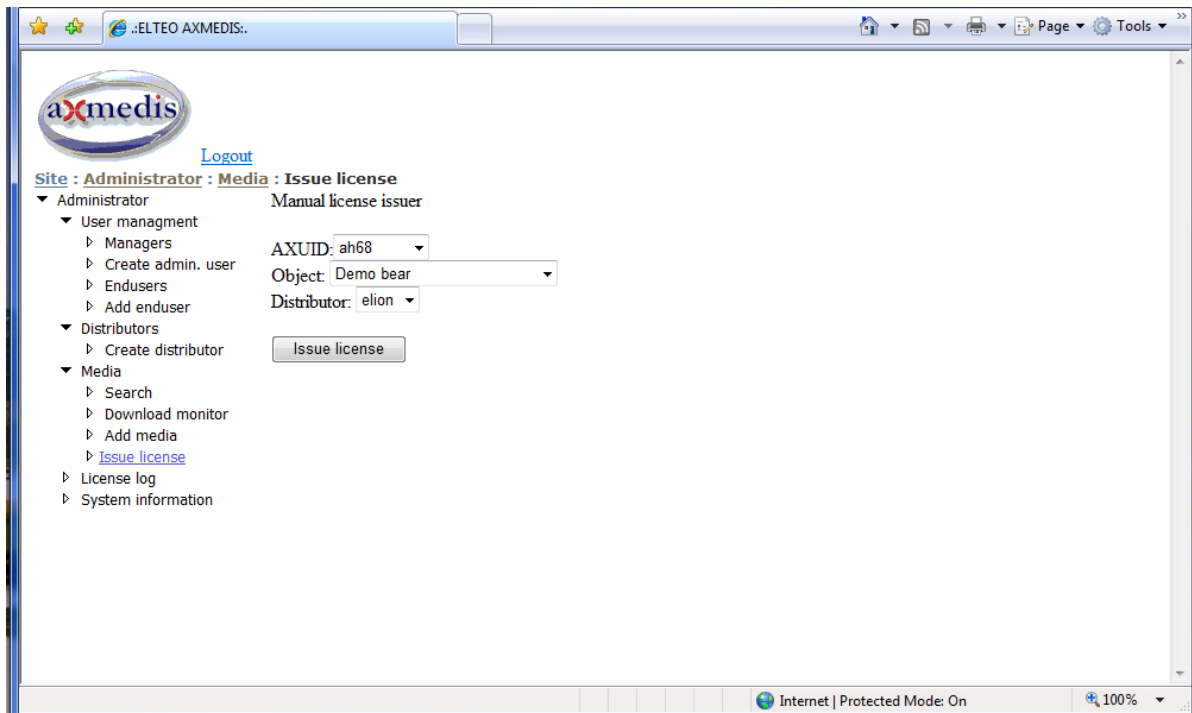
Download status from P2P client is also available over the interface.



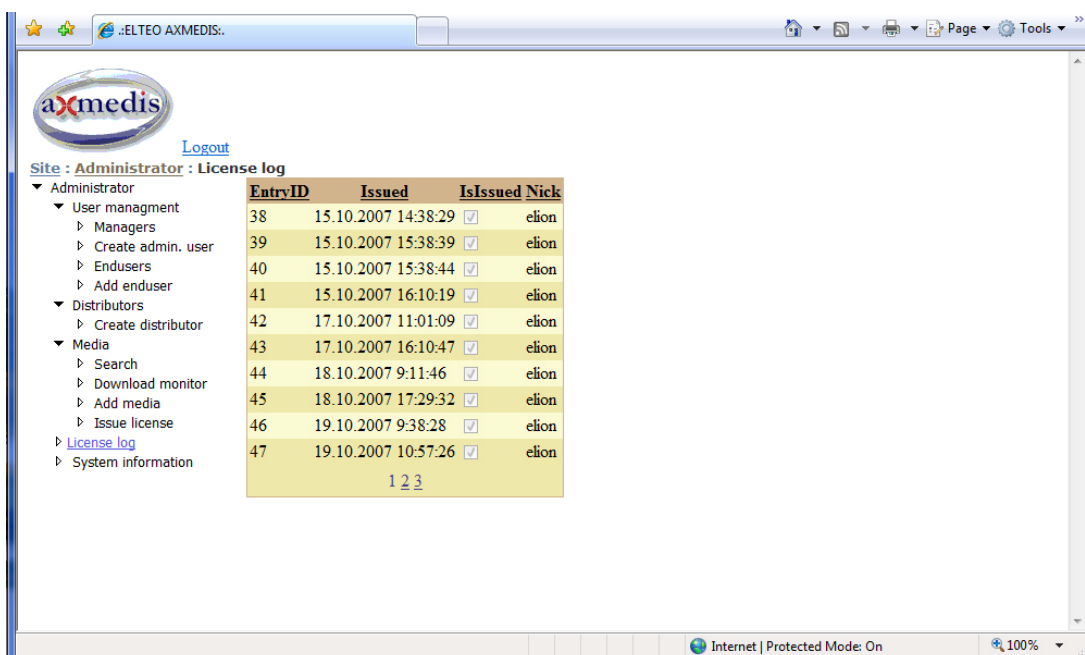
System also allows object delivery using non P2P networks, for example; object can be uploaded using FTP and then this interface can be used to index the object for distribution. Filename drop down box is automatically populated by listing the objects in distribution storage.



