



Automating Production of Cross Media Content for Multi-channel Distribution

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Abstract:

Project flyer for technical and B2B new version, single flyers for P2P B2B area, Content Processing, Content Protection and AXMEDIS tools.

Keyword List:

AXMEDIS flyer, dissemination, promotion, exploitation.

List of Brochures and Flyers reported in this deliverable:

- AXMEDIS project brochure v3.2.5
- AXMEDIS Model flyer (v0.4)
- AXMEDIS For Cultural Heritage Content Distribution flyer, English version
- AXMEDIS For Cultural Heritage Content Distribution flyer, Italian version
- AXMEDIS Technical note on AXMEDIS Content Model v1.9
- AXMEDIS Technical note on AXMEDIS Content Processing v2.9
- AXMEDIS Technical note on AXMEDIS P2P v1.8
- AXMEDIS Technical note on AXMEDIS DRM v1.8
- AXMEDIS Technical Note on eCommerce and DRM v1.5



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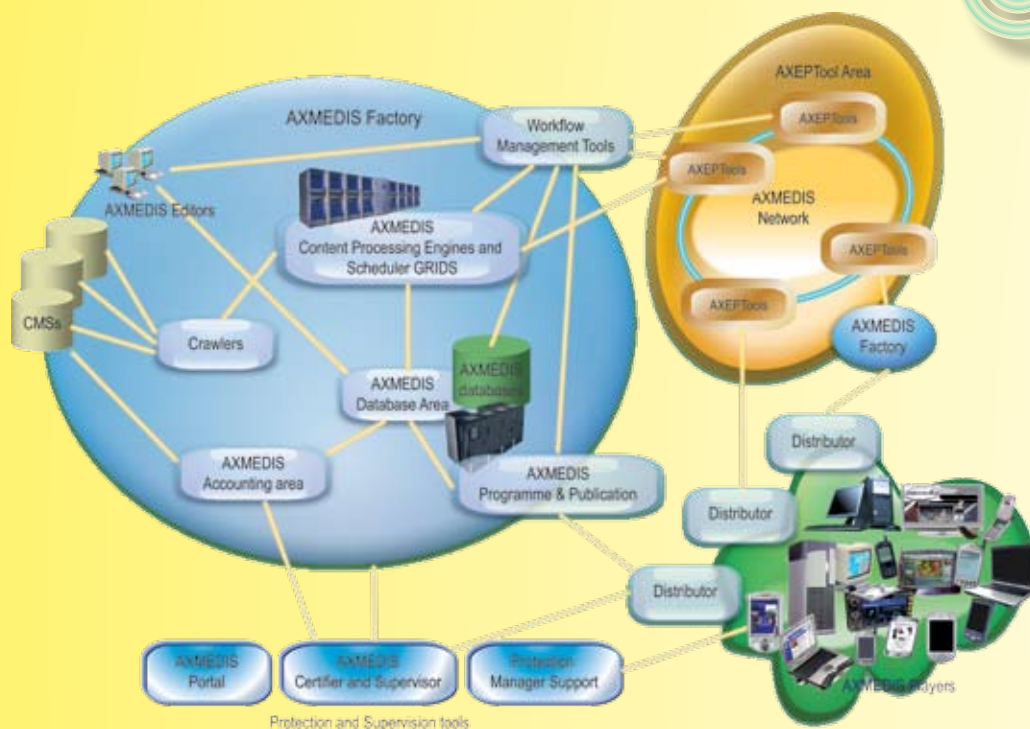
AXMEDIS Framework

The AXMEDIS Framework is an open solution which builds on technologies and tools to:

- reduce costs and increase efficiency for content repurposing, processing, management, production, protection, and distribution;
- offer effective automation for:
 - ✦ integrating Content Management Systems (CMSs) with distribution systems by automating the repurposing, communication and maintenance of content and information;
 - ✦ managing content gathering and ingestion processes from local / remote CMSs as well as file systems;
 - ✦ managing workflow processes at content-factory level and between content-factories with the support of OpenFlow and BizTalk;
 - ✦ processing and adaptation supporting parallel processing, GRID technology, and optimisation techniques;
 - ✦ allowing content production on demand, VOD and IPTV;
- allow the convergence of several media and interoperability of content to enable multi-channel distribution. In more details the framework supports content distribution:
 - ✦ on different channels such as satellite data broadcast, Internet, cellular/mobile network, wireless and traditional media support such as CDs and DVDs;
 - ✦ via different communication technologies, particularly with controlled Peer-to-Peer (P2P) for both B2B

(Business-to-Business) and B2C (Business-to-Consumer) levels;

- ✦ to different devices such as PC, PDA, interactive TV (i-TV), set-top box (STB), mobiles, etc.;
- ✦ with different transaction models on the same channel and for the same kind of content (pay per play, subscription, with a large set of conditions, etc.);
- ✦ using new methods and tools for flexible and interoperable Digital Rights Management (DRM) in order to facilitate a smooth transition from paper contracts to digital licenses;
- ✦ exploiting MPEG-21 REL (Rights Expression Language) with specific extensions and enhancements;
- ✦ supporting different business and transaction models and their integration;
- ✦ integrating different DRM models such as MPEG-21 REL and ODRL OMA (Open Mobile Alliance).
- support the whole value chain, including composition, repurposing, packaging, integration, aggregation, synchronisation, formatting, adaptation, transcoding, and indexing. Additional features include the integration of both protected and non-protected components within an object, definition of relationships with other resources, metadata integration and remapping/transcoding, protection, license production and verification;
- harmonise B2B and B2C areas for DRM, bringing DRM models into the B2B area, supporting production and protection models across the whole value chain;
- integrate B2B, DRM and content production and distribution with P2P at both business and consumer levels.



AXMEDIS Architecture

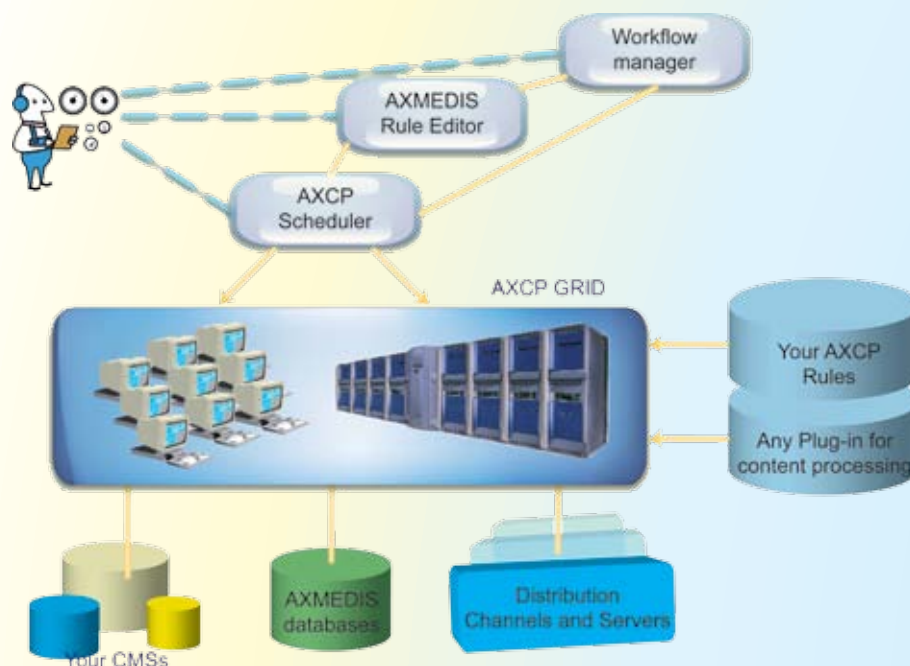
AXMEDIS Content Model

AXMEDIS content model is designed to support all types of cross-media content; from simple media files such as video, audio, images to complex groups such as SMIL and HTML presentations with images, video, documents, text, games, etc. It can be used for a large set of applications, from leisure, education, entertainment, infotainment to the management of protected content for government, healthcare, business, etc. The AXMEDIS model allows enforcing a high level of interactivity into your content by integrating SMIL and HTML technologies with scripting capabilities. AXMEDIS content and players may work with the full set of content formats and with the full set of content processing capabilities.

AXMEDIS is an open format capable of integrating any kind of metadata from the native Dublin Core to other custom metadata for identification, classification, categorisation, indexing, description, annotations, and protection aspects. The AXMEDIS format allows the combination of content components and their secure distribution in respect of intellectual property rights, supporting a large variety of DRM rules and models according to concepts of interoperability among DRM models (mainly, but not only, based on MPEG-21 and OMA, with both binary and XML formats). AXMEDIS is open to all DRM models and solutions.

applications in the factory and among geographically distributed factories, etc. The AXMEDIS Factory is scalable and can satisfy the needs of small and large content producers, integrators, and distributors. The factory is fully supported by tools for automating the production process as well as performing manual editing;

- AXMEDIS P2P and distribution tools, AXP2P: for automating the content publication and acquisition in the business area allowing the interconnection of AXMEDIS Factories by means of the secure and legal P2P tools, AXEPTool, based on BitTorrent technology and AXMEDIS. The tools in this area also allow scheduling of content distribution and publication towards multiple channels and P2P;
- AXMEDIS Players for several different platforms (PC, PDA, mobiles, Mozilla Plug in to insert into WEB pages, Active X to insert in IE web pages and other tools, STB, PVR, HDR, for IPTV, DVB-T, DVB-S). They can be customised in terms of GUI and look and feel for distributing and sharing AXMEDIS and non AXMEDIS content among final users with the support of DRM and P2P tool; Players include the capabilities of playing more than 200 formats of video, audio, images, documents and SMIL, HTML, FLASH, MPEG-4. They can also include scripting capabilities;



Key Components

- AXMEDIS Content Production tools, AXCP: for automatically producing and repurposing any content and cross media content. Exploiting legacy CMSs, programming and scheduling the production processes in extended AXMEDIS JS language, processing metadata, composing and formatting content, producing licenses to harmonise the production with workflow

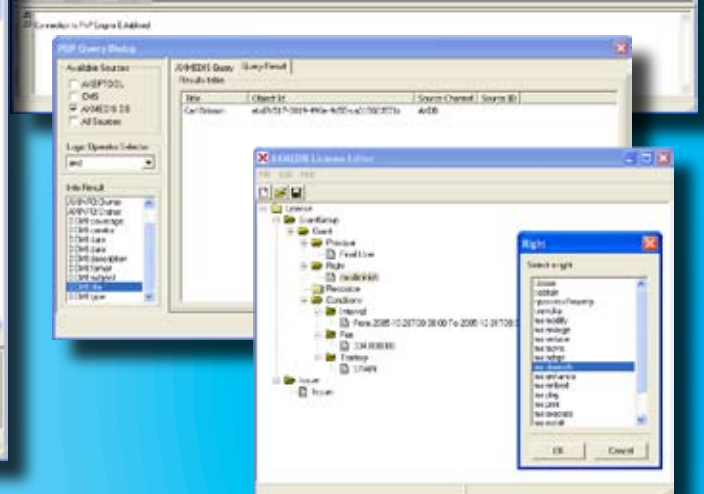
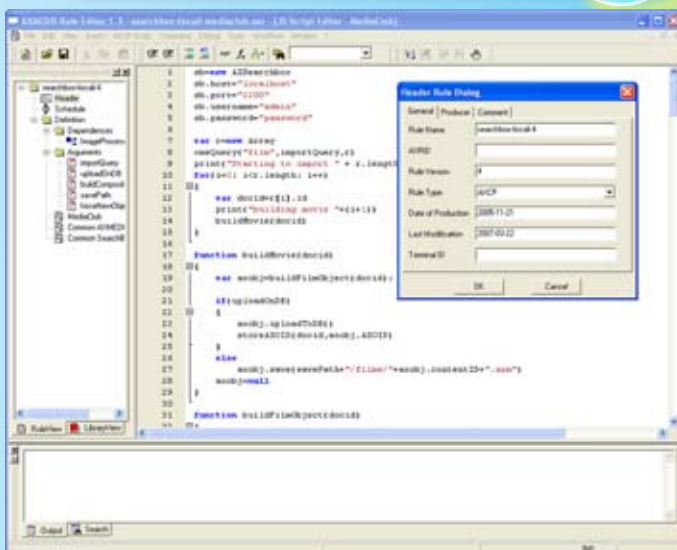
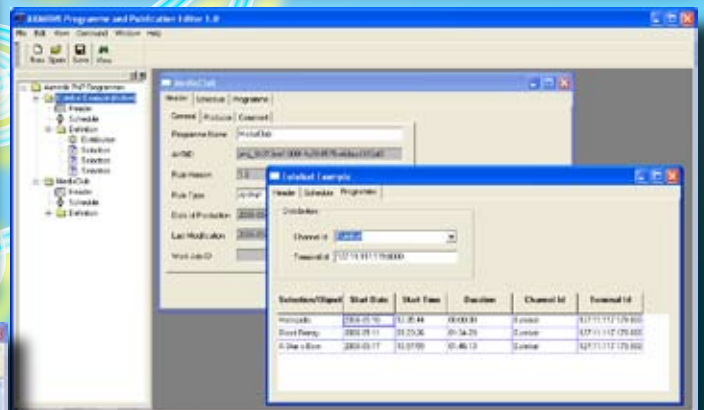
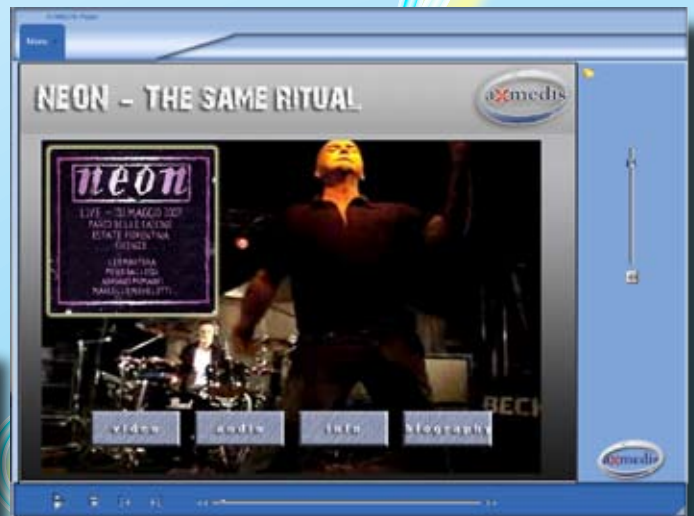
- AXMEDIS DRM tools: to enforce DRM on content distribution. It has supports for user and tools registration, certification, authentication and supervising, attack detection, monitoring all the activities performed on the AXMEDIS content on AXMEDIS players and tools, processing licenses, managing black lists, and collecting and reporting the information about content usage and rights exploitation, etc., for business purposes and/or for statistical reasons.

Content Processing

AXMEDIS framework and the AXMEDIS Content Processing (AXCP) based on GRID technology offer automated features and functionalities, supporting convenient scripting interface and integrated development tools to automate integrated activities of:

- Content Ingestion and Gathering;
- Content Storage and Retrieval;
- Content Processing, repurposing, adaptation, transcoding for text, docs, images, audio, video, multimedia, XML, SMIL, HTML, styles, MXF, NewsML, MPEG-4, etc.;

- Metadata repurposing, adaptation, transcoding;
- Content composition, formatting, layout, styling;
- Communication with databases, P2P and distribution servers via several protocols;
- Content packaging: MPEG-21, MXF, OMA, newsML, ATOM, ZIP, etc.;
- Content Protection via several algorithms;
- Content DRM with MPEG-21 and OMA, with tracking and reporting rights exploitation;
- Content Licensing;
- Content Publication and Distribution toward multiple channels;
- Workflow management integration with BizTalk and OpenFlow.



Access to the AXMEDIS Framework

The AXMEDIS Framework consists of a set of tools, libraries, manuals, specification, test cases, server tools, reports, technical notes and promotional material. All of these, along with their source code, are accessible to Affiliated Partners.

You can use it to setup and build simple as well as complete applications and services in the area of content repurposing, production, protection and distribution. With the flexibility of AXMEDIS dynamic plug-in technology, you can customise your applications and processes according to your needs. The same plug in can be used on authoring, production tools and players.

AXMEDIS Framework is open:

- AXMEDIS focuses on interoperability and openness of content model and interoperability of DRM models, including multi-channel distribution;
- AXMEDIS specification is public and accessible from AXMEDIS portal. Its use is royalty free;
- source code of the AXMEDIS Framework is accessible via the AXMEDIS Affiliation programme. The affiliation fee is affordable for all. Alternatively affiliation can also be offered in return for contributions to improve and/or extend the AXMEDIS Framework;
- AXMEDIS plug-in technology is public. The specification and the source code for creating new plug-ins are public and accessible without the need to be affiliated. Any tool can be integrated into the AXMEDIS Content Processing GRID with this technology;
- AXMEDIS partners are open to your needs that may be useful to improve the capabilities of the AXMEDIS framework.

To take advantage of the AXMEDIS framework and technologies, you are invited to apply for the AXMEDIS Affiliation. Affiliation is free of charge for non profit institutions.

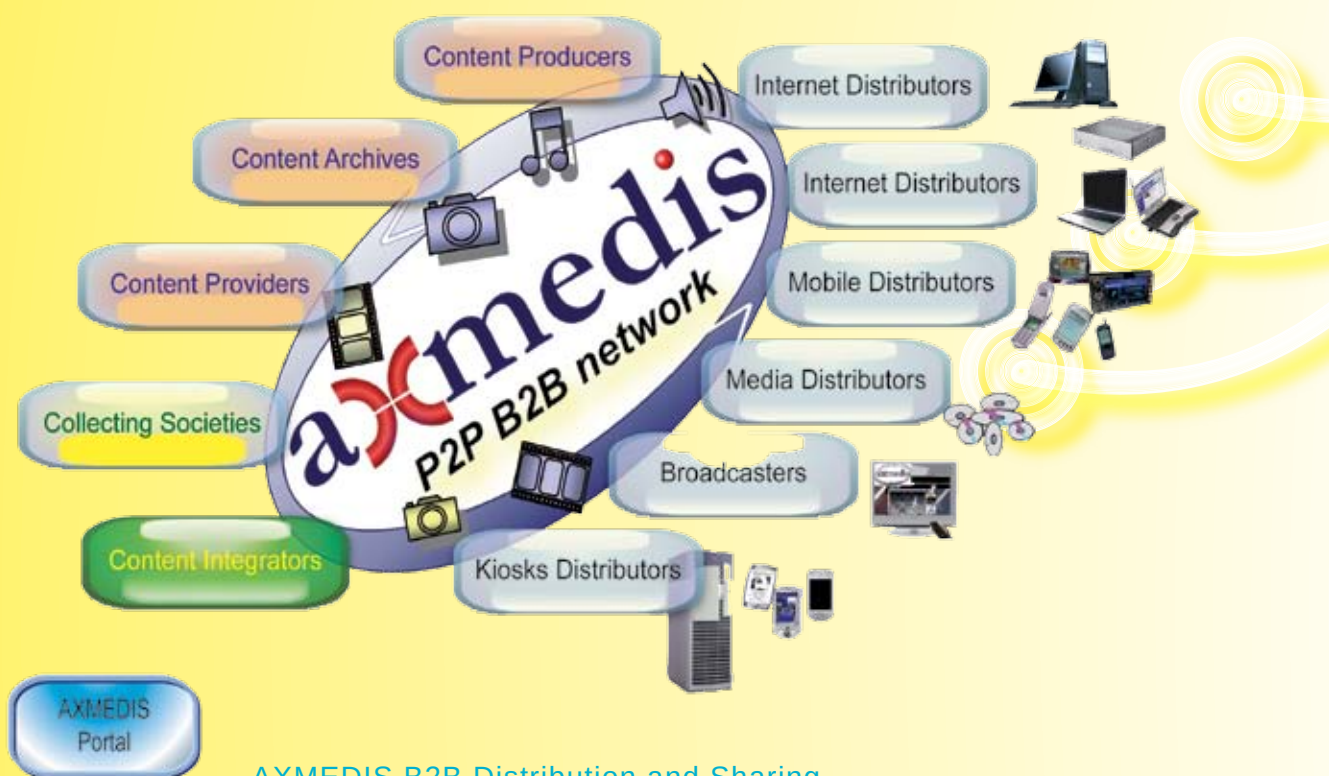
AXMEDIS Affiliation

With the AXMEDIS Affiliation, industrial participants can:

- access the AXMEDIS Framework which can be used to set up and enhance production, protection and distribution facilities/platforms in a simple and cheap manner;
- adopt standard models (e.g. MPEG-21) for content and licenses modelling and hence adding DRM in your content business;
- establish contacts with other business partners interested in exploiting similar technology;
- obtain greater control on the content usage;
- create customised AXMEDIS players for PC, PDA, mobiles and STB;
- exploit and trial innovative business models that can be enforced on a distribution channel with management of rights and obtain reports on exploited rights of the multimedia content distributed.

With the AXMEDIS Affiliation, research institutions can:

- access the AXMEDIS Framework to build different solutions and applications to cover the needs of the value chain actors and tested with low effort;
- improve visibility, promote and produce algorithms and tools that can be used for content processing and modelling, and can be integrated into the framework;
- add new content models and new DRM models, make them interoperable with MPEG-21 and others already in place on the AXMEDIS Framework;
- test algorithms and tools with respect to the state of the art solutions, with ease;
- collaborate with other relevant research institutions and companies within the sector.



AXMEDIS B2B Distribution and Sharing

For latest information, developments, events and announcements, please visit the AXMEDIS web portal at <http://www.axmedis.org>.

If you have any queries or comments, please email axmedisinfo@axmedis.org.

AXMEDIS Partners include:

- Accademia Nazionale di Santa Cecilia Fondazione, Italy
- Advance Concepts for Interactive Technology GmbH, Germany
- AFI, Associazione dei Fonografici Italiani, Italy
- AI2, Italy
- Albeniz Foundation, Spain
- APT, Associazione Produttori Televisivi, Italy
- BBC, British Broadcasting Corporation, UK
- AIV, DigiChannel.net, Italy
- DSI, Department of Systems and Informatics, University of Florence, Italy
- Dipartimento di Italianistica, University of Florence, Italy
- EPFL, Ecole Polytechnique Federale de Lousanne, Switzerland
- ETRI, Electronics and Telecommunications Research Institute, Korea
- Elion Enterprises Ltd., Estonia
- EUTELSAT S.A., France
- EXITECH S.r.l., Italy
- Focuseek, Italy
- FHGIGD, Fraunhofer Institute for Computer Graphics, Germany
- GIUNTI Interactive Labs S.r.l., Italy
- Grupo Gesfor, Spain
- HP, Hewlett Packard Italy S.r.l., Italy
- Hexaglobe, France
- Kaunas University of Technology, Lithuania
- Maat-G, Italy
- MBI S.r.l., Italy
- Peking University, China
- Pentex, Italy
- Rigel Engeneering, Italy
- SEJER, Bordas and Nathan, France
- SDAE, Sociedad Digital de Autores y Editores, Spain
- SIAE, Società Italiana degli Autori ed Editori, Italy
- Strategica S.r.l., Italy
- Telecom Italia, Italy
- Telsey, Italy
- TEO LT, Lithuania
- TISCALI Italia SpA, Italy
- UPC, Universitat Politècnica de Catalunya, Spain
- University of Leeds Interdisciplinary Centre for Scientific Research in Music, UK
- University of Reading Informatics Research Centre, UK
- VRS Grupė, Lithuania
- XIM Ltd., UK

For the full list, please see the AXMEDIS portal.

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Image courtesy of NASA and the Visible Earth, <http://visibleearth.nasa.gov>
Thanks to EUTELSAT for the images



Automating Production of Cross Media
Content for Multi-channel Distribution

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Automated Content Tools to Manage Your Processes as You Like

AXMEDIS the perfect solution for new content models, protection solutions and processing for multi-channel management.

Stop working to converging technologies and let technology working for you.

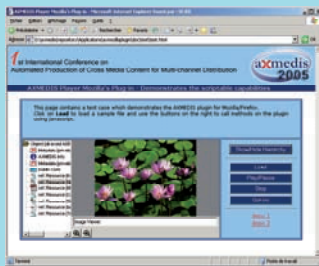
AXMEDIS provides manual and automated tools to make easy the migration towards multi-channel of your production and distribution processes.

AXMEDIS EDITOR, a tool for the

- authoring of multiple Object Identification codes: ISRC, ISAN, your personal codes, etc.
- authoring of multiple Metadata
- creation of simple and/or complex AXMEDIS objects, MPEG-21 content
- creation of nested AXMEDIS objects
- creation of objects with links/URI to other objects and/or resources
- definition of SMIL based presentation layers
- acceptance of any kind of resources and/or collections including HTML, SMIL, etc.
- application of content processing (any AXMEDIS Content Processing plug in)
- application of content protection (any AXMEDIS Protection Tool plug in)
- registration and certification of content for DRM
- protection of content for DRM
- search and query on database
- save, post on database, etc.

AXMEDIS EDITOR Tools:

- Hierarchy editor
- Metadata editor and Mapper
- Visual and behavioral editor
- Workflow editor
- Protection editor
- Java Script editor
- License editor (MPEG-21 REL)



AXMEDIS object model

- structure and packing models and formats
- metadata capabilities
- presentation and interaction model
- DRM support
- protection and security supports
- dynamic behavior support

Supported by several tools for

- manual production and protection
- automated production, protection and distribution
- workflow management
- DRM for B2B, B2C, and B2B2C
- Multi-channel distribution and convergence

Structural and Packaging Capabilities:

- Any file in any format/type can be packaged
- images, video, audio, documents, animations, etc.
- from executables to games and DLL
- any presentation model and file, single and multiple
- nested AXMEDIS objects
- MPEG-21 format and ISO MEDIA Binary File format
- default AXMEDIS model: MPEG MAF CMIP (prop)
- nested Objects: nested levels of metadata are reported on the top in an AXMEDIS index
- simple and nested protection models are supported
- support for MXF, SCORM, OMA, etc.

Metadata Capabilities:

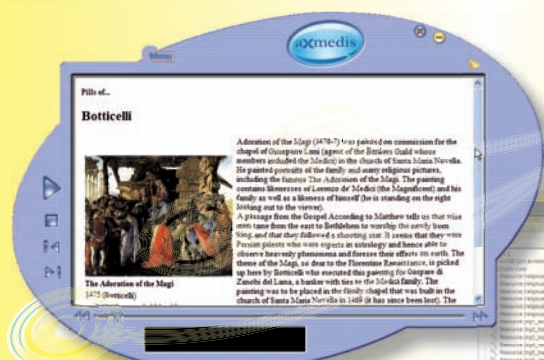
- any identification model, default AXOID
- any classification model, default AXInfo with Dublin Core, B2B metadata, etc..
- any descriptor, default fingerprints, plus MPEG-7
- any file can be included into the package as additional metadata or info, from RDF to ontologies, free text, XML

Presentation and interaction Capabilities:

Any presentation model/format can be included into the AXMEDIS package.

- Presentation models of AXMEDIS players
- any combination of cross media content based on HTML, SMIL, MPEG-4 plus single multimedia.
 - SMIL for PC, Mobile and PDA
 - MPEG-4 for PC, STB(Linux) and PDA
 - HTML for PC and PDA
 - SCORM for PC
- any presentation/interaction paradigms depending on the presentation format used, such as:

- Menus and collections
- Hypermedia (internal and external links)
- Cross media and Multimedia
- animations
- dynamic scripts
- dynamic advertising integration
- gaming, etc.



DRM support and tools:

- MPEG-21 DRM model plus OMA interoperability
- MPEG-21 REL as licensing
 - AXMEDIS profile and OMA interoperability
 - AXMEDIS License Server (AXPMS)
- MPEG-21 Event Reporting
 - AXMEDIS Action Log extensions and servers
 - Statistics and reporting with CAMART and All tools of AXMEDIS

Protection and security services and tools:

- AXMEDIS Protection Processor (AXPP)
 - extending and supporting MPEG-21 IPMP
 - dynamic replaceable protection tools as AXMEDIS Protection Tools plug ins
 - fully customizable protection tools
- AXMEDIS protection servers:
 - AXMEDIS Certifier and Supervisor (AXCS)
 - AXMEDIS Registration Service (AXRS)
 - AXMEDIS Certification Authority (AXCA)

Dynamic Behavior Capabilities:

- Java script integrated at model level
 - MPEG-21 DIP, DIM, DIBO
 - AXMEDIS extensions
- Narrative capabilities of SMIL, HTML,... plus JavaScripting



AXMEDIS players

For different devices and Operating Systems:

- PC windows
- STB/PVR and Media Centers
- PDA windows Mobile 5
- PC Apple MAC
- Pure java for mobiles
- PC windows, based on Active X, for usage into HTML and simple VB and .NET applications
- PC windows, based Mozilla plug in
- PC windows, based on .NET

Players Capabilities:

- fully customizable with plug ins and GUI
- DRM support (MPEG-21)
- downloading and streaming
- dynamic behavior with scripting
- metadata viewer
- presentation and interaction layers: SMIL, HTML, SCORM, MPEG-4, etc.
- annotation support

P2P and Final User Tools

- AXMEDIA P2P client tool
 - P2P community for content sharing
 - integrated with the players
 - version for Mobile is coming
- Content Posting Tool, COPOP
 - to involve final users in content production
 - automated packaging, protection and publication of AXMEDIS content of final users.



AXMEDIS Content Processing GRID

To automate any business solution with and without DRM such as:

- advertising (including customized and/or real time personalized advertising inside the package or linked from outside)
- personalization (including personal content inside the package or linked)
- DRM with transaction model depending on the MPEG-21 REL
- content production on the final user side
- B2B content distribution
- B2C content distribution
- B2B2C content distribution and sharing
- P2P controlled content sharing
- Super-distribution and its control
- video on Demand, VOD
- production on demand
- Multi-channel experience and distribution
- Multi-business integration: several business and transaction models on the same distribution channel with a unique AXMEDIS-based production platform/factory (AXCP)
- etc.

AXCP GRID as technical backoffice tool for

- content packaging: MPEG-21, OMA, MXF, SCORM, etc.
- content digital signature application
- content management system
- content processing and house keeping
- content transcoding, adaptation platform
- content fingerprinting
- content and metadata enrichment
- access to legacy CMS and Metadata
- license transcoding (MPEG-21, OMA)
- licensing platform, production of licenses on demand
- profiles management and processing
- metadata follower and integrator
- crawling resources and metadata
- valorization of legacy content and CMSs
- integration with OpenFlow and/or BizTalk workflow Management Systems
- recognition and channel monitoring
- etc.

See specific flyer and technical references for the AXCP.



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AXMEDIS FOR CULTURAL HERITAGE CONTENT DISTRIBUTION

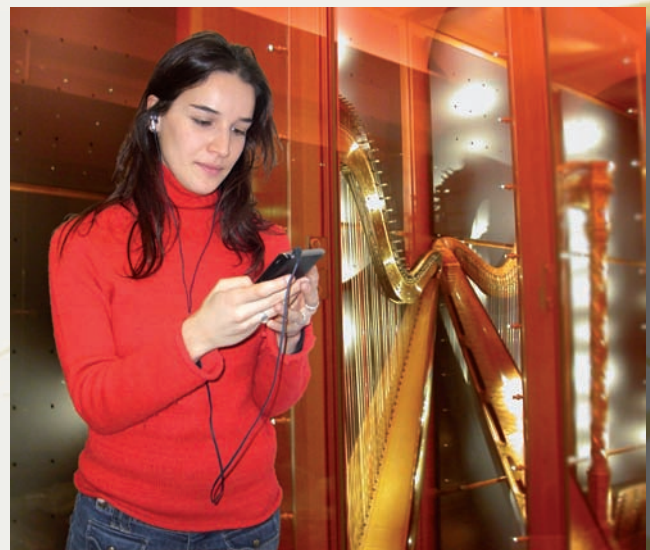


ACCADEMIA NAZIONALE
DI SANTA CECILIA
Fondazione

The **Accademia Nazionale di Santa Cecilia** has always been interested in the opportunities offered by new technologies for the valorisation of musical and cultural heritage. In this direction the Accademia has been sharing competences and experiences, and its enormous cultural heritage, by contributing to an international project such as AXMEDIS, that joins universities, research centres, and leader enterprises in working in the IT field.

With the opening of the Musical Instruments Museum, the MUSA, the Accademia Nazionale di Santa Cecilia is now able to offer users a highly innovative and immersive experience based on the sound of instruments and possible thanks to AXMEDIS technologies for the creation and presentation of interactive content for visiting the museum.

Thanks to the use of the AXMEDIS technology MUSA visitors will be able to expand their experience with an AXMEDIS enabled PDA, that enhances the visit with multimedia content such as, for example, the possibility of hearing the real instrument sounds and viewing images of them: the application accompanies visitors throughout the whole exhibition gallery.



The PDAs available for museum visitors are capable to play AXMEDIS objects. These can include a wide set of multimedia content: from simple files to complex collections, possible presented in an highly interactive manner. AXMEDIS Objects are suitable for a wide set of applications for the valorisation of cultural heritage or educational purposes: as support for museum visits, guides, or simply for entertainment (or "edutainment"). They can be loaned to the visitors who can also upload to their PDA and also on java-enabled mobiles.

The AXMEDIS solution enables content owners to create, distribute and play contents on different platforms: internet, satellite, digital terrestrial, IPTV, STB, PDA, P2P, mobile phones; both in protected and non-protected manners, optionally with some DRM. From a cultural institution's point of view AXMEDIS allows to automate the content production process and potentially the whole process for on-line publication on multiple channels and devices.

AXMEDIS applications

The AXMEDIS Content Model has been designed to simplify and reduce production and distribution costs for interactive multimedia. AXMEDIS Objects can include simple files or interactive collections, for a large set of applications, and are suitable for the most different context and workloads: from a small single-user home scenario, to bigger “business” ones with massive workloads. See the “AXMEDIS production tools and players” page for additional information on AXMEDIS model and tools.



AXMEDIS Model supports, among the many suitable solutions:

- Cross-media content for cultural heritage and cultural contents valorisation;
- Content for DVB-T, DVB-S, VOD, IPTV, webTV, mobile devices, PDA, with interactive parts;
- Content for pc, kiosks, STB, media centers, home servers;
- Content formats interchange for audio-visual sharing;
- Recreational and entertainment content as music, cultural content, video, games, and so on;
- Educational and “edutainment” content as courses, lessons, interactive guides;
- newsML packages for change, protection, and news distribution;
- content with intelligent advertising (even customized in real-time, included into the same package or coming from external links);
- business on content, secure distribution, secure distribution of contracts and sensible data;
- personalized contents into the package, or with external links;
- content created and customised by final users;
- multi-channel distribution of identical or different content, adapted for different channels, for a multi-channel experience, interoperable access.

Technical information about AXMEDIS on:
<http://www.axmedis.org>

The AXMEDIS solution is actually supported by around 40 partner as: Accademia Nazionale di Santa Cecilia, Università degli Studi di Firenze, Telecom Italia, BBC, TISCALI, GIUNTI LABS, EUTELSAT, SIAE, HP and many others.

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TECNOLOGIA AL SERVIZIO DELLA CULTURA AL MUSEO STRUMENTALE DELL'ACCADEMIA NAZIONALE DI SANTA CECILIA

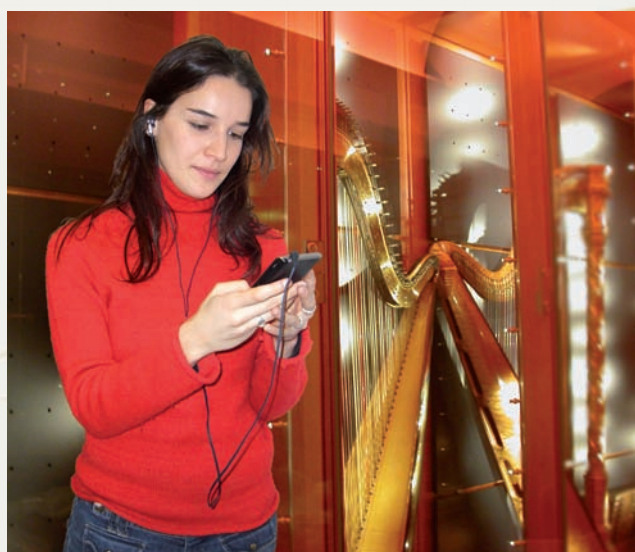


ACCADEMIA NAZIONALE
DI SANTA CECILIA
Fondazione

L'attenzione alle nuove tecnologie come strumento di valorizzazione delle proprie attività e del patrimonio musicale e culturale ha da sempre spinto l'Accademia Nazionale di Santa Cecilia a un significativo interesse per le possibilità offerte in questo campo, accogliendo con entusiasmo l'opportunità di mettere a disposizione le proprie competenze, esperienze e l'enorme bagaglio culturale e musicale, lavorando in un contesto internazionale formato da università, centri di ricerca e aziende leader nel settore.

Con l'apertura del Museo degli Strumenti Musicali, l'Accademia Nazionale di Santa Cecilia è ora in grado di arricchire l'offerta per i propri utenti con un'esperienza altamente innovativa e coinvolgente utilizzando le tecnologie per la creazione e presentazione dei contenuti multimediali allo stato dell'arte offerte dalla piattaforma AXMEDIS.

Grazie all'uso di queste tecnologie gli utenti saranno in grado di visitare il Museo degli Strumenti Musicali con l'aiuto di un "PDA", un computer palmare che permetterà loro di seguire un percorso multimediale parallelo a quello espositivo, di approfondire la conoscenza degli strumenti in mostra e soprattutto di ascoltarne il suono.



Il palmare messo a disposizione degli utenti del Museo è in grado di riprodurre file AXMEDIS (chiamati "oggetti"). Questi possono contenere un'ampia gamma di contenuti multimediali: da semplici file fino a intere collezioni interattive e complesse adatte a una larga gamma di applicazioni per la valorizzazione dei beni culturali, in campo educativo, a supporto di visite museali, come guide, o anche semplicemente per l'intrattenimento (o "edutainment"), grazie all'integrazione di audio, video, immagini, documenti di testo, eventualmente presentati in maniera altamente interattiva.

La soluzione AXMEDIS permette di creare, distribuire e riprodurre tali contenuti su diverse piattaforme: internet, satellite, digitale terrestre, IPTV, "video on demand", P2P, telefonia mobile, chioschi elettronici, e altri. Dal punto di vista delle istituzioni culturali AXMEDIS permette di automatizzare determinati processi della creazione dei contenuti e quindi, potenzialmente, dell'intero procedimento di digitalizzazione e divulgazione dei contenuti on-line.

Applicazioni di AXMEDIS

Il modello di contenuti AXMEDIS è stato progettato per semplificare e ridurre i costi di produzione e distribuzione dei contenuti interattivi multimediali con e senza l'uso di soluzioni per la protezione. Gli oggetti AXMEDIS possono contenere semplici file ma anche collezioni complete e interattive adatte a una larga gamma di applicazioni: dalle soluzioni business a quelle del singolo utente "home" fino alla distribuzione su scala globale.



Il modello AXMEDIS supporta ad esempio:

- contenuti cross-mediali per la valorizzazione del patrimonio e dei contenuti culturali;
- contenuti per digitale terrestre, satellitare, VOD, IPTV, webTV, sistemi *mobile*, PDA, con parti interattive;
- contenuti per PC, chioschi, decoder, media center, home server e sistemi *mobile* con parti interattive;
- interscambio di formati di contenuti per una condivisione audio/visuale;
- contenuti ludici e d'intrattenimento quali musica, contenuti culturali, video, TV, giochi, e così via;
- contenuti educativi e di tipo "edutainment" inclusi corsi, lezioni, guide interattive;
- pacchetti newsML per lo scambio, la protezione e la distribuzione di notizie;
- contenuti con pubblicità intelligente (personalizzata anche in real-time, contenuta all'interno dello stesso pacchetto o proveniente da link esterni);
- business sui contenuti, distribuzione sicura di contratti e di dati sensibili;
- contenuti personalizzati all'interno del pacchetto o con link all'esterno;
- contenuti creati o personalizzati dagli utenti finali;
- distribuzione multicanale di contenuti identici o differenti, adattati per canali diversi, per una esperienza multicanale o per un accesso interoperabile

Ulteriori informazioni tecniche sulla piattaforma AXMEDIS sono disponibili sul sito <http://www.axmedis.org>.

La soluzione AXMEDIS è attualmente supportata da circa 40 partner quali: Accademia Nazionale di Santa Cecilia, Università degli Studi di Firenze, Telecom Italia, BBC, TISCALI, GIUNTI LABS, EUTELSAT, SIAE, HP e molti altri.

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Technical Note
n.5102
February 2008

Model, format, tools and players for:

Multi-channel production and distribution:
broadcasting, IP/Internet, WEB sites, P2P, mobile, PDA, IPTV, interactive TV and channels, etc.

Multi-channel experience for your customers

Exploit Video on Demand (VOD), and production on demand solutions

Control of P2P content sharing and distribution, involving your customers in distribution (super-distribution)

Involve your customers and final users in content production and social networking

Integrate interoperable DRM into your business (MPEG-21, OMA, etc.)

Exploit different business models and/or transactions on the same distribution channels: pay per play, monthly rate, preview, renting, advertising, etc.

Exploit interactivity with cross media models

Adopt advertising (customized and/or real time personalized advertising)

Provide content with unprotected preview and the rest protected

AXMEDIS Model and Format main features and rationales

The market of digital content is rapidly changing. Users are becoming more interested in using interactive multimedia and cross media content. For example, content which can:

- o include several kinds of media inside (audio, video, games, documents, etc.), reproducing in a single digital object the interactivity and the entertainment capabilities that you can see now on DVDs and much more;
- o provide enhanced interactivity such as navigating and selecting content elements to be played, making queries into the content elements, reacting to user commands and changes, etc.;
- o be exchanged and distributed among different devices/tools: PC, mobiles, smart-phones, STB/PVR, HDR, PDA, game station, etc.;
- o be obtained from several different interoperable distribution channels based on Internet, P2P, wireless mobile, satellite and/or terrestrial networks, etc.;
- o change content behavior according to the context and/or to the personal information of the user, the profiles;
- o be acquired by using preferred business models: renting, pay per play, subscription, advertising, etc.;
- o be stored in media centers to be redistributed to other devices;
- o be personally produced at home and/or shared in the network.

These new forms of content and content usages can be fully exploited for digital content distribution, and are opening paths for a larger set of new applications and markets beyond the limitations of the physical media. With AXMEDIS the combinations of digital content formats and digital distribution channels are creating new applications including: user content, shared content, IPTV, DVB, VOD, POD, WEBTV, etc., for PC, PDA, mobiles and STB/PVR. Recent distribution models have been enabled by a set of new technologies grounded on content formats, content processing and adaptation capabilities, content protection models and solutions, hardware capabilities, and new solutions for Digital Rights Management, DRM.