Manual license issuing is also available for object testing.



Finally the sample license issuing log is provided for current distributor, more detailed action logs are also available over AXMEDIS Camart providing flexibility and customization dependent on business partner needs.



6 Bibliography

AXMEDIS project website – www.axmedis.org

Demonstrator web pages:

General – www.axmedis.org/com

TEO demonstrator:

http://www.axmedis.org/com/index.php?option=com_content&task=view&id=72&Itemid=51

Elion demonstrator:

http://www.axmedis.org/com/index.php?option=com_content&task=view&id=75&Itemid=46

7 Glossary

A

API, Application Programming Interface

A set of definitions of the ways one piece of computer software communicates with another.

ASP, Active Server Pages

A web-scripting language by Microsoft.

AXCS, AXmedis Certifier and Supervisor

AXCS is the authority put in charge of supervising the certification process over all its phases

AXCP, AXmedis Content Processing

Tools set for automatic content production, adaptation and protection of AXMEDIS object and their publication on a P2P environment.

AXDB, AXmedis DataBase

Database for storing Axmedis objects

AXOID, AXmedis Object ID

Unique AXMEDIS Object identification string

AXUID, AXmedis User ID

Unique AXMEDIS User identification string

B

B2B, Business to Business

Refers to one business communicating with or selling to another.

B2C, Business to Consumer

Refers to a business communicating with or selling to an individual rather than a company.

C

CM, Content Management

Designs the set of processes and technologies supporting the evolutionary life cycle of digital information.

CMS, Content Management System

A software tool designed to help content managers create, manage, and publish their content.

CRM, Customer Relationship Management

An information industry term for methodologies, software, and Internet capabilities that help an enterprise manage customer relationships in an organized way.

D

DAM, Digital Asset Management

System for ingesting, annotating, cataloguing, storage and retrieval of digital assets.

DRM, Digital Rights Management

A system for protecting the copyrights of digital content.

F

FTP, File Transfer Protocol

A protocol used to transfer files over a TCP/IP network.

GUI, Graphical User Interface

A computer terminal interface based on graphics instead of text.

H

HTTP, HyperText Transport Protocol

The communications protocol used to connect to servers on the World Wide Web.

HTTPS, HyperText Transport Protocol Secure

Version of the HTTP protocol that enables secured transmission of Web pages.

HTML, HyperText Markup Language

The document format language used on the World Wide Web.

I

IP, Internet Protocol

The network layer protocol in the TCP/IP communications protocol suite.

IPTV, Internet Protocol Television

A system where a digital television service is delivered by using Internet Protocol over a network infrastructure

J

J2EE, Java 2 Enterprise Edition

A version of Java for developing and deploying enterprise applications.

L

LDAP, Lightweight Directory Access Protocol

A protocol used to access a directory listing.

M

MPEG TS, Moving Picture Experts Group Transport Stream

Communications protocol for audio, video, and data which is specified in MPEG-2 Part 1, Systems (ISO/IEC standard 13818-1).

N

.NET

Microsoft's framework for Web services and component software.

P

P2P, Peer-to-Peer

Computer network which uses diverse connectivity between participants in a network and the cumulative bandwidth of network participants rather than conventional centralized resources where a relatively low number of servers provide the core value to a service or application

PMS, Protection Manager Support

A tool set for protecting/unprotecting Axmedis objects.

Q

QoS, Quality of Service

S

SSL, Secure Sockets Layer

A protocol developed by Netscape for transmitting private documents on the Internet.

SOAP, Simple Object Access Protocol

A message-based protocol based on XML for accessing services on the Web.

STB, Set Top Box

A device that connects to a television and an external source of signal, turning the signal into content which is then displayed on the television screen

U

UML, Unified Modeling Language

An object-oriented analysis and design language.

URI, Uniform Resource Identifier

The addressing technology for identifying resources on the Internet.

URL, Uniform Resource Locator

A type of uniform resource identifier (URI) that uses an HTTP connection.

V

VOD, Video On Demand

Systems which allow users to select and watch video and clip content over a network as part of an interactive television system

W

WS, Web Service

A software system designed to support interoperable Machine to Machine interaction over a network.

WSDL, Web Services Description Language

An XML-based language (Developed by Microsoft and IBM) for defining Web services.

X

XHTML, eXtensible HyperText Markup Language

A reformulation of HTML markup language with the same expressive possibilities but a stricter syntax.

XML, eXtensible Markup Language

A metalanguage used to design markups languages.