AXMEDIS Content Model Applications

AXMEDIS content model is designed to support all types of cross-media interactive contents with DRM support or without, from simple multimedia files to complex collections for a large range of applications, from business to business to personal and/or global scale **production, protection and distribution** of:

- o cross media content for cultural heritage valorization;
- o content for DVB, VOD, POD, IPTV, WEBTV, etc., with interactive parts;
- o content for PC, PDA, P2P, Kiosks and mobiles with interactive parts;
- o intelligent content having the possibility of defining the internal business model and actions on the content itself, dynamic modeling of content behavior;
- o interchange content format as wrapped MXF for safer audio/visual sharing;
- o leisure and entertainment content: video, TV, games, etc.;
- o educational and infotainment content: lessons, coursewares;
- o governmental and/or military information and content;
- o healthcare content such as clinical information;
- o news as packages, newsML, for exchange, protection and delivering;
- o content with advertising (customized and/or real time personalized advertising inside the package or linked to outside);
- o business content such as contracts and data;
- o personalized content inside the package or linked to outside;
- o personally produced content from final users and customers;
- o multichannel experience and distribution: different content on different channels at the same time for multichannel experience of the user.

The above mentioned innovations and many others can be accessible thanks to AXMEDIS solutions for cross media content modeling, DRM, controlled P2P, and content processing, with the support of automated

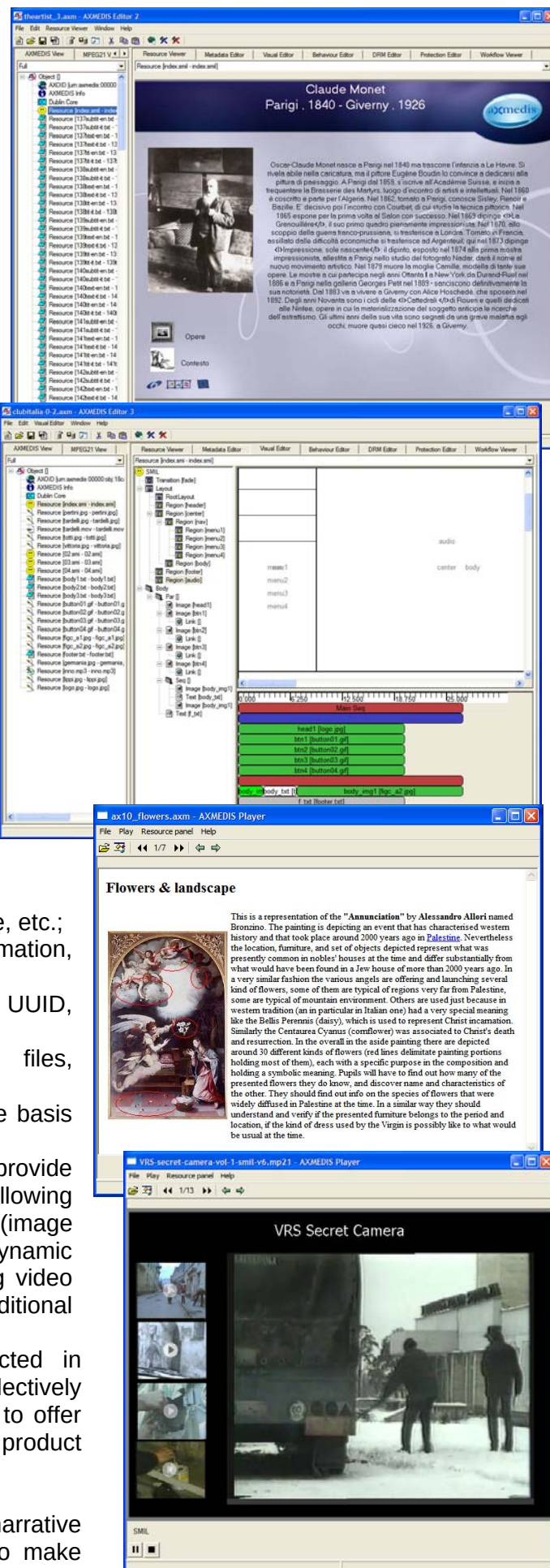
production and DRM tools and players as described in the following and in other AXMEDIS Technical Notes
<http://www.axmedis.org/documenti/documenti.php>

AXMEDIS Content Model and Package

AXMEDIS content may range from simple files with single resources such as video, audio, images, documents, animations, games, etc., to cross media and multimedia content including: HTML, SMIL, MPEG-4, FLASH, etc., as presentation layer. Combinations of the above mentioned content formats can be used, protected and managed in terms of detailed rights. AXMEDIS content model extends the MPEG-21 standard and allows creating different solutions for any distribution channels.

The AXMEDIS content model enables to distribute, for download or streaming (RTSP and/or MPEG-2 TS), AXMEDIS content packages (also called AXMEDIS Objects) containing:

- o simple files:
 - o audio, video, images, documents, animations, games, etc.;
 - o any combinations of cross media with presentation formalized in HTML, SMIL, MPEG-4, XML, FLASH, MXF, etc.;
 - o hypermedia with internal and external links;
 - o menus, collections, lists, interactive elements on animations, etc.
- o reference to external files and/or other AXMEDIS objects as URIs and links;
- o content with a large variety of information associated to single resources and/or content collections.
 - o any metadata, classification information, Dublin Core, etc.;
 - o any descriptors such as fingerprint, technical information, MPEG-7, XML, etc.;
 - o any single and/or multiple identifications: AXOID, UUID, ISBN, ISMN, ISRC, ISAN, etc.
- o collections as lists or hierarchically organized files, collections/packages, AXMEDIS objects (nesting levels)
 - o on which users may navigate, make queries on the basis of metadata of single components or files;
 - o with HTML and/or SMIL as presentation layers to provide interactivity to users and presentation of other files allowing the setup of: menus, lists, text, list of icons (image previews), audio play and image presentation, dynamic advertising integration, chaining of videos, merging video and special content, packaging audio visual with additional content, etc.;
 - o with files and internal nested packages protected in different manners with different algorithms, or selectively non-protected. This allows to create previews and to offer non protected content elements to show users the product and stimulate them to acquire licenses;
 - o annotations to AXMEDIS/MPEG-21 content elements;
 - o AXmethods, to add dynamic JavaScript adding narrative capabilities, actions and semantics, and in general to make



more intelligent and interactive the content package behavior. This enables final users to perform activities of: (i) content enrichment (addition of comments and data to content), (ii) content transformations (for example the migration of the same object to another device with some adaptation), (iii) content queries inside the content collection, (iv) integration of recording with additional content coming from P2P, Web, etc. All these features are operated on the basis of user rights obtained from a purchased license.

AXMEDIS permits the combination of innovative content models with protection and DRM aspects to respect copyright laws. AXMEDIS supports a large variety of DRM models and rules according to concepts of interoperability among DRM models (e.g., MPEG-21 and OMA).

AXMEDIS model support both binary and XML file formats, as ".mp21" and ".axm" extensions, respectively.

AXMEDIS Editor, how to create AXMEDIS cross media content!

The AXMEDIS Editor can be used for the manual production, authoring, editing and/or inspection of AXMEDIS MPEG-21 cross media content/objects. It can be used for

- o creation of simple and/or complex (nested) AXMEDIS objects, MPEG-21 content, collections, etc.;
- o creation of objects with links/URI to other objects and/or resources;
- o authoring of multiple Metadata and IDs;
- o integration/inclusion of digital resources and presentation information and content into the AXMEDIS object package;
- o application of content processing and/or protection algorithms (via AXMEDIS plug in);
- o registration and certification of content for DRM;
- o protection of content for DRM;
- o search, query, load and save on databases, etc. The integration with the AXMEDIS database is performed via Web Services and the AXDB module;
- o integration with OpenFlow workflow to receive commands from the workflow management system, and integrate the tools in any production process.



The AXMEDIS Editor presents:

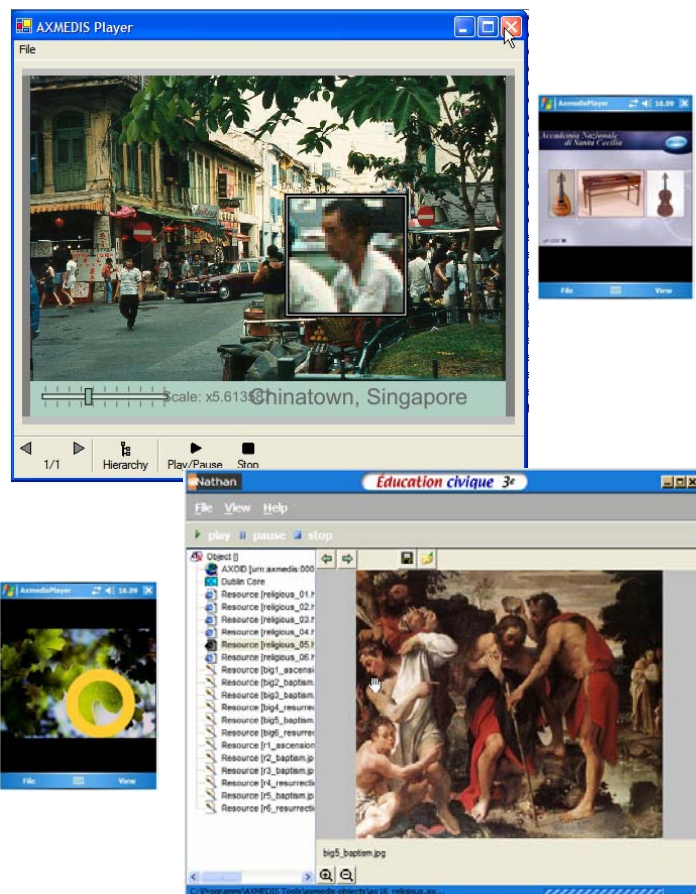
- o Hierarchy editor to navigate the object structure, to add resources with drag and drop: images, video, documents, audio, SMIL, HTML, MPEG-4, etc., to edit their details and parameters, etc.;
- o Metadata editor and Mapper, to manipulate metadata and create XSLT mappings for them;
- o Visual editor for defining SMIL presentation details and links. Any other SMIL or HTML Editor can be used and files can be dropped into the package. HTML files can be included with their own CSS, and JavaScript, etc.;
- o Behavioral editor to create Axmethods in JavaScript defining the content business intelligence and semantics, associated to actions and other events;
- o DRM editor (MPEG-21 REL) to create licenses;
- o Protection editor to protect the content;
- o Workflow editor to set up workflow parameters, etc.

The production of AXMEDIS content can be automated by using AXCP tools as described in the Technical Note:

http://www.axmedis.org/documenti/view_documenti.php?doc_id=3624

AXMEDIS Players

AXMEDIS players are capable of rendering AXMEDIS objects, and are available on different operating systems



and of different kinds:

- o PC Windows players, capable of executing SMIL, HTML, MPEG-4, video, audio, documents, images, etc., and JavaScript.
- o Available PC players are:
 - o AXMEDIS stand alone PC player;
 - o AXMEDIS Skin based PC player;
 - o AXMEDIS Active X, for usage into HTML pages and simple VB and/or .NET applications and PC players;
 - o AXMEDIS .Net player based on Active X;
 - o AXMEDIS Mozilla plugin;
 - o AXMEDIS SEJER player;
- o PDA Windows Mobile 5 and 6 player, supporting: SMIL, HTML, MPEG-4, video, audio, documents, images, etc.;
- o STB/PVR player based on (i) Linux, supporting audio visual, SMIL and HTML and on (ii) Kreatel STB;
- o Pure java player for mobiles, supporting: SMIL, images and audio visual;
- o PC Apple MAC player, supporting: SMIL, MPEG-4, video, audio, documents, images, etc.

All the AXMEDIS players have DRM capabilities. In order to access protected AXMEDIS objects, players have to be certified by a registered AXMEDIS user. AXMEDIS players are capable of reading AXMEDIS objects from files and streaming, navigating the resources, showing metadata, presenting the internal hierarchy, etc.



Customization of AXMEDIS Players

Most of the AXMEDIS players can be customized in terms of GUI and functionalities (examples of customizations are shown in this technical note figures, other can be downloaded from the portal). A module/library called AXOM (AXMEDIS Object Model) can be integrated into your tool or STB decoder to transform it into an AXMEDIS DRM enabled player/decoder. AXMEDIS Skin based player can be easily customized by your designer, adding your logos and style, and changing the graphical look and feel of the player. Customizations or further extensions can be also realized by you or by AXMEDIS according to your needs.

AXMEDIS Intelligent Content for advanced interactivity

AXMEDIS object model has also introduced a set of new capabilities and features that allow to provide at the final users content that interact in deeper manner with the user and may change the content's behavior and aspect on the basis on the user activities. For example, content that allows migrating its parts to another computer/device, content that may permit to make a query among its internal data, content that may stimulate the user to create other content, for example its collection of video and images, and so on. This kind of content may have potentially all features of the AXCP platform and much more interactivity with respect to any other content model: http://www.axmedis.org/documenti/view_documenti.php?doc_id=3624. AXMEDIS PC players have full support for the production of intelligent content and annotations.

AXMEDIS CMS and Automated Content Production Tools

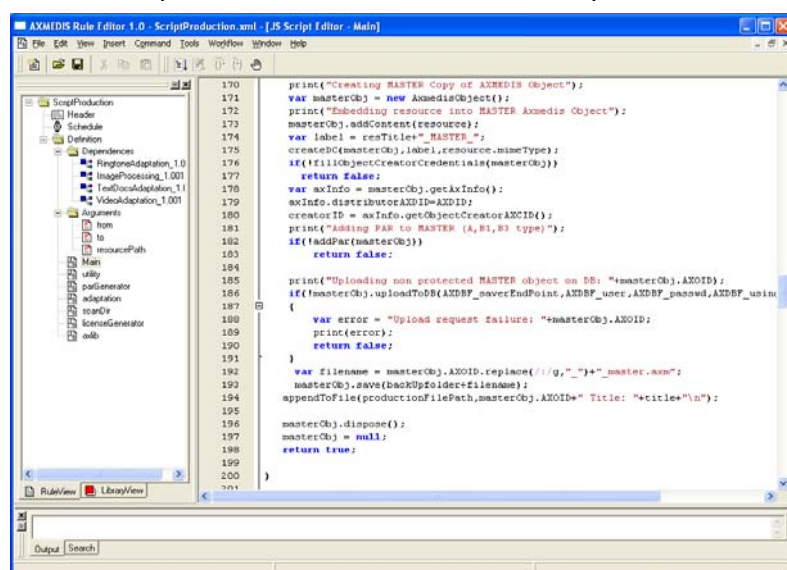
The AXMEDIS Automated Content Production tool, AXCP, and related AXMEDIS database, are an open, integrated, distributed, and scalable solution for Content Management; capable of automating content production, management and protection for multichannel distribution and many other purposes.

AXCP solution is based on GRID technology and allows automated management of: content, metadata and licensing information, etc., with the operations of ingestion, crawling, database management, indexing, processing, adaptation, transcoding, encoding, decoding, descriptor extractor, recognition, filtering, production, archiving, storing, packaging, preview, extracting fingerprint, licensing, DRM, profiling, protection,

AXMEDIS allows reducing costs and increasing efficiency of your content management. AXMEDIS supports the whole value chain and makes real and simple the convergence of media, the media transcoding, and the interoperability of content enabling multi-channel production and distribution (e.g., mobile, satellite, kiosk, iTV, web, P2P, interactivity, etc). AXMEDIS also provides a flexible and interoperable DRM, for both B2B and B2C across traditional and P2P distribution platforms.

- o content production for single as well as for multiple distribution channels and multiple DRM models in a fast manner and low costs;
- o content and/or license production on demand, VOD;
- o content filtering and repurposing in real time;
- o video, audio and text fingerprint, and fingerprint recognition in real time;
- o control of P2P networks, content sharing and distribution, in real time;
- o content processing, adaptation, transcoding, etc., in real time;
- o collecting content and metadata, metadata integration, processing and enrichment;
- o layout of content: SMIL and HTML automated production and optimization.

- o creating and customizing AXCP Rules to be executed;
- o executing AXCP Rules according to different policies such as: periodic, sporadic or on demand from third parties, external tools, web services, etc.;
- o customizing, realizing and installing additional AXMEDIS plug-ins to add new formats, encoders, decoders, adapters, converters, etc. The AXMEDIS Plug-in technology is open, well documented and supported by a development tool kit;
- o executing operating system processes, passing them parameters/files and getting eventual errors (if any).



AXMEDIS Multichannel DRM support

All the AXMEDIS players have DRM capabilities. AXMEDIS DRM solution can cover:

- o Internet distribution: client-server and P2P distribution;
- o broadcasting, satellite and terrestrial distribution;
- o production and video on demand distribution;
- o mobile and PDA distribution;
- o interactive TV and educational content distribution;
- o PC, STB/PVR, HDR, PDA, Mobiles, etc.;
- o physical media: CD, DVD, USB, etc.;
- o business to business (B2B) distribution;
- o self production, distribution and sharing;



o integrated business to business to consumers (B2B2C) distribution models.

o

Technical Information

AXMEDIS players are available for the above mentioned platforms. The AXMEDIS server tools are based on a Service Oriented Architecture (SOA). Fully documented APIs are available for all the JavaScript functionalities and Web Services for accessing and controlling tools and distributing produced content towards your front-end distribution servers. AXMEDIS servers are based in MS Windows XP and/or Linux. Specific customizations have to be negotiated on the basis of your needs. Training, integration and service level agreements are also available.

AXMEDIS Adoption and Affiliation Programs

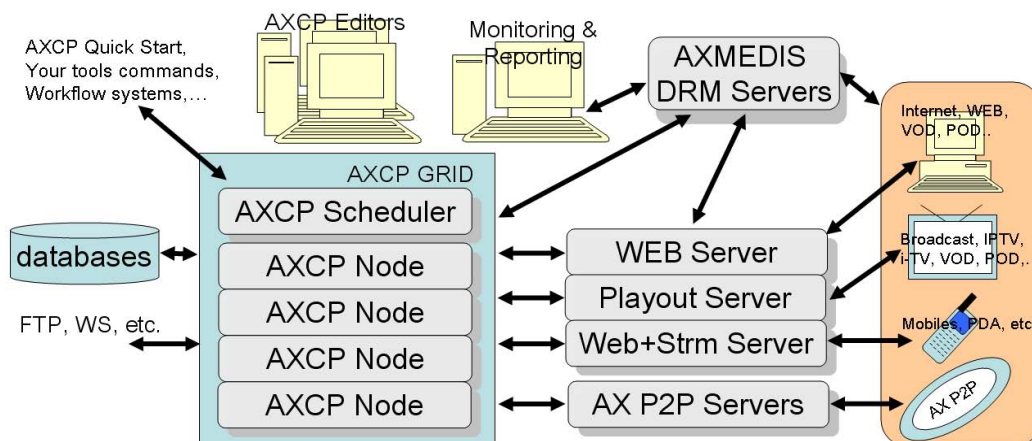
AXMEDIS has been adopted and currently trialed by several industrial partners, who have expressed their appreciation (see <http://www.axmedis.org/ibc2007/>). AXMEDIS is open and allows you to access source code of all libraries and tools, reports, technical support, training days, tutorial material, technical notes and documentation, by means of the affiliation program. AXMEDIS consists of over 38 partners (such as: TISCALI, BBC, EUTELSAT, Telecom Italia, TEO, ELION, HP, Giunti Labs, AFI, ACIT, EXITECH, XIM, SIAE, SDAE, etc.). AXMEDIS allows you to exploit innovative results with new tools and solutions for content market.

AXMEDIS Content Distribution and other Integrated Solutions

The AXMEDIS Object Model is a solution for modeling distributing content. It has also been designed to be used in conjunction with:

- **AXMEDIS AXCP** to automate your content production, protection and distribution as stated above and in more details into the technical note:
http://www.axmedis.org/documenti/view_documenti.php?doc_id=3624
- **AXMEDIS DRM** which adopts MPEG-21 DRM, including servers and licensing tools and allowing DRM, detection of attacks, black list management, collection of actions logs containing traces about the rights exploitation, tools for administrative management, etc.
http://www.axmedis.org/documenti/view_documenti.php?doc_id=3616
- **AXMEDIS P2P Controlled Network**, for content distribution via P2P. It utilizes BitTorrent Technology with query support and cataloguing servers, for protected or non protected content. It has capabilities of automating content publication, controlling P2P network, and extracting statistical data and reports. The AXMEDIS P2P solution allows to control the network by means of control nodes that can be geographically distributed: http://www.axmedis.org/documenti/view_documenti.php?doc_id=3612
- **AXMEDIS COPOP**, to involve your final users, to collect their content and metadata, to automatically transcoding, packing and redistributing user content for social networking and content enrichment.
http://www.axmedis.org/com/index.php?option=com_content&task=view&id=79&Itemid=50

The following example presents an AXCP solution for automating production, protection and distribution of content with DRM. This solution allows the reduction of costs for content post-production and management for DRMed distribution.





In this case, the DRM technology can be MPEG-21 or OMA which is used to distribute content according to several different business models (pay per play, monthly rate, etc.), different rights (play, print, etc.), with different conditions (times of play, duration, etc.).

The AXCP allows (i) producing content on demand on the basis of final user profiles (device, network, etc.); (ii) producing licenses on demand for pay per play and new subscriptions; and (iii) managing black lists of terminals and/or users.

AXMEDIS tools (AXMEDIS P2P, AXCP, AXMEDIS DRM, AXMEDIS COPOP, etc.) have been designed to satisfy a large set of requirements collected by AXMEDIS Consortium partners and user group AXMEDIS tools are based on modular components which can be reused to set up a large range of different configurations/solutions. They are open to be customized to cover your needs and business ideas. For any issue, please contact AXMEDIS reference person.

AXMEDIS Tools for your download

In the following, the links to download the most important AXMEDIS player are reported. It is also possible from the AXMEDIS portal to download additional AXMEDIS tools and content:

- o Available PC players are:
 - o AXMEDIS stand alone PC player;
http://www.axmedis.org/documenti/view_documenti.php?doc_id=3767
 - o AXMEDIS Skin based PC player;
http://www.axmedis.org/documenti/view_documenti.php?doc_id=3716
 - o AXMEDIS Active X, for usage into HTML pages and simple VB and/or .NET applications and PC players. .NET Player; http://www.axmedis.org/documenti/view_documenti.php?doc_id=3717
- o PDA Windows Mobile 5 and 6 player, supporting: SMIL, HTML, MPEG-4, video, audio, documents, images, etc.; http://www.axmedis.org/documenti/view_documenti.php?doc_id=3842
- o Many other tool from:
http://www.axmedis.org/com/index.php?option=com_content&task=view&id=83&Itemid=55

AXMEDIS Technical Notes

On the AXMEDIS portal you can find a set of other technical notes on:

- o How to integrate the AXMEDIS DRM into a e-Commerce portal for digital content
http://www.axmedis.org/documenti/view_documenti.php?doc_id=3736
- o The show case of TEO (Telecom Lithuania) in adopting AXMEDIS DRM into their VOD service to STB based on Kreatel http://www.axmedis.org/documenti/view_documenti.php?doc_id=3738
- o The show case of ELION (Telecom Estonia) in adopting AXMEDIS DRM for content distribution service towards PC http://www.axmedis.org/documenti/view_documenti.php?doc_id=3745
- o The show case of EUTELSAT in adopting AXMEDIS for satellite data broadcast of AXMEDIS content towards PC and STB http://www.axmedis.org/documenti/view_documenti.php?doc_id=3820
- o The show case of TISCALI in adopting AXMEDIS Model, P2P and DRM for content distribution service towards PC.
- o The show case of ILABS in adopting AXMEDIS solution for the automated production of content and distribution towards PDA and java enabled mobiles
- o The show case of BBC in adopting the AXMEDIS tools for distributing content that is created on the user side by recoding free on air DVB-T and integrating additional content and information coming from internet and AXMEDIS P2P.
- o The show case of TI, Telecom Italia, about the usage of AXMEDIS as back office management and interoperable platform among AXMEDIS MPEG-21 DRM and OMA
- o The show case of SIAE for content collection from the users.
- o The show case of VARIAZIONI GESFOR about the usage of AXMEDIS DRM for content enrichment and distribution, mainly video and audio
- o Etc.

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Technical Note
n.3903
November 2007

Automate your business processes, manage your content at lower costs:

Multi-channel production and distribution:
broadcasting, IP/Internet, WEB sites, P2P, mobile, PDA, IPTV, interactive TV and channels, etc.

Multi-channel experience for your customers

Exploit Video on Demand (VOD), and production on demand solutions

Control of P2P content sharing and distribution, involving your customers in distribution (super-distribution)

Involve your customers and final users in content production and social networking

Integrate interoperable DRM into your business (MPEG-21, OMA, etc.)

Exploit different business models and/or transactions on the same distribution channels: pay per play, monthly rate, preview, renting, advertising, etc.

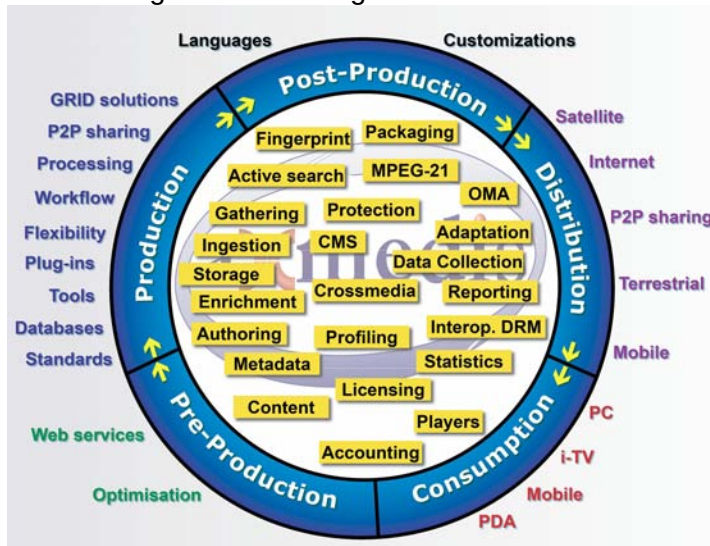
Exploit interactivity with cross media models

Adopt advertising (customized and/or real time personalized advertising)

AXMEDIS Content Processing GRID, AXCP

An open, integrated, distributed, and scalable solution for automating content production, management and protection for multichannel distribution.

AXCP allows an integrated content management of pre- and post-production, following your business growth and integration demands.



The AXCP GRID allows creating in short time saving costs automating content management solutions for

- o DVB, VOD, POD, IPTV, WEBTV, etc., with interactive parts;
- o PC, PDA, P2P, Kiosks and mobiles with interactive parts;
- o single and multiple distribution channels, formats and devices;
- o single and multiple DRM models on distribution channels;
- o content and news filtering and repurposing;
- o video, audio and text fingerprint and recognition;
- o control P2P networks, content sharing and distribution;
- o content processing, adaptation, transcoding, etc.;
- o collecting content and metadata, metadata integration, processing and enrichment;
- o advertising (customized and/or real time personalized advertising inside the package or linked from outside);
- o personalized content production, protection and packing.

AXCP Main Technical capabilities

AXCP GRID solution allows automated management of: content, metadata and licensing information, etc., with the operations of ingestion, crawling, database management, indexing, processing, adaptation, transcoding, encoding, decoding, descriptor extractor, recognition, filtering, production, archiving, storing, packaging, preview, extracting fingerprint, licensing, DRM, profiling, protection, encryption, accounting, enrichment, network management, etc. AXCP tools can be integrated and controlled by your applications and/or workflow management systems.

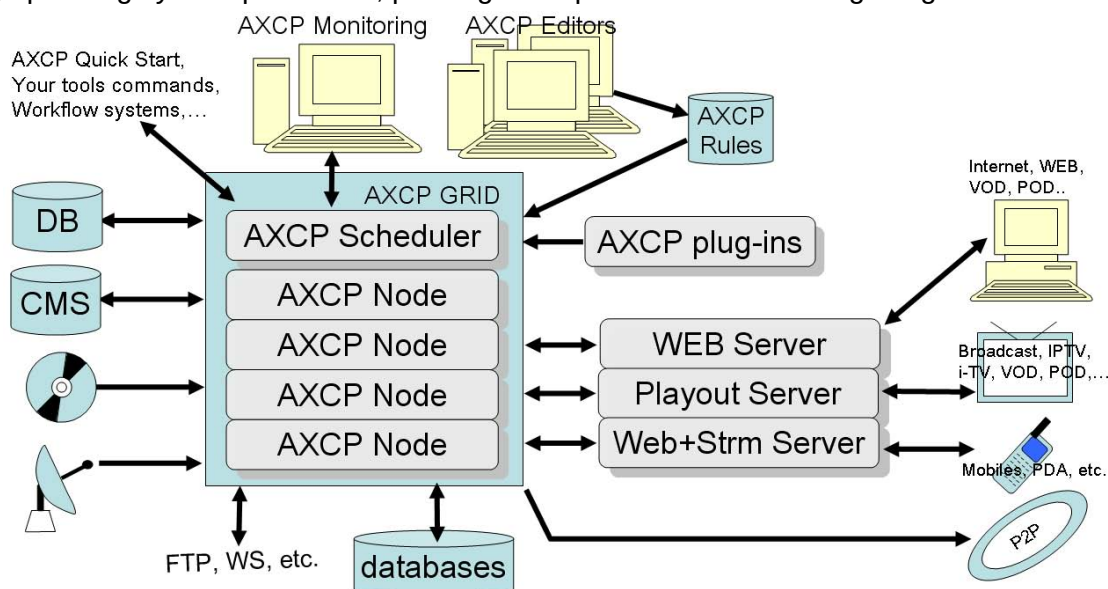
AXMEDIS allows you to reduce costs and increase efficiency of your content management. AXMEDIS supports the whole value chain and makes real and simple the convergence of media, the media transcoding, and the interoperability of content enabling multi-channel distribution (e.g., mobile, satellite, kiosk, iTV, web, P2P, interactivity, etc), and provides a flexible and interoperable DRM, for both B2B and B2C across traditional and P2P distribution platforms.

Open Architecture and Solution

AXCP solution is based on AXCP Rules formalized in JavaScript and XML to define jobs, processes and their features (deadlines, needs, etc.). An AXCP

solution is open since it can be expanded and/or customized for your needs by:

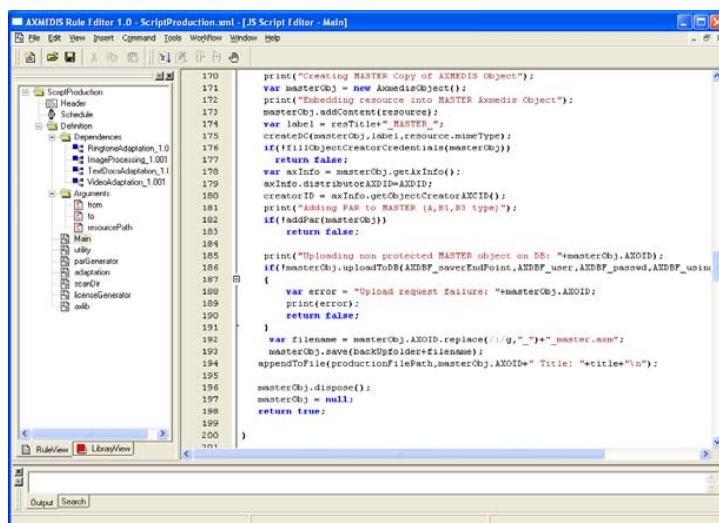
- o creating and customizing AXCP Rules to be executed on AXCP Nodes
- o entering in execution Rules according to different policies such as: periodic, sporadic or on demand from third parties, external tools, web services, etc.
- o customizing, realizing and installing additional AXMEDIS plug-ins to add new formats, encoders, decoders, adapters and converters, etc. The AXMEDIS Plug-in technology is open, well documented and supported by a development tool kit
- o organizing AXCP GRID Nodes in a hierarchical manner. An AXCP Node may control one or more AXCP Schedulers which in turn may control other AXCP Nodes, etc.
- o executing operating system processes, passing them parameters/files and getting eventual errors.



The AXCP tools are based on a Service Oriented Architecture (SOA); fully documented APIs for all the JavaScript functionalities, and WEB Services for accessing and controlling tools, and for distributing produced content towards your front-end distribution servers. The above figure depicts an integrated AXCP solution for automated content processing and multichannel distribution.

AXCP GRID solution consists of:

- **AXCP Rules which can be:**
 - activated for content processing on any AXCP Node as well as on a single computer
 - used/parameterized to produce content on demand or to be integrated in your content factory
 - activated from your Workflow Management System or from any other application
 - activated by changes in remote objects and queries in the local database and on the P2P network.
- **AXCP Nodes** allow to be controlled by an AXCP Scheduler. The stand alone version of the AXCP Node can be used for executing AXCP Rules for ad-hoc processing and activation without demanding their allocation and scheduling to the AXCP Scheduler.
- **AXCP Scheduler to allocate and manage AXCP Rules on Nodes:**
 - scheduling and balancing jobs/processes on AXCP Nodes according to the content production and processing needs in terms of time and resources: (i) balancing nodes workloads, (ii) Deadline





- Monotonic, (iii) starting time, (iv) optimization with Taboo Search (the latter is in progress)
- activating jobs as sporadic and periodic tasks, controlled by other tools and/or web services
- monitoring progress of production processes and their status, etc.
- **AXCP Rule Editor** allows you to produce, debug, test and validate AXCP Rules to execute them on AXCP Nodes via AXCP Scheduler (industrial computers or computers in your offices delegating a part of their CPU).
- **AXCP Quick Start** allows you to activate Rules in simple manner by passing them parameters; for examples a collection of objects, a path, a database, a query, a list of files, etc., or just a click.
- **AXCP Standalone Node** allows you to put in execution a single AXCP Rule from your applications and servers via a simple shell command. This solution is an easy way to access to the whole functionalities of the AXCP without calling the Web Service AXCP Scheduler.

Reliability and Redundancy

The AXCP solution is reliable, scalable and fault tolerant and can grow with your needs. AXCP nodes can run multiple copies of the same rules on the same content making possible the set up of fault tolerant solutions and recovery in case of server or disk failure. AXCP nodes are capable to automatically reconnect to the AXCP Scheduler after a lack of connection. They can be located in the local network as well as remotely. The status of the AXCP scheduler is continuously saved allowing disaster recovery of the last stable situation, thus to set up fault tolerant solutions.

Scalability

The AXCP solution is scalable in terms of number of AXCP Nodes and Schedulers. It may work on a single computer with all inside as well as on hundreds/thousands of industrial or desktop computer (putting at disposal a part of their CPU power and file systems).

Each node may share file systems and access independently on the network and thus on databases. Thus, solutions with large numbers of distributed databases are possible to realize Data and/or Computational GRID solutions.

Technical Information

The AXCP solution is based in MS Windows XP. AXCP Scheduler and Nodes can be executed on high performance multi CPUs computers or single low resources computers depending on your needs in terms of performances. AXCP is provided as software or as hardware/software solution ready to be integrated in your company according to your needs. Training, integration and maintenance services are available.

AXMEDIS Affiliation Programme

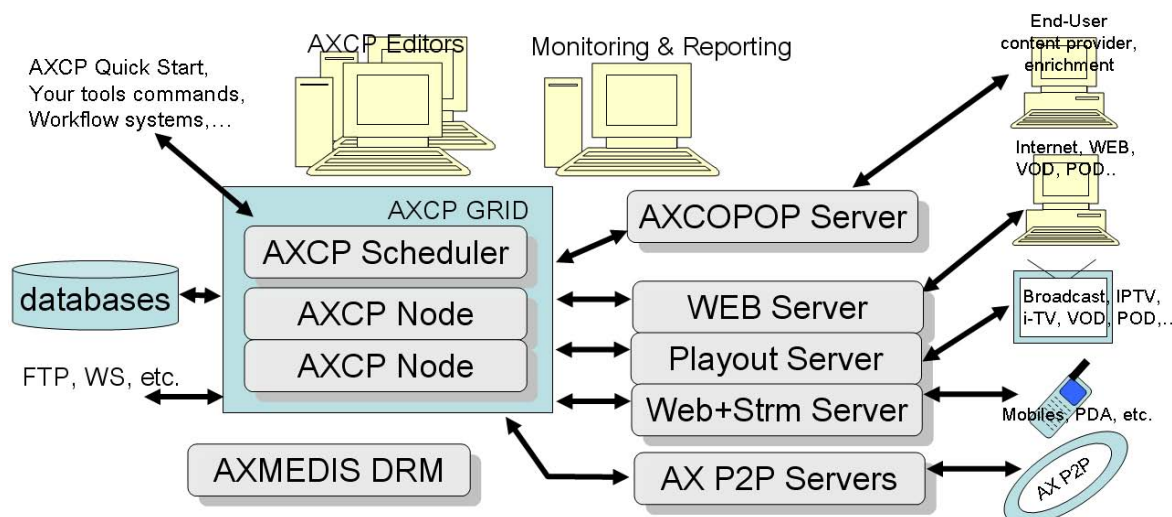
AXMEDIS has been adopted and is under trial by many industrial partners, who have expressed their appreciations, (see <http://www.axmedis.org/ibc2007/>). AXMEDIS is open and allows you to access source code, reports, technical support, training days, etc., by means of the affiliation program. AXMEDIS consists of over 35 partners (such as: TISCALI, EUTELSAT, Telecom Italia, TEO, ELION, HP, BBC, Giunti Labs, AFI, ACIT, EXITECH, XIM, SIAE, SDAE, etc.). It allows you to exploit innovative research results with new tools and solutions for your needs.

AXMEDIS Integrated Solutions

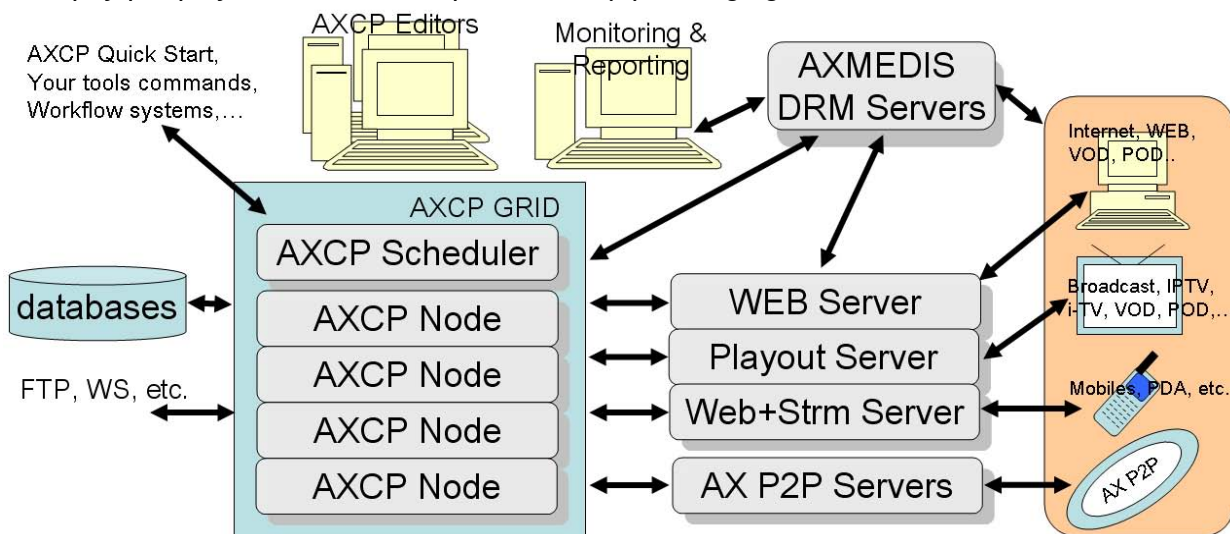
The AXCP solution is independent, but it has also been designed to be used with:

- **AXMEDIS P2P Controlled Network**, for content distribution via P2P, B2B and B2C BitTorrent Technology with queries and catalogue, for protected content or not, automating content publication/distribution, controlling the P2P network, extracting statistical data and reports. AXMEDIS P2P network has P2P clients for PC and Mobiles. http://www.axmedis.org/documenti/view_documenti.php?doc_id=3612
- **AXMEDIS DRM**, is a solution to adopt MPEG-21 DRM with other DRM solutions, includes servers and licensing tools and allows DRM, detection of attacks, black list management, collection of actions logs containing traces about the rights exploitation, tools for administrative management, etc. http://www.axmedis.org/documenti/view_documenti.php?doc_id=3616

- **AXMEDIS Editor and players, tools for MPEG-21 and AXMEDIS authoring** (SMIL, HTML, MPEG-4, and of any kind of digital resource), DRM, licensing, protection, packaging, workflow, playing, etc. AXMEDIS authoring on Windows. AXMEDIS players for: MS Windows, Apple OS X, Linux, Windows Mobile 5, and java mobiles, for PC, STB/PVR/HDR, Media Centers, PDA, and mobiles. They can be customized as GUI and functionalities. Examples of customizations are available.
http://www.axmedis.org/documenti/view_documenti.php?doc_id=3634
- **AXMEDIS COPOP**, content posting solution, to involve your final users, to collect their content and redistributed it for social networking, content enrichment and/or integrating it in your content business solutions.



The above example describes an AXCP based solution in which AXMEDIS COPOP is used to collect content provided by final users. The content is distributed (after being processed, adapted, protected, etc.) in the traditional multichannel distribution as well as in the AXMEDIS P2P controlled network for PC and Mobiles. The following example presents an AXCP solution for automated production, protection and distribution of content with DRM. This solution allows the reduction of costs for content post-production and management for DRMed distribution. In this case, the DRM technology can be MPEG-21 or OMA to distribute content according to several different business models (pay per play, monthly rate, etc.), setting up different rights (play, print, etc.), with different conditions (times of play, duration, etc.). The AXCP allows (i) producing content on demand on the basis of final user profiles (device, network, etc.); (ii) producing licenses on demand for pay per play and new subscriptions; and (iii) managing black lists of terminals and/or users.



AXMEDIS tools (AXMEDIS P2P, AXCP, AXMEDIS DRM, AXCOPOP, AXP2P, etc.) have been designed on the basis of a large set of requirements collected by AXMEDIS Consortium partners. AXMEDIS tools are based on modular components which can be reused to set up a large range of different configurations. They are open to be customized to cover your needs and business ideas.



AXCP Rules Functionalities

The language is an evolution of the standard JavaScript language. The following functionalities have been added by adding new operators and/or new libraries accessible as native Javascript functionalities or by means of AXMEDIS Plug ins. AXMEDIS plug ins have been mainly used for adding transcoding and content processing capabilities. The addition of new functionalities according to your needed is possible by adding new plug ins or creating new native AXMEDIS Javascript functionalities with other specific modules.

Firing and control activities

- Activation via AXCP scheduler web service
- Activation via AXCP Quick Start tool
- Activation via Workflow tools
- Activation via your Applications
- Activation via detection of files changing
- Cross activation of a rule via another rule
- Time periodic activation
- Time sporadic activation

Content and metadata access, ingestion and gathering from

- CMSs and databases:
 - ORACLE, XML databases, Tamino, eXact
 - Lobster®, MySQL, MSSQL, HP DMP, ODBC, etc.
- operating systems files:
 - MS Windows
- protocols:
 - SQL, Web Services, FTP, HTTP,
 - WebDAV, SMB, Gopher, NNTP
- formats:
 - MXF, NewsML, IMS SCORM, MPEG-21, etc.
- Focuseek crawling tool:
 - file system DB2, Oracle, MySQL, ODBC,
 - IMAP4, POP3, WebDAV, RSS, etc.

Content and metadata management and retrieval

- from AXMEDIS database (MPEG-21 database) or from others
- actualizing the queries into the scripts, definition of active/dynamic queries
- from P2P AXMEDIS network
- multi-archive content crawling, extraction and aggregation with metadata
- any databases via HTTP and/or ODBC, etc.
- integration with HP DMP, Digital Media Platform
- integration with GIUNTI mobile distribution platform
- Integration with TISCALI Media Club VOD distribution platform
- Integration with other solutions for content distribution see WWW.AXMEDIS.ORG/IBC2007

Metadata models and processing

- metadata models and extensions:
 - Dublin Core full set

- complex metadata such as: EAD, DC
- multiple Unique IDs and descriptors: UUID, ISBN, ISRC, ISAN, ISMN, etc., your IDs
- business metadata such as: AXInfo
- Potentially Available Rights, PAR, Licensing information in MPEG-21 REL
- any custom metadata
- Workflow information
- Protection information
- Content descriptors as Metadata
- MPEG-7 descriptors
- Content fingerprint for recognition and monitoring distribution channels
- metadata manipulation and processing:
 - mapping via XSLT (production of mapping with specific editor)
 - filtering via XSLT
 - processing via XSLT

Content Processing for audio videos, document, images, and any files:

- digital resources adaptation and transcoding
- extraction of descriptors and/or fingerprints
- watermarking
- indexing
- classification
- summarization
- filtering
- repurposing
- recognition
- search and retrieval
- MIME type description and access of files

Text/Document processing, adaptation and transcoding:

- text processing with regular expressions and other techniques
- text language detection
- text transcoding by format:
 - PDF-TXT, HTML, PS, RTF,
 - MS-Word, Plain text
 - Etc.
- text keywords Multilanguage:
 - Extraction from comparison (corpus based)
 - Extraction from semantic analysis
- text fingerprint:
 - Extraction
 - Plagiarism detection

Audio Processing, adaptation and transcoding:

- Audio transcoding:
 - WAV, WMA, MPEG, VORBIS, AC3, DV,
 - MACE, ADPCM, AAC, real audio, AIFF,
 - PARIS, NIST, SVX, IRCAM, W64, SD2, MP3, etc.
- RingTones:
 - Operations of: resample, clip, etc.



- Audio descriptors:
 - o Low level descriptors extractor: waveform, spectrum, centroid, MFE, MFCC, ZCR, Spectral Flatness, onset and offsets, etc.
 - o High level descriptors extractor: audio segmentation, music genre, rhythm, silence detection, spoken/music content, noise
- Audio fingerprint:
 - o M2Any fingerprint algorithm and recognition
 - o Philips fingerprint algorithms
 - o AudioID fingerprint algorithm
 - o extractors and comparison of fingerprints
 - o detection of plagiarism

Video Processing, adaptation and transcoding:

- Video transcoding
 - o FFMPEG and other libraries
 - o MPEG-1, MPEG-2, MPEG-4, VC1, H.261,
 - o RealVideo 1.0, RealVideo 2.0, MJPEG,
 - o RAW, lossless MJPEG,
 - o H.263, WMV, ASF, ASUS, DV, YUV, ASV1,
 - o ASV2, SVQ1, SVQ2, AVI, FLAC, DAUD, AVS,
 - o H.264, VP3, FFW, Flash, VCR1, VCR2,
 - o CLJR, Apple, DXA, THP, AASC, DVD, 3GPP,
 - o etc.
- Video descriptors MPEG-7
 - o GoF/GoP color
 - o Dominant color
 - o Homogeneous Texture
 - o Color Structure
- Video fingerprint:
 - o extractors and comparison of fingerprints
 - o detection of plagiarism

Image Processing, adaptation and transcoding:

- Image conversions of more than 100 different formats:
 - o JPG, GIF, PNG, BMP, TIF, SVG, PS,
 - o PDF, MPEG, PCX, PGH, PICT, PIX,
 - o RGB, TGA, TXT,
 - o WMF, XPM, YUV, YCbCr, YcbCrA,
 - o etc.
- text to image conversion
- Image processing algorithms:
 - o Contrast, edge, blur, media, mirror, equalize,
 - o magnify, resize, roll, scale, shade,
 - o negate, noise, filtering, rotate, past, spread,
 - o extract, overlap, replace, shear,
 - o etc.

Digital File Fingerprint and recognition

- Estimation of fingerprint of digital files:
 - o MD5, SHA-1, base64, ascii-bin, etc.
- Recognition of fingerprint by similarity

Content Composition Presentation and Interactive models

- creation of cross media and multimedia content

combining raw assets such as text, images, audio, video, animation, metadata, descriptors, licenses, and other

- multimedia objects in formats
 - o MPEG-4
 - o HTML
 - o SMIL
 - o MPEG-21 (supported by AXMEDIS Editor and players for MPEG-21)
 - o NewsML (in progress)
 - o MXF (in progress)

Multimedia and cross media adaptation/processing

- Create MPEG-4
- Create MPEG-4 SMR (Symbolic Music representation)
- Audio visual processing:
 - o concatenation, delay, extract
- MPEG-4 remove tracks
- conversions:
 - o MPEG-4 to 3gp
 - o MPEG-4 to AVI
 - o MPEG-4 to ISMA
 - o SMIL to HTML

General Information Processing of:

- Load/import, production and saving of XML files for commands and/or metadata
 - o based on E4X model
- Load/save any file from/to the operating system, server, FTP etc.
- Production of custom, template and/or behavior-based, HTML pages
- Production of custom, template and/or behavior-based, SMIL scenes
- Processing XSLT with XALAN

Distribution and control of P2P network

- Monitoring of P2P nodes and network status
- Automatic publication of content into the P2P network
- Automatic download of content from the P2P network
- Control the seeding capabilities
- Accessing to reporting and statistics
- Remote control of P2P network
- Removing obsolete content from P2P network

Communication Capabilities:

- Accessing to a large range of databases
- Accessing to Web Services; dynamic client generator based on WSDL
- Accessing FTP sites, GET/PUT, etc.
- Accessing operating system, activating shells, etc.
- Sending commands HTTP, HTTPS
- Sending Mails, with attachments and/or HTML
- Sending SMS
- Creating reports in:



- o TXT, CSV, HTML, XML, XHTML, ...

Workflow management Production Process

- integration of the AXCP tools with OpenFlow and BizTalk Workflow Management systems
 - o receive commands
 - o activate scripts passing parameters
 - o returning values and results
- definition of full customized solution for workflow management
- WEB based interfaces for creating GUI to control AXCP GRID processing
- WEB based interface for monitoring AXCP reports and results
- Collaborative Workflow solutions

Content Packages, Media Containers and DRM

- MPEG-21 file read and production, with any digital resource inside, from other MPEG-21 to HTML, SMIL, groups of files and related resources
- MPEG-21 to keep joined your metadata and digital resources as well as to package and delivering them as unique chunks of information with DRM
- OMA files production
- IMS SCORM ingestion
- ZIP ingestion and production
- production of MPEG-2 TS streams
- RSS ingestion and production
- ATOM ingestion and production (in progress)
- MXF ingestion and production (in progress)
- newsML ingestion and production (in progress)

Content Formatting

- structuring and styling content elements by means of SMIL based templates
- applying style-sheets to define the usage interface (format, layout) of the whole collection of content elements and the interested content usage paradigms
- Genetic Algorithms for best time fitting, etc.

Profiling and their management

- Reading and manipulating:
 - o user profiles
 - o network profiles, and
 - o device profiles

Content Adaptation Process

- Digital Item Adaptation (DIA) based on MPEG-21 DIA
- Decision taking engine for DIA based on the above mentioned profiles.
- Scripting capabilities for expanding DIA and decision taking engine

Content Protection and DRM

- Content registration (unique IDs) and verification
- Content and digital files signature

- Content fingerprints and watermarks
- Protection of digital resources and objects with MPEG-21 IPMP, OMA
- protection/encryption:
 - o AES, DES, 3-DES, blowfish, Cipher, CAST
- Tracking exploited rights and reporting actions performed to the content owner, distributors, collecting societies, etc.
- Manipulating MPEG-21 protected objects according to AXCP Node license
- Open to integrate other DRM solutions

Content Licensing and DRM

- generating license from license model and additional information, storing licenses, and posting to license server automatically
- supporting transcoding/translating licenses (MPEG-21 REL, OMA ODLR);
- posting licenses on license server
- verification of licenses
- resolving nationality from IPs

Content Publication and Distribution

- supporting distribution towards multiple channels, for one or more: Internet, satellite, mobile, P2P distributions
- producing, monitoring and editing programmes and schedules
- controlling P2P AXMEDIS network in downloading and publishing reducing the seeding time to zero
- connecting other AXMEDIS Factories of content integrators, producers, and distributors
- posting content on the EUTELSAT Carousel for broadcasting.

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Set up and maintain your P2P network at lower costs:

Integrate P2P in Multi-channel production and distribution:
broadcasting,
IP/Internet, WEB sites,
P2P, mobile, IPTV,
interactive TV and
channels, etc.

Exploit Video on Demand (VOD), and production on demand solutions

Control P2P content sharing and distribution, involving your customers in distribution (super-distribution)

Involve your customers and final users in content production and social networking

Integrate interoperable DRM into your business

Exploit different business models and/or transactions on the same distribution channels: pay per play, monthly rate, preview, renting, advertising, etc.

Exploit interactivity with cross media models

Adopt advertising (customized and/or real time personalized advertising)

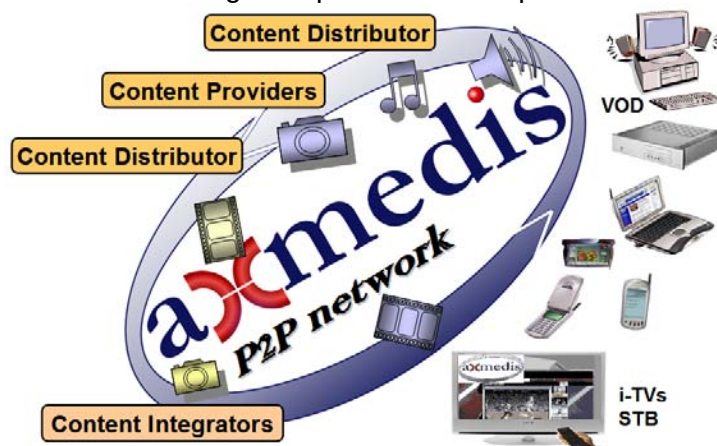
AXMEDIS P2P: for a legal, flexible and controllable P2P

Content sharing via P2P is regarded by many content owners as one of the major reasons for lack of revenues. This opinion has grown on the basis of the way users exploit some P2P applications. However, the same basic technology can be used in many profitable manners which can avoid misuses. Many applications based on P2P have emerged and have proved to be controllable, profitable and efficient for commercial content distribution. It should be noted that currently more than 75% of data downloaded by final users/consumers are obtained via P2P protocols, while only the remaining 25% refers to data directly downloaded from servers.

It should be kept in mind that P2P implies (i) large scale and scalable content distribution, (ii) creation and management of a collectivity of consumers for advertising and profiling, (iii) lower costs for content download, and (iv) lower costs for content distribution since the front end distribution servers do not have to provide all the amount of bytes downloaded by final users. These are the main reasons behind the usage of the P2P protocol for WebTV, IPTV and also content publication.

The AXMEDIS P2P is an open and scalable solution for setting up P2P networks for content distribution and sharing which can be used among business actors or consumers, or for creating thematic or mixed P2P networks for B2C content distribution and sharing. Content in this case, can be any kind, from video to audio, games, documents, etc.

AXMEDIS P2P solution allows content owners and distributors to exploit the capabilities of P2P protocols to create efficient, controllable, legal and secure P2P networks for content distribution and sharing. By using the AXMEDIS P2P solution a distributor may publish content in the P2P network; and the content may freely navigate among peers with the supervision and control of the AXMEDIS protection and monitoring tools. Content distributors may use the AXMEDIS P2P solution to set up legal P2P services for content distribution towards and among their customers, thus reducing their direct costs for distribution and infrastructure. Final users can be profiled and may be stimulated by advertising, and/or promotions of content to acquire licenses to play the content (e.g., pay per play). Other business models such as the monthly rate or the renting for a period are also possible.



AXMEDIS Adoption and Affiliation Programme

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AXMEDIS P2P Main Capabilities

The AXMEDIS P2P solution allows to:

- share any kind of content (digital files)
 - limit the content sharing to particular types/formats of content, protected or not;
- publish/distribute content
 - with DRM or not (for example with MPEG-21 REL DRM, but other DRMs are also supported). In the case of DRMed content, different business models can be supported on the same P2P network and on the same content at the same time: pay per play, monthly subscription, renting, etc.
 - in a fast and reliable manner on the P2P network, the so called "immediate seeding" of P2P network, in direct connection with your Content Management Systems;
- create a community among different actors to publish, download and share content and tools
 - set up content distributing/sharing network among business partners: B2B solution;
 - set up content distributing/sharing network among consumers: C2C solution;
 - set up content distributing/sharing network among mixed community of business partners and consumers: B2B2C. In this case, both of them may enjoy the sharing of files (faster download) for different purposes;
- monitor the activity of the P2P network including
 - monitoring and measuring performances in particular points of the geographical P2P network;
 - information regarding the status and profile of the P2P control nodes and of peers;
 - statistics about the status of the whole P2P network;
 - detailed reporting about the activity related to each content/object on the P2P network;
- filter content that is not
 - authorized to be shared on the network, for example when a content is infringed with some Intellectual Property. The filtering can be based on detection of content on the basis of fingerprint or watermark solutions, or of simple IDs;
 - conformant to some standard or format;
- control the activity of the P2P network
 - automated content publication and/or download;
 - managing black lists of P2P clients and content;
 - strategies for the publication, polishing and maintenance of the P2P network;
- easily and immediately integrate with any WEB portal and/or services for content distribution and sale;
 - starting the download with P2P client tools by just a click from any WEB page;
 - promoting new content, top/premium content, advertising, etc., towards the users connected with the P2P network via P2P Clients;
 - bringing users to a specific WEB page for each DRMed content to provide additional information for sale and/or promotion of related products;

AXIPool

Help About

Previous Next

Tracker: http://axtrk.axmedis.org:8080/AXTrackv2/

Home Page Search Catalogue Downloads

AXIPool Homepage Search Catalogue Downloads Settings Publication Publish

#	Media name	Incoming rate	Upload rate	Downloaded	Size	Progress	Remaining time	Elapsed time	Start date	End date	AVOID	Status
14	mp4 test 4.aom	9.61 KB/s [1]	0 bytes/s [0]	450.92 kb	450.92 kb	100.00 %	0 s	5 m 23 s	Tue Apr 10 12:...		unraxedmedis:00...	Downloading
20	axmedis-players-full-version-pc-activex-skill-v...	4.80 KB/s [1]	0 bytes/s [0]	120.80 kb	267.81 Mb	0.04 %	15 h 50 m 41 s	3 m 53 s	Tue Apr 10 12:...		unraxedmedis:00...	Downloading
0	slae presentation feb2007-new.exe	41.06 KB/s [2]	0 bytes/s [0]	2.25 Mb	62.28 Mb	3.60 %	24 m 20 s	6 m 24 s	Tue Apr 10 12:...		unraxedmedis:00...	Downloading
7	FC 6 i386 DVD.iso	33.81 KB/s [3]	0 bytes/s [0]	2.83 Mb	3.28 Gb	0.09 %	1 d 4 h 13 m 4...	6 m 42 s	Tue Apr 10 12:...		unraxedmedis:00...	Downloading
22	batman-reg.aom	3.86 KB/s [1]	0 bytes/s [0]	70.81 kb	330.82 kb	21.39 %	1 m 24 s	38 s	Tue Apr 10 12:...		unraxedmedis:00...	Downloading
13	title-vampire-trailer-mpeg4.aom	25.33 KB/s [2]	0 bytes/s [0]	893.55 kb	7.10 Mb	12.14 %	4 m 15 s	5 m 23 s	Tue Apr 10 12:...		unraxedmedis:00...	Downloading
4	axmedis 2006 general tutorial part5.mpg	213.50 KB/s [3]	0 bytes/s [0]	159.59 Mb	451.05 Mb	35.14 %	20 m 38 s	8 m 2 s	Tue Apr 10 12:...		unraxedmedis:00...	Downloading
10	axmedis 2006 general tutorial part6.mpg	231.20 KB/s [3]	0 bytes/s [0]	1.28 Mb	7.22 Mb	17.71 %	4 m 21 s	8 m 2 s	Tue Apr 10 12:...		unraxedmedis:00...	Downloading
5	axmedis 2006 general tutorial part6.mpg	218.24 KB/s [3]	0 bytes/s [0]	47.75 Mb	459.00 Mb	10.37 %	32 m 13 s	7 m 14 s	Tue Apr 10 12:...		unraxedmedis:00...	Downloading
19	AXMEDIS DVD Tools Docs Examples Tutorials ...	19.98 KB/s [2]	0 bytes/s [0]	1.03 Mb	4.31 Gb	0.02 %	2 d 14 h 55 m ...	4 m 37 s	Tue Apr 10 12:...		unraxedmedis:00...	Downloading
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9	xim-ansc.html flash example.html files.v2.aom	12.73 KB/s [1]	0 bytes/s [0]	575.95 kb	13.04 Mb	4.30 %	16 m 43 s	6 m 2 s	Tue Apr 10 12:...		unraxedmedis:00...	Downloading
18	Flash-example-2.AXMEDIS-WEDEL.aom	12.66 KB/s [1]	0 bytes/s [0]	574.52 kb	1.87 Mb	29.86 %	1 m 46 s	4 m 39 s	Tue Apr 10 12:...		unraxedmedis:00...	Downloading
21	axmedis-major-tools-full-version-author-grid-v...	0 bytes/s [1]	0 bytes/s [0]	0 bytes	537.76 Mb	0.00 %		3 m 53 s	Tue Apr 10 12:...		unraxedmedis:00...	Downloading
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15	earth photo-reg.aom	0 bytes/s [0]	0 bytes/s [0]	0 bytes	161.16 kb	0.00 %		5 m 23 s	Tue Apr 10 12:...		unraxedmedis:00...	Downloading

Download interface of the P2P clients

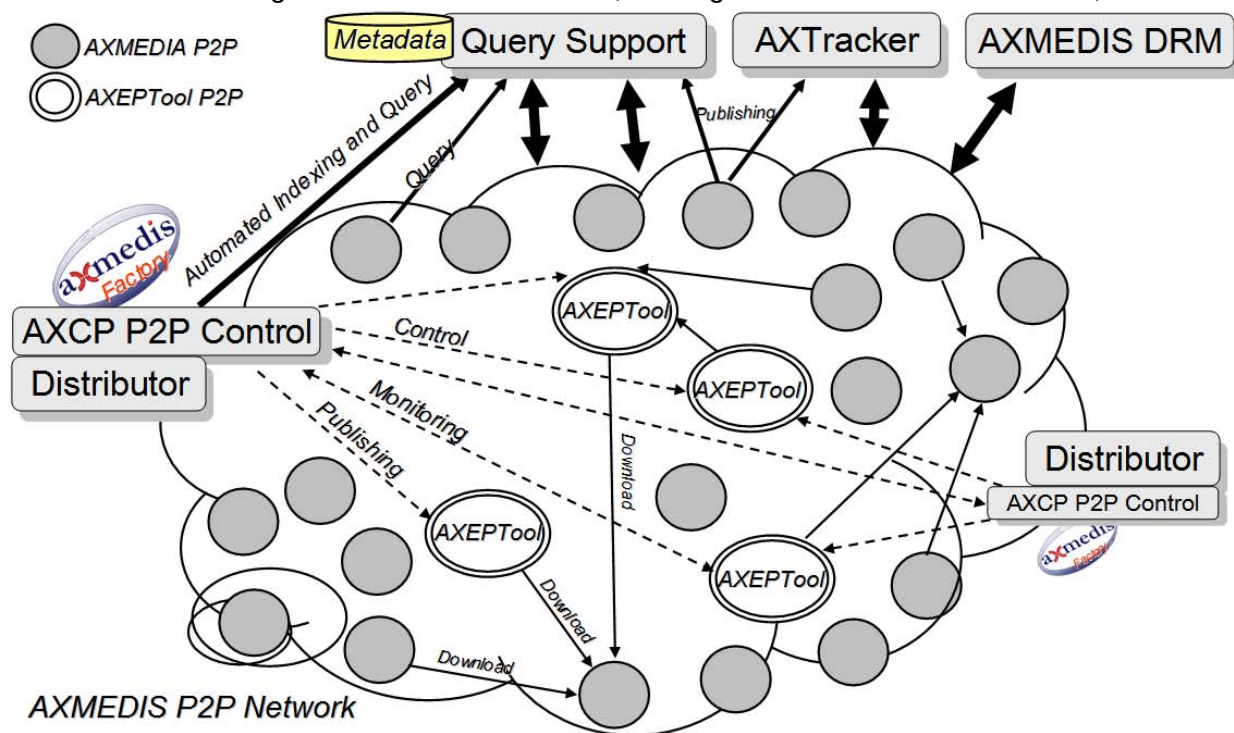
With the AXMEDIS P2P solution, it is also possible to

- have facilities to make queries into the P2P network. This search facility is provided for MPEG-21 objects and it is based on Dublin Core metadata and classification model plus additional business information such as licensing information, distributor information, etc.;
- expose the whole content catalogue to your P2P network clients;
- have a direct integration of P2P tools with your content management systems, CMS;
- have a direct integration of P2P tools with your workflow management systems, WFMS;

AXMEDIS P2P is fully integrated with the AXMEDIS GRID for Content Processing, AXCP, which is an open and scalable solution for automating content production, management and protection for multichannel distribution. AXCP allows setting up integrated and automated content management systems for pre- and post-production, following your business growth and integration demands. The AXMEDIS P2P solution provides the above mentioned capabilities of control and monitoring when it is integrated with the AXCP tools and facilities. Direct integration with your existing factory and tools is also possible.

AXMEDIS P2P Architecture and Solution

AXMEDIS P2P is based on the BitTorrent technology for P2P distribution and sharing. The AXMEDIS P2P technology enhances the classical BitTorrent solution with several innovations to realize the possibilities of: monitoring and controlling the network, managing DRMed content, making queries, deriving statistics, managing protected and non protected content, distributing MPEG-21 objects, automating publication and download, creating P2P networks for e-commerce at business and consumer levels, accelerating the publication up the immediate distributed seeding of content in the network, filtering content on the P2P network, and more.



A minimal AXMEDIS P2P network is comprised of:

- an AXTracker that manages and defines the P2P community. Multiple AXTrackers can be used to manage large communities;
- an unlimited numbers of AXMEDIS P2P clients, called AXMEDIA tools. They are the P2P clients for the hands of final users with the above mentioned capabilities of publishing, downloading, receiving advertising, etc. They are Java-based applications which are easy to be installed on a large range of systems. Simplified versions are also available for mobiles and STB/PVR.

Additionally, an AXMEDIS P2P network may have:

- a Query Support to allow indexing of content that is published in the P2P network thus making available a



query portal for your users. The indexing is based on Dublin Core plus other additional information depending on the MPEG-21 model. In principle any kind of metadata can be added;

- one or many P2P super nodes (AXEPTTool), that are substantially points of control (control nodes) in the P2P network directly managed by one or more content Distributors or by whom is devoted to monitoring the correctness of the content shared on the P2P; for example, by filtering unauthorized content. AXEPTTools should be installed by your business and/or affiliated partners. These control nodes of the P2P network can be controlled and monitored by one or more AXCP P2P Control servers;
- one or many AXCP P2P Control servers to control and exploit the P2P network which includes monitoring files, automatic publication, automatic download, accelerating seeding, etc. These are the engines to control one or all the super node AXEPTTools in the network. Specific policies can be set up according to your needs for seeding and controlling the network. A set of predefined rules is provided, while additional rules can be easily defined in Javascript;
- an AXMEDIS DRM server to set up and manage digital rights management policies on protected objects shared on the P2P network or directly distributed from your servers (it works mainly according to the MPEG-21 standard, but other DRM models can be integrated). Protected content is licensed to the user defining the rights that he/she can exploit on the content. The DRM server allows to authorize the final users' players and to keep trace of activities performed by the users on the content for accounting and reporting them in details to the Distributors and/or content owners.

Customization of AXMEDIS P2P Architecture and Tools

AXMEDIS P2P can be fully customizaed in all its parts: filtering, publication, monitoring, query, classification, indexing, profiling, advertising, user interface, integration with other tools, etc., plus all the AXCP details to control and monitoring the network.

P2P Report - Windows Internet Explorer

Summary of AXMEDIS P2P Node Status

Node Profile (.....)

AXEPTTool Version	Online since	Operating System	Username	JVM memory used
3.2.30	Wed Oct 24 18:48:46 CEST	Windows 2003 OSArch:86 OSVersion:5.2	Administrator	291.24 MB

Report of activity on P2P node at

Object n.	Filename	Size	Download (%)	Start date	End date	AXOID	Status	Number of seeds	Number of peers
1	VRS-1-0c.axm	246.40 MB	100	Monday, October 22, 2007 17:18:23	Monday, October 22, 2007 20:27:11	um:axmedis:00002:obj:e6ac1ee5-7be8-38bc-b17a-29688acee123	Seeding	6	8
2	raw_ec3.axm	262.24 MB	100	Monday, October 22, 2007 18:21:17	Monday, October 22, 2007 20:18:12	um:axmedis:00000:obj:dd43b5be-f6c6-4bcf-9091-65ccba0b807f	Seeding	12	74
3	Xim-garden-P6201687-Mobile.axm	51.05 KB	100	Monday, October 22, 2007 17:10:50	Monday, October 22, 2007 19:36:18	um:axmedis:00000:obj:02ad02c9-1c66-4803-bd39-c736f129721e	Seeding	10	48
4	VRS-059-Signalers.axm	54.78 MB	100	Monday, October 22, 2007 18:21:32	Monday, October 22, 2007 18:59:54	um:axmedis:00002:obj:7596a254-552b-3790-92d7-82564d0ba46a	Seeding	134	348
5	Xim-garden-P6201658-HiRes.axm	677.01 KB	100	Monday, October 22, 2007 17:10:22	Monday, October 22, 2007 18:50:17	um:axmedis:00000:obj:55033b54-63fc-48ba-af77-c8d025b8785e	Seeding	390	456
6	Xim-garden-P6201675-PDA.axm	116.89 KB	100	Monday, October 22, 2007 17:10:40	Monday, October 22, 2007 18:34:33	um:axmedis:00000:obj:2f476004-b695-4187-a4e9-cea51bee189d	Seeding	5	9
7	Xim-garden-P6201663-PDA.axm	120.11 KB	100	Monday, October 22, 2007 17:10:27	Monday, October 22, 2007 18:26:23	um:axmedis:00000:obj:2bf0c77c-4ff6-4cbf-adfc-459a8141015c	Seeding	456	563
8	REVIEW2007_18_OCT_REVIEW2007_18_Oct_tiscalitest_Akkordzither.axm	546.71 KB	100	Monday, October 22, 2007 18:21:43	Monday, October 22, 2007 18:24:33	um:axmedis:00000:obj:0db9bf4d-2b00-43ac-b39e-61ab118aba88	Seeding	76	82
9	REVIEW2007_15_OCT_B002_4_image.jpg_MASTER_REVIEW2007_IvanOCT_15.axm	255.96 KB	100	Monday, October 22, 2007 18:21:20	Monday, October 22, 2007 18:24:07	um:axmedis:00000:obj:e5fc2444-979c-4611-9936-942c145a5652	Seeding	45	58
10	VRS-demo-0c-mpeg4.axm	61.27 MB	100	Monday, October 22, 2007 17:09:47	Monday, October 22, 2007 18:13:28	um:axmedis:00000:obj:e4497340-ff6c-4c4d-b6f9-2c86f5826823	Seeding	12	85
...	...	...	...	...	...	...	...	...	...

Number of objects	Total Disk Space	Free Disk Space	Total Objects Size
2172	219.83 GB	192.82 GB	14.63 GB

AXMEDIS 2007 - Thu Oct 25 2007 12:48:42 GMT+0200 (ora legale Europa occidentale)

Summary reporting page of a AXEPTTool P2P client



AXCP Open Architecture and Solution

AXCP P2P Control is realized by using the so called AXMEDIS GRID solution which allows automated management of content, metadata and licensing information, and so on, with the operations of ingestion, crawling, database management, indexing, processing, adaptation, transcoding, encoding, decoding, description extraction, recognition, filtering, production, archiving, storing, packaging, preview, extracting fingerprint, licensing, DRM, profiling, protection, encryption, accounting, enrichment, network management, and much more. Additionally, the AXCP tools can be integrated and controlled by your applications and/or workflow management systems.

In summary, the AXCP solution is based on AXCP Rules formalized in JavaScript and XML to define jobs, processes and their features (deadlines, needs, etc.). An AXCP solution is open since it can be expanded and/or customized for your needs by:

- o creating and customizing AXCP Rules to be executed;
- o entering in execution Rules according to different policies such as: periodic, sporadic or on demand from third parties, external tools, web services, etc.;
- o customizing, realizing and installing additional AXMEDIS plug-ins to add new formats, encoders, decoders, adapters and converters, etc. The AXMEDIS Plug-in technology is open, well documented and supported by a development tool kit; etc.

The AXCP tools are based on a Service Oriented Architecture (SOA); fully documented APIs for all the JavaScript functionalities and WEB Services for accessing and controlling tools and distributing produced content towards your front-end distribution servers. *For additional details see the last technical note on AXCP:* http://www.axmedis.org/documenti/view_documenti.php?doc_id=3624

AXMEDIS P2P Reliability and Scalability

The AXMEDIS P2P solution is reliable, scalable and fault tolerant and can grow with your needs.

AXCP nodes can run multiple copies of the same rules on the same content making possible the setting up of fault tolerant solutions and recovery solutions in case of server or disk failure.

The AXMEDIS P2P solution is scalable in terms of number of P2P clients, AXTracker, AXEPTools and AXMEDIA tools. It may work with small networks or with a very large and geographic number of users, with multiple trackers, etc.

AXMEDIS P2P Technical Information

The AXMEDIS P2P servers (Query Support, AXTracker) are run on Linux and based and P2P clients are mainly run on MS Windows. AXMEDIS P2P Solution is fully scalable according to your needs, with or without DRM support, with or without AXCP, as software or as an integrated hardware-software solution ready to be included in your company according to your needs. Specific customizations have to be negotiated on the basis of your needs. Training, integration and service level agreement are also available.

Testing a Trial AXMEDIS P2P Network

You can join a TRIAL AXMEDIS P2P network by downloading and installing your AXEPTool P2P Client from the following link: http://www.axmedis.org/documenti/view_documenti.php?doc_id=3611 After that you can start downloading and publishing files, then observing them on the catalogues, etc. if you are interested in the fast seeding you have to contact us to see a demo from an AXEPTool controlled by an AXCP.

AXMEDIS Integrated Solutions

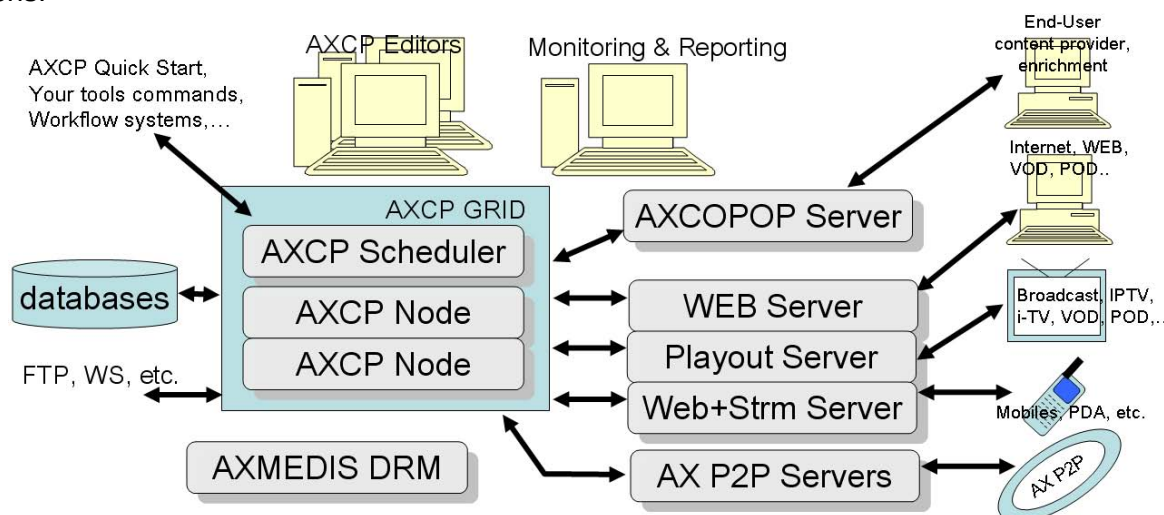
The described solution is independent, but it has also been designed to be used with:

- **AXMEDIS DRM**, a solution to adopt MPEG-21 DRM, or other DRM solutions, including servers and licensing tools which allow digital rights management, detection of attacks, black list management, collection of actions logs containing traces about the rights exploitation, tools for administrative management, etc. http://www.axmedis.org/documenti/view_documenti.php?doc_id=3616
- **AXMEDIS Editor and Players, tools for MPEG-21 and AXMEDIS authoring** (SMIL, HTML, MPEG-4, or any other kinds of digital resources), DRM, licensing, protection, packaging, workflow, playing, etc. AXMEDIS authoring on Windows. AXMEDIS players running on: MS Windows, Mac OS X, Linux,

Windows Mobile 5, and java mobiles, are available for PC, STB/PVR/HDR, Media Centers, PDA, and mobiles. Their GUI and functionalities can be customized (examples of customizations are available).

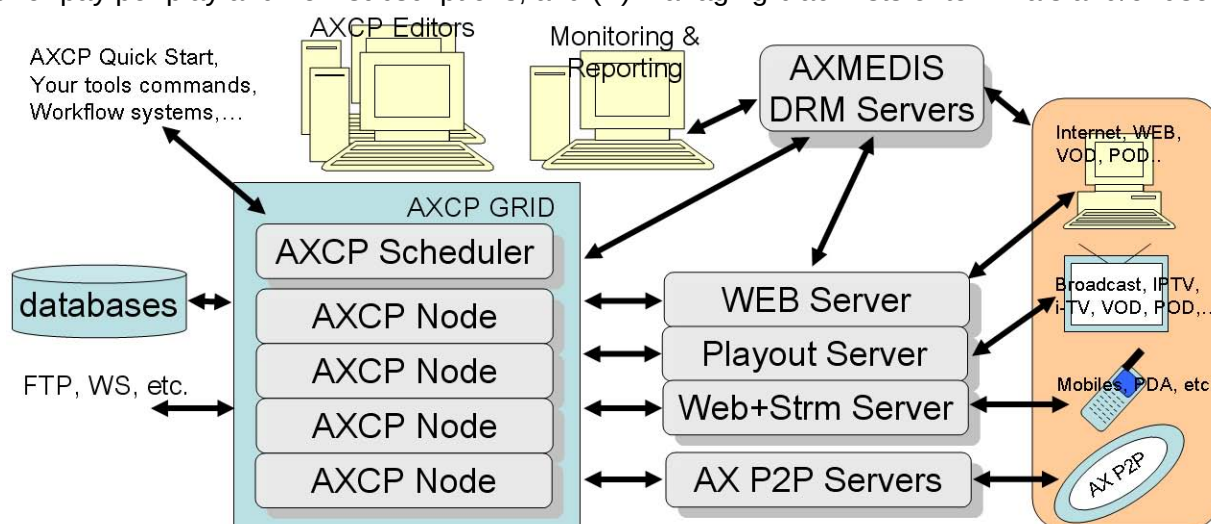
http://www.axmedis.org/documenti/view_documenti.php?doc_id=3634

- **AXMEDIS COPOP**, content posting solution, to involve your final users, to collect their content and redistribute it for social networking and content enrichment, and/or integrate it in your content business solutions.



The above example describes an AXCP based solution in which AXMEDIS COPOP is used to collect content provided by final users. The content is distributed (after being processed, adapted, protected, etc.) in the traditional multichannel distribution as well as in the AXMEDIS P2P controlled network for PC and Mobiles.

The following example presents an AXCP solution for automated production, protection and distribution of content with DRM. This solution allows the reduction of costs for content post-production and management for DRMed distribution. In this case, the DRM technology can be MPEG-21 or OMA to distribute content according to several different business models (pay per play, monthly rate, etc.), setting up different rights (play, print, etc.), with different conditions (times of play, duration, etc.). The AXCP allows (i) producing content on demand on the basis of final user profiles (device, network, etc.); (ii) producing licenses on demand for pay per play and new subscriptions; and (iii) managing black lists of terminals and/or users.



AXMEDIS tools (AXMEDIS P2P, AXCP, AXMEDIS DRM, AXCOPOP, AXP2P, etc.) have been designed on the basis of a large set of requirements collected by AXMEDIS Consortium partners. AXMEDIS tools are based on modular components which can be reused to set up a large range of different configurations. They are open to be customized to cover your needs and business ideas.

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Technical Note
n.4501
October 2007

Multichannel DRM for your content:

Multi-channel production and distribution:
broadcasting, IP/Internet, WEB sites, P2P, mobile, PDA, IPTV, interactive TV and channels, etc.

Multi-channel experience for your customers

Exploit Video on Demand (VOD), and production on demand solutions

Control of P2P content sharing and distribution, involving your customers in distribution (super-distribution)

Involve your customers and final users in content production and social networking

Integrate interoperable DRM into your business (MPEG-21, OMA, etc.)

Exploit different business models and/or transactions on the same distribution channels: pay per play, monthly rate, preview, renting, advertising, etc.

Exploit interactivity with cross media models

Adopt advertising (customized and/or real time personalized advertising)

Provide content with unprotected preview and the rest protected

AXMEDIS Multichannel Digital Rights Management

The market of digital content is rapidly changing. Users are requesting richer content and more services from content distributors. Presently, business and final users are becoming more and more interested in using interactive cross media content. For example, content with several kinds of media inside (audio, video, games, documents, etc.) which provide interactivity such as selecting content elements, navigating and playing with the information inside. Users are strongly interested in:

- o obtaining innovative forms of content from several different interoperable distribution channels based on Internet, wireless mobile, satellite, terrestrial networks, and other means;
- o paying for content only after previewing it;
- o acquiring content using their preferred business model for different content on the same channel: renting, pay per play, subscription, etc.;
- o exploiting the acquired interoperable content on different devices/tools: PC, Mobiles, TV, etc.;
- o collecting content from in-house or on portable media centers;
- o sharing content with others at homes and/or on the street;
- o creating new content for sharing with other friends.

New models of content usage, based on new forms of content exploiting fully digital content distribution, are opening paths for a larger set of new applications and markets far beyond the limitations of the physical media. Combinations of digital content formats and digital distribution channels are creating new applications including: IPTV, DVB-T, DVB-S, DVB-H, VOD, POD, WEBTV, etc. An evolving set of business models and solutions have been proposed on the market for the acceptance of users. These recent distribution models have been enabled by a set of new technologies grounded on content formats, high speed connections and digital transmission, content processing and adaptation capabilities, content protection models and solutions, hardware capabilities, and finally new solutions for Digital Rights Management, DRM.

Many of these innovations can be now exploited thanks to AXMEDIS solutions for DRM, controlled P2P, cross media content modeling, and content processing, with the support of production and DRM tools, and players.

AXMEDIS DRM Overview

AXMEDIS solutions can reduce costs and increase efficiency of your content management. AXMEDIS supports the whole value chain and provides tools to simplify the convergence of media, the media transcoding, and the interoperability of content enabling multi-channel distribution. AXMEDIS provides a flexible and interoperable DRM, for both B2B and B2C across traditional and P2P distribution platforms.

AXMEDIS Multichannel DRM is an open interoperable solution for protecting and managing rights for a wide range of content, from single files to complex cross media and multimedia, distributed on different channels towards different type of players and devices. AXMEDIS can be used to setup and manage DRM solutions for:

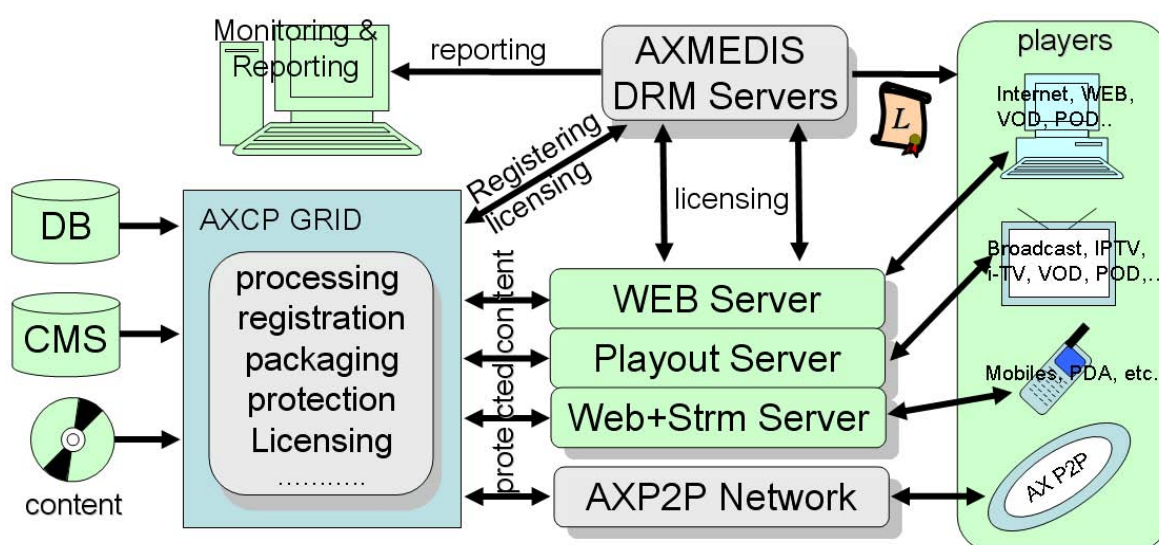
- o Internet, client server and P2P distribution;
- o broadcasting, satellite and terrestrial distribution;
- o production and video on demand distribution;
- o mobile and PDA distribution;
- o interactive TV and educational content distribution;
- o PC, STB/PVR, HDR, PDA, Mobiles, etc.;
- o physical media: CD, DVD, USB, etc.;
- o business to business (B2B) distribution;
- o integrated business to business to consumers (B2B2C) distribution models.

AXMEDIS Adoption and Affiliation Programs

AXMEDIS has been adopted and currently trialed by several industrial partners, who have expressed their appreciation (see <http://www.axmedis.org/ibc2007/>). AXMEDIS is open and allows you to access source code, reports, technical support, training days, tutorial material, technical notes and documentation, by means of the affiliation program. AXMEDIS consists of over 35 partners (such as: TISCALI, EUTELSAT, Telecom Italia, TEO, ELION, HP, BBC, Giunti Labs, AFI, ACIT, EXITECH, XIM, SIAE, SDAE, etc.). AXMEDIS allows you to exploit innovative results with new tools and solutions for your needs.

AXMEDIS DRM Architecture and Solution

AXMEDIS DRM architecture has been designed to be easily integrated into any distribution channel, allowing you to maintain your front end distribution solution and customer relationship management tools. In the following figure, the green parts are your servers and tools and your customers/markets; grey and light blue part are those that can be provided by AXMEDIS or in which AXMEDIS parts can make the difference with tools.



AXMEDIS DRM exploits and extends the MPEG-21 standard allowing you to:

- o **protect any content formats and types:**
 - o video, audio, images, documents, games, etc.;
 - o cross media and multimedia content: HTML, SMIL, MPEG-4, etc.;
 - o collections and combinations of the above mentioned content formats;
- o **control the exploitation of rights** of the above content formats:
 - o formalization of rights and conditions with formal licenses. The license for content is a digital version of a contract that contains the list of rights (with related conditions) that can be exploited on that content by a given user. In AXMEDIS, licenses are formalized in MPEG-21 REL Standard;
- o **collect and report information about consumption** of rights for
 - o accounting, billing and/or statistical analysis;

AXMEDIS DRM solution provides you:

- o **tools for content packaging and protection** (they may range from simple manual tools to automated tools based on GRID technology, AXMEDIS Content Processing, AXCP solution), see a summary in the following technical note http://www.axmedis.org/documenti/view_documenti.php?doc_id=3624
- o **DRM servers** for (i) controlling the exploitation of rights of protected content, (ii) collecting information about the exploitation of rights; for example counting the number of times a given content object has been played, by a given user, on given device, etc. (iii) optionally interacting with an intellectual property ontology to facilitate the production and verification of licenses.
- o **players for protected content** on PC (MS Windows), PDA (Windows Mobile 5 and 6), STB/PVR (Linux and Kreatel based), and AXMEDIS Java based Mobile. AXMEDIS players can be customized in several different manners and can be hosted in WEB pages (AXMEDIS player in the form of Active X).
http://www.axmedis.org/documenti/view_documenti.php?doc_id=3634
- o **tools** for manual and automated production of licenses, and for accelerating the transformation of contracts



to licenses directly from the contract text, and vice versa for legal validation of licenses.

Front end content distribution servers, commerce servers, customer relationship servers can produce licenses for your final customers. These licenses are required to be posted onto the AXMEDIS DRM Servers via a Web Service call. In alternative, the same servers can use the AXCP GRID to perform the same activity, particularly when there are a high number of licenses produced. For example, in the case of a business model based on subscription; each new subscription produces a set of licenses to enable the new user to access all the content distributed.

As illustrated in the above figure, it is possible to exploit the P2P technology for content distribution by using AXMEDIS P2P Network solution which is fully integrated with the AXCP GRID and AXMEDIS DRM.

See technical note on P2P http://www.axmedis.org/documenti/view_documenti.php?doc_id=3612

AXMEDIS Content and Players

AXMEDIS content may range from simple files with single resources such as video, audio, images, documents, animations, games, etc., to cross media and multimedia content: HTML, SMIL, MPEG-4, etc. Combinations of the above mentioned content formats can be used, protected and managed in terms of detailed rights. AXMEDIS content model extends the MPEG-21 standard and allows creating different solutions for your distribution channels. The model enables you to distribute, for download or streaming, AXMEDIS content packages (also called AXMEDIS Objects) containing:

- o simple single files: audio, video, images, documents, animations, games, etc.;
- o reference to external files and/or other AXMEDIS objects as URIs and links;
- o content with a large variety of
 - o metadata, descriptors, classification information, and identification information associated to single resources and content collections. In addition, any metadata file can be integrated into an AXMEDIS package;
- o collections as lists or hierarchically organized files, collections/packages, AXMEDIS objects (nesting levels)
 - o on which users may navigate, make queries on the basis of metadata of single components or files;
 - o with HTML and/or SMIL as presentation layers to provide interactivity to users and presentation of other files. These allow to set up: menus, lists, text, list of icons, audio play and image presentation, dynamic advertising integration, etc.;
 - o with files and internal nested packages protected in different manners with different algorithms, or selectively non-protected. This allows to create previews and to offer non protected content elements to show users the product and stimulate them to acquire licenses;
- o dynamic scripts to add narrative capabilities, semantics, and in general to make more intelligent and interactive the content package behavior. This enables final users to perform activities of content enrichment (addition of comments and data to content), content transformations (for example the migration to another platform), content queries inside the content collection, etc. All these features are operated on the basis of user rights.

http://www.axmedis.org/documenti/view_documenti.php?doc_id=3634

For the production of AXMEDIS content it is possible to use AXMEDIS Editor tools for MPEG-21 and AXMEDIS authoring (SMIL, HTML, MPEG-4, or any other kinds of digital resources), DRM, licensing, protection, packaging, workflow, playing, etc. AXMEDIS authoring is available on MS Windows. AXMEDIS players run on MS Windows, Mac OS X, Linux, Windows Mobile 5, Java mobiles, and are available for PC, STB/PVR/HDR, Media Centers, PDA, and mobiles. Their GUI and functionalities can be customized (examples of customizations are available). The production of AXMEDIS content can be also automated by using AXCP tools, see the above mentioned technical note.





AXMEDIS DRM Servers Main Capabilities

AXMEDIS DRM allows the exploitation of rights on a given content to any user that has been registered and certified, as long as there is a license that assigns the right for that content to the user. AXMEDIS enforces the DRM by means of protection technologies, certification models and protocols, and authentication models and protocols. For the physical protection, any kind of encryption algorithms can be used as an alternative to those provided by default: AES, DES, 3-DES, Blowfish, Cipher, CAST. Any other AXMEDIS Protection Tools can be developed as plug-ins and thus can be even easily updated in final user players.

Technically, the AXMEDIS DRM Servers support the following functionalities:

- o registration of final users via web service or on a portal;
- o certification and authentication of final users, players and devices;
- o collection and processing of licenses to provide authorizations to players. Licenses are expressed in MPEG-21 REL standard;
- o detection of attacks performed at AXMEDIS DRM and tools by final users; verification and supervision of the activity performed at players;
- o collection of action logs reporting the rights exploited by final users on players. This extends the MPEG-21 ER standard and can be used for reporting and statistical purposes;
- o counting the number of times a given right is exploited and revoking the grant when the number is greater than that imposed by the license;
- o revoke licenses assigned to a user, which disables the exploitation of rights on a given object; manage black lists of licenses;
- o revoke users' authorizations; manage black lists of users;
- o revoke players' and devices' authorizations; manage black lists of players/devices;

AXMEDIS DRM Advanced Capabilities

AXMEDIS DRM provides a number of Advanced Capabilities that can be used to widen the market by creating specific business models and solutions:

- o Rights expressions translation: conversion of MPEG-21 REL to OMA DRM licenses, and vice versa;
- o Production and management of chains of licenses
 - o Final level licenses are verified in AXMEDIS DRM Servers against the parent license(s) to verify that the rights are fulfilled along the whole value chain.
 - o Example: to create a license which enables Distributors to make licenses for final users. This allows content producers, collecting societies, authors and publishers to control the distribution process and to obtain the report on content consumption directly from AXMEDIS DRM servers;
 - o Example: to create a license which enables final users to make/change the content and produce other licenses. This allows distributors and/or the other actors in the value chain to monitor and control the exploitation of rights via AXMEDIS DRM servers;
- o Production and management of domain licenses to
 - o assign rights/licenses to a group of users and devices, simplifying the license processing;
 - o allow creating and managing a collection of content (at home, in the disco, in the pizzeria, etc.) that can be played on a set of devices;
- o Production of specific reports to all actors in the value chain according to the visibility that they can have on private information of users, such as Action Logs registered at AXMEDIS DRM servers;
- o Classification of user roles and AXMEDIS objects;
- o Integrating ontology to support the correct production of licenses from contracts.

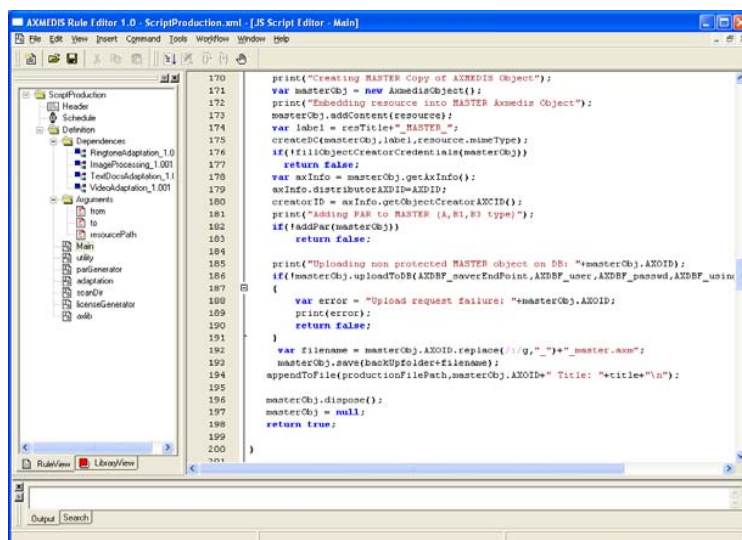
AXMEDIS can be used to create trading market places on digital content for B2B, B2C and C2C applications. Those are areas in which users (business or consumers) may access protected content to see which rights can be bought for a given object or collection. This operation can be performed by making queries via an AXMEDIS database or P2P network; e.g. looking for content to be compounded, distributed and/or played in January 2008 in Germany. These possibilities enable potential customers to search and select content in a free accessible market and maybe to negotiate the price later. This feature is grounded on the information that may be included in an AXMEDIS object regarding the producers of the object itself and on the possibility of nesting protected objects. AXMEDIS objects may contain among its metadata the AXMEDIS Information PAR. The AXMEDIS PAR is the list of Potentially Available Rights that object creators may be capable to provide for an object. It is substantially a formalization of what users (business or consumers) could do with that object after acquiring one or more specific licenses.

AXCP Main Capabilities to Automate the DRM Processes

AXCP GRID allows (i) automated management of content, metadata, licensing information, and so on; and (ii) operations of ingestion, database management, indexing, processing, adaptation, transcoding, encoding, decoding, description extraction, recognition, filtering, archiving, packaging, preview, extracting fingerprint, licensing, DRM, profiling, protection, and much more. Additionally, the AXCP tools can be integrated into and controlled by your applications and/or workflow management systems.

In brief, the AXCP solution is based on AXCP Rules formalized in JavaScript and XML to define jobs, processes and their characteristics (deadlines, needs, etc.). An AXCP solution can be expanded and/or customized for your needs by:

- o creating and customizing AXCP Rules to be executed;
- o entering in execution Rules according to different policies such as: periodic, sporadic or on demand from third parties, external tools, web services, etc.;
- o customizing, realizing and installing additional AXMEDIS plug-ins to add new formats, encoders, decoders, adapters, converters, etc. The AXMEDIS Plug-in technology is open, well documented and supported by a development tool kit.
- o executing operating system processes, passing them parameters/files and getting eventual errors (if any).



The AXCP tools are based on a Service Oriented Architecture (SOA). Fully documented APIs are available for all the JavaScript functionalities and Web Services for accessing and controlling tools and distributing produced content towards your front-end distribution servers. For additional details see the last technical note on AXCP: http://www.axmedis.org/documenti/view_documenti.php?doc_id=3624

Technical Information

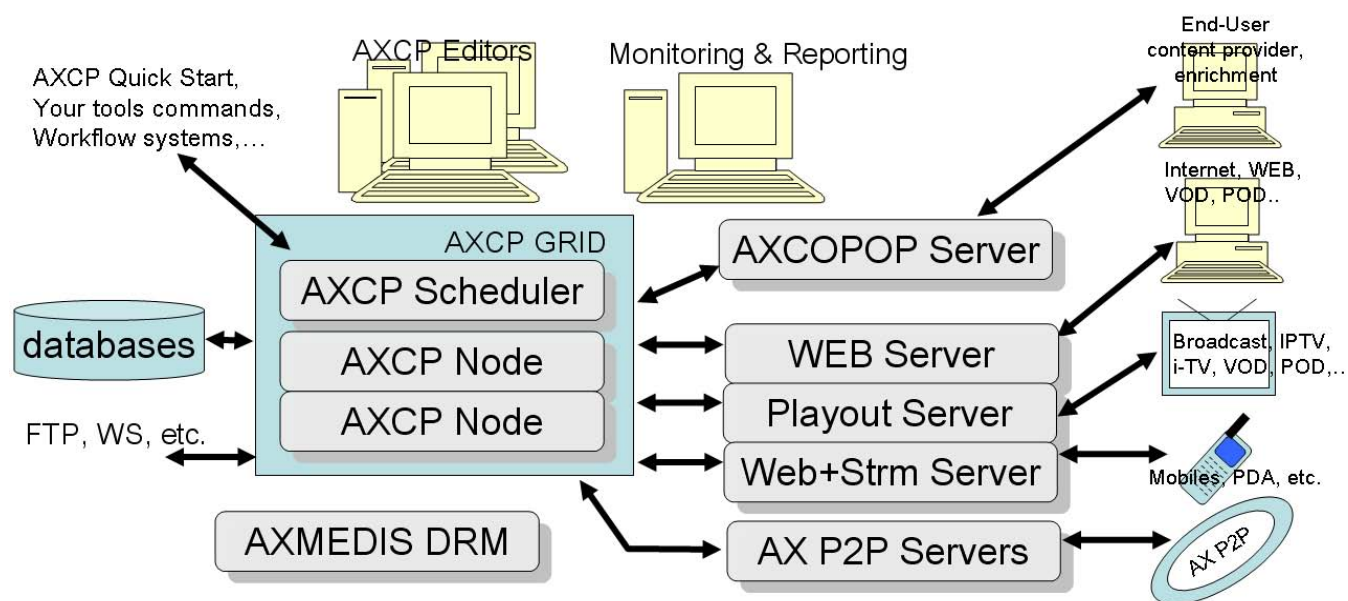
AXMEDIS DRM servers are based in MS Windows XP. Among the servers AXMEDIS can provide: registration portal and service, certification authority (all AXMEDIS tools and users are certified by using standard X.509 certificates), AXMEDIS Certifier and Supervisor and the AXMEDIS Protection Manager Support. Specific customizations have to be negotiated on the basis of your needs. Training, integration and service level agreement are also available.

AXMEDIS DRM Integrated Solutions

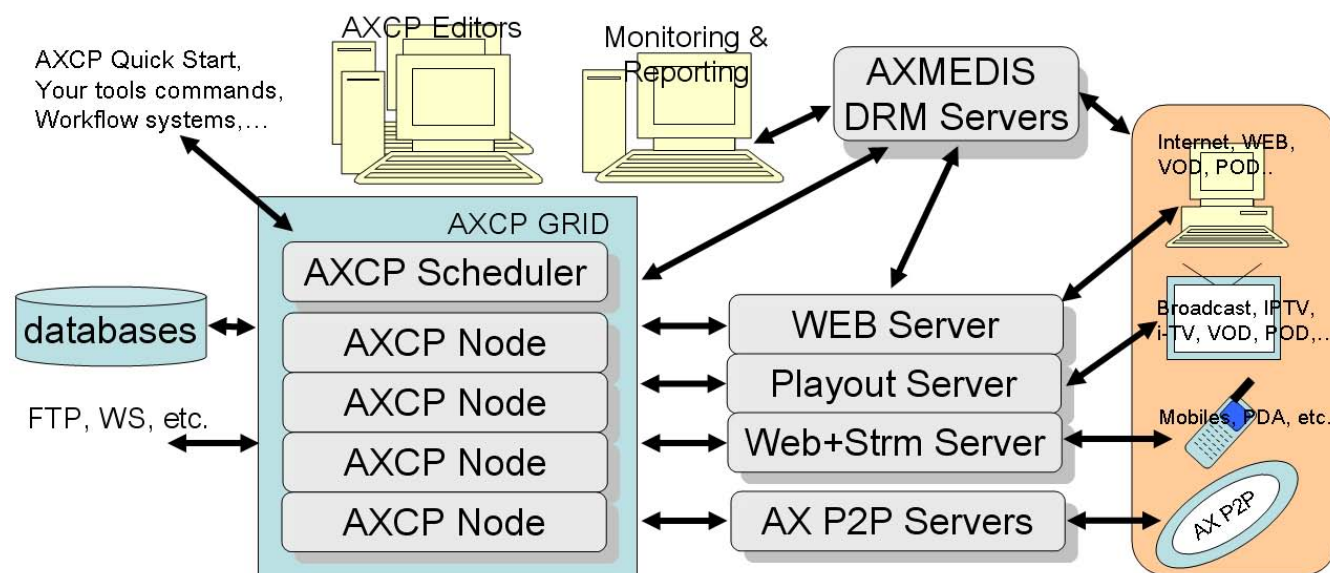
The AXMEDIS DRM solution is independent, but it has also been designed to be used with:

- **AXMEDIS P2P Controlled Network**, for content distribution via P2P. It utilizes B2B and B2C BitTorrent Technology with query support and cataloguing servers, for protected or non protected content. It has capabilities of automating content publication/distribution, controlling P2P network, and extracting statistical data and reports. AXMEDIS P2P network has P2P clients for PC and Mobiles http://www.axmedis.org/documenti/view_documenti.php?doc_id=3612
- **AXMEDIS COPOP**, content posting solution, to involve your final users, to collect their content and redistribute it for social networking and content enrichment, and/or to integrate it into your content business solutions, protect and distribute the content with DRM.

The example reported in the following figure describes a solution in which AXMEDIS COPOP is used to collect content provided by final users. The content is processed, adapted, protected on the AXCP GRID, and finally distributed via traditional multichannel distribution with the AXMEDIS DRM support as well as via the AXMEDIS P2P controlled network for PC and Mobiles. In the figure, the details regarding the DRM have been omitted since they are identical to what has been presented before.



The following example presents an AXCP solution for automating production, protection and distribution of content with DRM. This solution allows the reduction of costs for content post-production and management for DRMed distribution. In this case, the DRM technology can be MPEG-21 or OMA which is used to distribute content according to several different business models (pay per play, monthly rate, etc.), different rights (play, print, etc.), with different conditions (times of play, duration, etc.). The AXCP allows (i) producing content on demand on the basis of final user profiles (device, network, etc.); (ii) producing licenses on demand for pay per play and new subscriptions; and (iii) managing black lists of terminals and/or users.



AXMEDIS tools (AXMEDIS P2P, AXCP, AXMEDIS DRM, AXCOPOP, AXP2P, etc.) have been designed on the basis of a large set of requirements collected by AXMEDIS Consortium partners. AXMEDIS tools are based on modular components which can be reused to set up a large range of different configurations. They are open to be customized to cover your needs and business ideas.

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Technical Note
n.4510
March 2008

Automate the business process and manage your contents in a more convenient way

Integrate P2P in Multichannel production and distribution: broadcasting, IP/Internet, WEB sites, P2P, mobile, IPTV, interactive TV and channels, etc.

Exploit Video on Demand (VOD), IPTV, and production on demand solutions

Control P2P content sharing and distribution, involving your customers in distribution (superdistribution)

Involve your customers and final users in content production and social networking

Integrate interoperable DRM into your business

Exploit different business models and/or transactions on the same distribution channels: pay per play, monthly rate, preview, renting, advertising, etc.

Exploit interactivity with cross media models

Adopt advertising (customized and/or real time personalized advertising)

How to exploit AXMEDIS DRM solution in your portal

Before reading this technical note we suggest to read the technical note N.4501 on general aspects of AXMEDIS DRM (Digital Rights Management) http://www.axmedis.org/documenti/view_documenti.php?doc_id=3616

Despite of the AXMEDIS capabilities in managing multichannel solutions, in this technical note a simple solution is presented to show a single instance. In particular, this technical note describes how to integrate AXMEDIS DRM and other tools in order to enforce DRM capabilities for e-commerce of digital content in a Web Portal. Before, to present the AXMEDIS solution, a short overview of the main AXMEDIS components is given; then the requirements of the Portal with DRM integrated are presented.

AXMEDIS DRM Overview

AXMEDIS solutions can reduce costs and increase efficiency of your content management. AXMEDIS supports the whole value chain and provides tools to simplify the convergence of media, the media transcoding, and the interoperability of content enabling multi-channel distribution. AXMEDIS provides a flexible and interoperable DRM, for both B2B and B2C across traditional and P2P distribution platforms.

AXMEDIS Multichannel DRM is an open interoperable solution for protecting and managing rights for a wide range of content, from single files to complex cross-media and multimedia, distributed on different channels towards different type of players and devices. AXMEDIS can be used to setup and manage DRM solutions for:

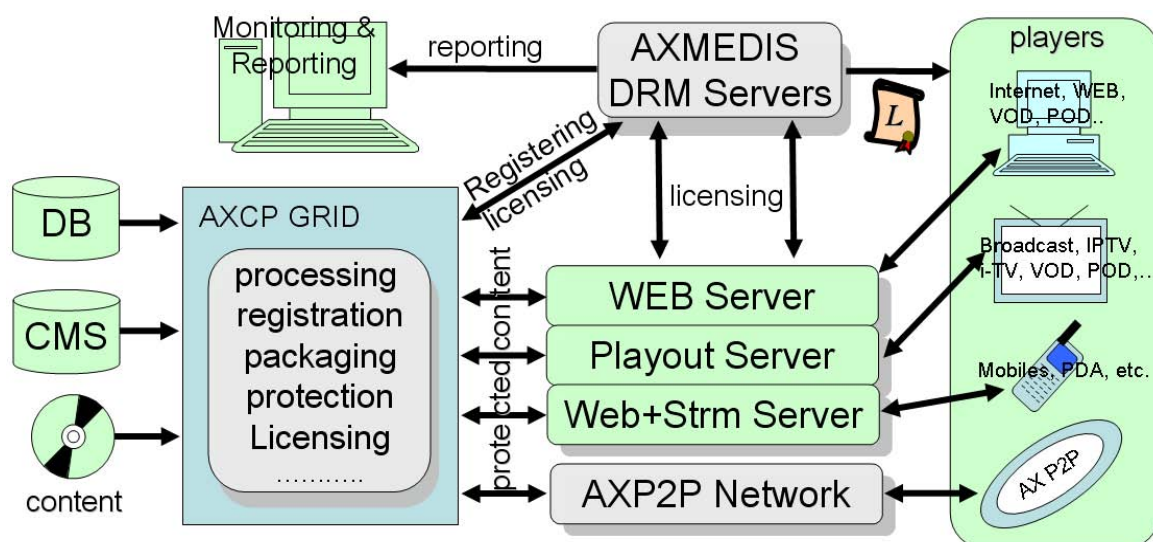
- o Internet, client server and P2P distribution;
- o broadcasting, satellite and terrestrial distribution;
- o production and video on demand distribution;
- o mobile and PDA distribution;
- o interactive TV and educational content distribution;
- o PC, STB/PVR, HDR, PDA, Mobiles, etc.;
- o physical media: CD, DVD, USB, etc.;
- o business to business (B2B) distribution;
- o integrated business to business to consumers (B2B2C) distribution models.

AXMEDIS DRM Architecture and Solution

AXMEDIS DRM architecture has been designed to be easily integrated into any distribution channel, allowing you to maintain your front end distribution solution and customer relationship management tools. In the following figure, the green parts are your servers and your customers/markets; grey and light blue parts are those that can be provided by AXMEDIS or in which AXMEDIS parts can make the difference with tools.

AXMEDIS DRM exploits and extends the MPEG-21 standard allowing to:

- o **protect any content formats and types:**
 - video, audio, images, documents, games, etc.;
 - cross media and multimedia content: HTML, SMIL, MPEG-4, etc.;
 - collections and combinations of the above mentioned content formats;
- o **control the exploitation of rights** of the above content formats:
 - formalization of rights and conditions with formal content licenses. The license is a digital version of a contract that contains the list of rights (with related conditions) that can be exploited on that content by a given user. In AXMEDIS, licenses are formalized in MPEG-21 REL Standard;
- o **collect and report information about consumption** of rights for
 - accounting, billing and/or statistical analysis;



AXMEDIS DRM solution provides you:

- **AXCP: tools for content packaging and protection** (they may range from simple manual tools to automated tools based on GRID technology, AXMEDIS Content Processing, AXCP solution), and are capable to make automatic registration of users, content adaptation, transcoding, fingerprinting, management, repurposing, licensing, etc., see a summary in the following technical note http://www.axmedis.org/documenti/view_documenti.php?doc_id=3624
- **DRM servers** for (i) controlling the exploitation of rights of protected content, (ii) collecting information about the exploitation of rights; for example counting the times a given content object has been played, by a given user, on given device, etc. (iii) optionally interacting with an intellectual property ontology to facilitate the production and verification of licenses.
- **players for protected and non protected cross media content** on PC (MS Windows), PDA (Windows Mobile 5 and 6), STB/PVR (Linux and Kreatel based), and AXMEDIS Java based Mobile. AXMEDIS players can be customized in several different manners and can be hosted in WEB pages (AXMEDIS player in the form of Active X). http://www.axmedis.org/documenti/view_documenti.php?doc_id=3845
- **tools** for manual and automated production of licenses, and for accelerating the transformation of contracts to licenses directly from the contract text, and vice versa for legal validation of licenses.

Front end content distribution servers, commerce servers, customer relationship servers can produce licenses for your final customers. These licenses are required to be produced posted onto the AXMEDIS DRM Servers via a Web Service call. In alternative, the same servers can use the AXCP GRID to perform the same activity, particularly when there are a high number of licenses produced. For example, in the case of a business model based on subscription; each new subscription produces a set of licenses to enable the new user to access all the content distributed.

As illustrated in the above figure, it is possible to exploit the P2P technology for content distribution by using AXMEDIS P2P Network solution which is fully integrated with the AXCP GRID and AXMEDIS DRM. See technical note on P2P http://www.axmedis.org/documenti/view_documenti.php?doc_id=3612

Digital Contents E-Commerce and AXMEDIS DRM

The main requirements of a distribution Portal for protected digital contents supported by a DRM can be summarized as it follows: The portal:

- o is interested in distributing digital content, from Video (for VOD) to audio, documents, multimedia, cross-media objects, collections, to courses and interactive collections, etc., with different DRMs rules and models;
- o manages a certain amount of users and objects to produce and distribute content according to the business models formalized with licenses and DRM solution;
- o allows final users to execute query, search, browse, download of protected objects and DRM;
- o arrange and propose some business models (e.g., pay-per-play, subscription, monthly fee, etc.) with the

final user and manages the economical transactions, delegating the payments to a certain lending institutions or via other means;

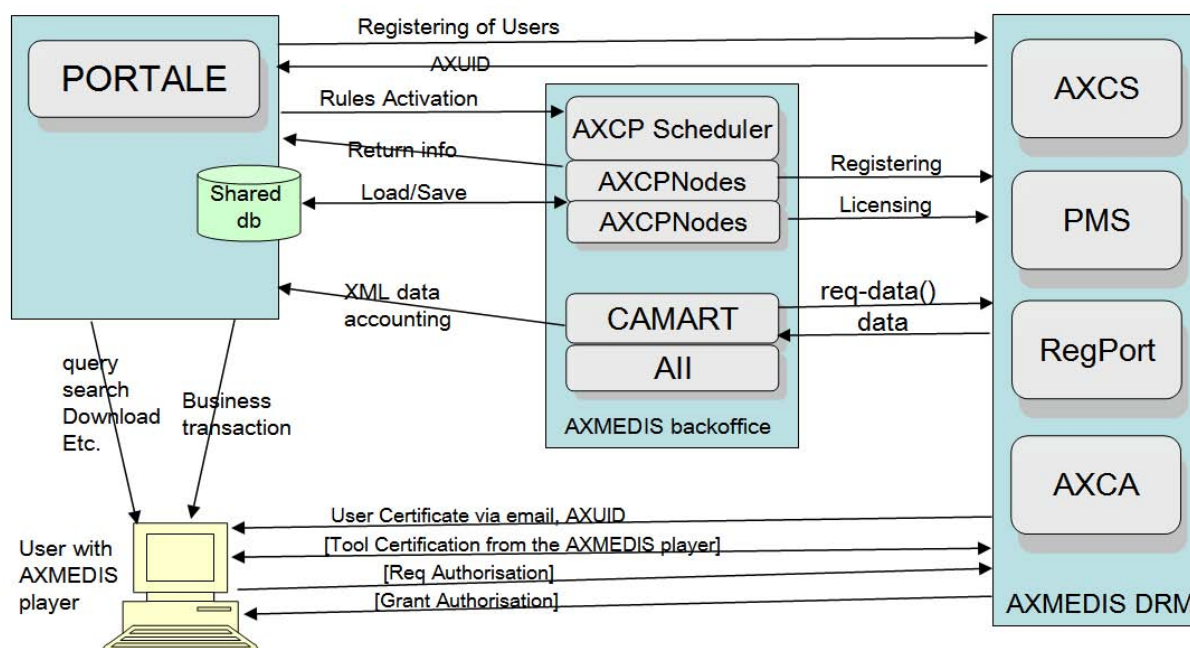
- o when requested, has to produce protected objects and formal licenses;
- o has to access to the consumption information for the production of bills or statistics;

This following description shows that the main activities to be undertaken for the distribution of content with DRM from a commercial Portal are:

- **Production of protected contents**, or anyhow of simple/composed contents starting from single or multiple component (as it happens for cross-media models);
- **User registration**: the licenses can be produced only for registered users, so that users have to be registered;
- **Production of licenses** for final users on the basis of one or more business models;
- **Fruition** of contents by users on some AXMEDIS player;
- **Gathering of consumption data** about rights and/or eventual statistic data;

These aspects are reported in details afterward.

The depicted solution is based on AXMEDIS DRM and it is based on tools, servers, and licenses formalized in MPEG-21/REL/AXMEDIS (to any further information please have a look at the references at the end of the document).



The above figure describes all the interactions between the main parts of AXMEDIS DRM solution: the portal, the AXMEDIS BackOffice and the AXMEDIS DRM Server.

The **AXMEDIS BackOffice** is based on the AXMEDIS AXCP technology and on instruments to report data collecting as CAMART and All.

- o The AXCP (it is composed by the tools AXCP Scheduler and AXCP Node, and represents a scalable solution). It is able to execute large amounts of tasks in an automated manner; among them the most important related to DRM are: producing protected objects, acquiring non-protected objects form the Portal, registering objects on the DRM server, registering users, production of protected content, etc. The AXCP has also the duty of producing on-demand licenses and sending to the DRM server. At the end of the production, the protected object is sent to the portal. For any further detail please refer to the AXCP Technical Note http://www.axmedis.org/documenti/view_documenti.php?doc_id=3624. If your solution is to delegate the registration to the AXCP, Your Portal will result to be simpler, since it will interact only with the AXCP

- o CAMART acquires periodically from the AXMEDIS DRM server reports about the exploitation of rights for all the managed objects;
- o All tool is capable to convert these reports in a manner pursuant to each administration server.

The **AXMEDIS DRM section** is composed by different parts that can be installed on servers strictly placed close to the Portal, or in remote locations. Going into details a complete AXMEDIS DRM solution includes:

- o AXCS: services for object registration, for players operations certification and supervision;
- o PMS: services for licenses storing and the production of players authorizations.
- o RegPort: registration service for users in the DRM system;
- o AXCA: service for production of certificates for users and devices.

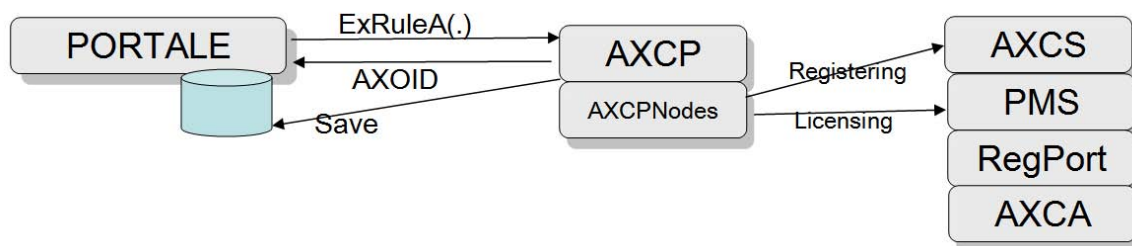
A part (or the whole) of these AXMEDIS DRM services can be purchased as services from AXMEDIS or any other AXMEDIS based distributor.

Protected content production

For the production of protected digital contents:

- o The Portal may decide which AXMEDIS Object has to be produced, with which metadata, resources, etc. For this aim, the Portal sends the request to execute an AXCP Rule, in this case named Rule A (the description of whom will follow), to the AXCP scheduler (simply named as AXCP into the figure), which on his hand puts in execution the rule on one or more AXCP Nodes as needed;
- o It has to be noticed that, the Portal can decide to invoke different Rules to produce different objects: maybe not simply the Rule A, or may invoke the Rule A with different parameters;
 - o The AXCP Rules are identified in a unambiguous manner by a proper AXRID (AXMEDIS Rule ID);
 - o The AXCP Rules are formalized in JavaScript and installed on the reference AXCP Scheduler to be executed, they can be freely changed according to your needs;
 - o The Rules can be produced trough the AXCP Editor that is an integrated development environment with debug and testing facilities.

On the basis of Rule A, the AXCP Produces the protected object according to what the Rule states (it registers the objects on the AXMEDIS DRM, etc.). It may also sends a feedback to the Portal to notify results and AXOID (AXMEDIS Object ID) of the last produced object. The AXCP can send and/or post the produced object in the local Database of the Portal and/or one or more remote databases.



It has to be noticed that, just after its creation and protection, an AXMEDIS Object is not available for the user usage, since nobody has the license to exploit it. In Rule A, it is possible to produce a license, for example a default license, for the producer himself to permitting at least to him to play the object. The portal has to identify or select a certain amount of users to whom release the license for the object usage. These Users have to be registered on the AXMEDIS DRM server and can be identified thanks to their unambiguous AXUID (AXMEDIS User ID). The portal itself has to be registered as Distributor user on the reference AXCS, obtaining its AXDID, that has to be requested to AXMEDIS. Rule A can be aware of the distributor ID, AXDID, to produce and use licenses for the distributor itself.

The AXCP, in the figure, represents the AXCP Scheduler that put in execution Rule A on an AXCP Node of the GRID. The AXCP Nodes can be dozens, or more (at most one on each computer). Their number depends by the complexity of the problem and the workload. The Simplest solution may include a single AXCP Node on the same computer of the Scheduler and/or the Portal.

Remarks

In the case in which the portal is intended to produce protected AXMEDIS Objects through an enrichment procedure (different versions of objects that come one after the other with additional metadata and information added) it has to be noticed that:

- o Each new version of the cross media object has to be re-generated each time from the elementary digital resources and from the metadata through the Rule A, or one of its evolutions, thus producing new objects with different AXOIDs. Then the users accessing to the older version have to receive new licenses to work with the new version of the object.
- o The contents can be re-generated from a Rule A with the same AXOID. In this way, the system avoids to re-generate all the licenses for all the different versions of the same objects. This can bring problems in the cases in which the content objects are distributed through AXOID in an unambiguous manner, as it happens in P2P distributions. In that case, it is recommended to produce a new AXOID each object generation as in the previous case.

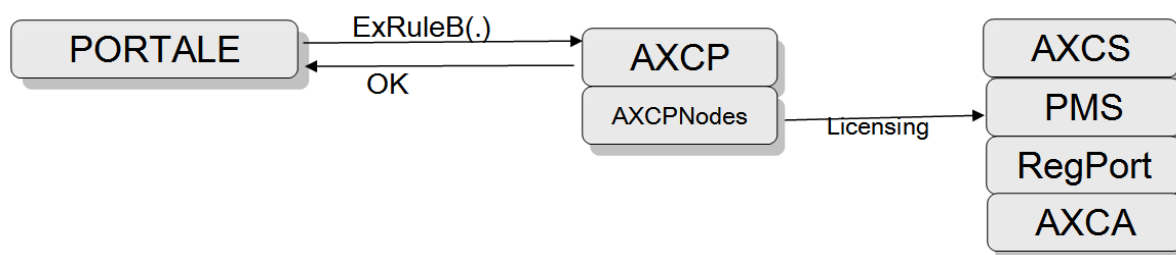
Licenses production for final users

The Portal engages the execution of AXCP Rule B (the description of whom will follow) for production of one or more licenses for one or more final users (AXUID list) for one or more objects (AXOID list). The activation of Rule B takes place by the AXCP Scheduler (simply named as AXCP in the following figure). In substance, producing the final license for the one user, the AXDID allows the user identified by AXUID to utilize the object identified by AXOID, according to certain written conditions formalized in MPEG-21 REL/AXMEDIS.

Remark

- o The users must be registered and certified. They are identified by their AXUID that must be known and stored into the Portal database, otherwise the Portal should not have all data for production of licenses non-demand or for each category. In a subscription model the collection and management of the user database can be delegated to the AXCP.
- o The objects must be protected and identified by their unique AXOID, which has to be known and stored into the Portal database. They are acquired from the feedback of Rule A execution. Otherwise the Portal could not perform the production of specific licenses for such objects, for the identified users;

The licenses are produced on the base of the distributor ID, AXDID. This can be used and coded directly in the body of Rule B. Such a rule uses the AXOID, the AXUID and the information on the business model for the production of Licenses. The Licenses can be produced even by starting from some templates accelerating their production.



The protected objects can be used by users:

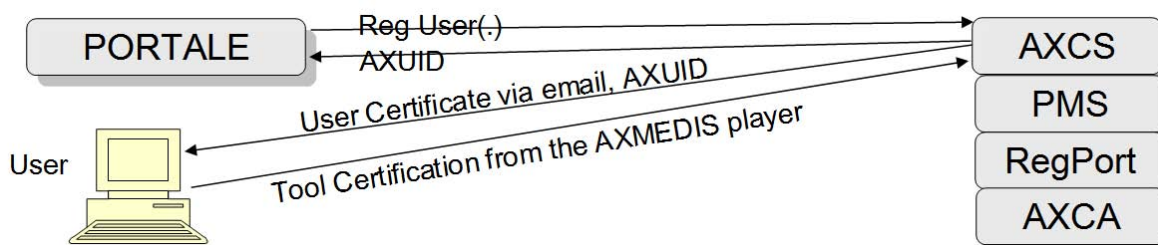
- o that are registered on AXCS and thus have an AXUID;
- o that own an AXMEDIS player installed and certified, according to the standard procedure for guided certification, and that have installed their user certificate into the AXMEDIS player;
- o for whom the Portal has produced a license with Rule B. It has to be reminded that a license is simply stored in the PMS, and the player requests the Grant Authorization for the play (exploitation of right), and it has been given to it, only if the player is certified. These operations are completely transparent for the final user and are automated.

User registration

The user registration can be performed by the Portal (aware of users' personal data) through and AXCS service or by requesting that service via the AXCP. In both cases the connection is performed via web service command. The AXMEDIS RegPort does not request the knowledge of the personal data and it is finalized to the production of an unambiguous AXUID and User certificate. This solution is always preferable by distributors. In fact, in this way we can avoid the users to reach front ends that are not aligned to the content distribution Portal style, look and feel and services. Another possibility is to delegate the registration to the user, which can access directly on the AXMEDIS Registration Portal.

The registration allows at

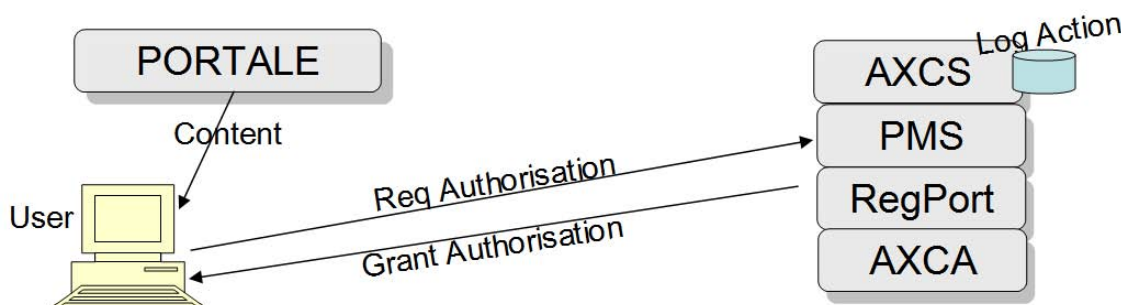
- o the user and at the distribution to know the proper AXUID, which is sent via email to the user and in response to the WebService call to the distributor. The distributor may delegate the AXCP to make this;
- o the user receives by email a certificate that has to be imported into the AXMEDIS player to complete the certification of the player itself;
- o the Portal has to know the AXUID of the users registered to produce licenses for them. If the Registration is performed by the AXCP, the Portal could even do not manage the AXUID.



The users receive by email a certificate that they have to put into their AXMEDIS player, and then proceed to the player certification. The player itself guides the user in these operations. In the case in which, they do not perform such a procedure, they will not be able to use the contents licensed for them.

Content fruition

As content fruition we intend the use of an AXMEDIS object by the user. The AXMEDIS content may be obtained (for example via download) by the users, according any transmission channel and modality, therefore that part is not detailed in this document. Furthermore, the user has to establish with the Portal (content distribution service) an business agreement that may imply an economic transaction. AXMEDIS DRM supports different business models concretely formalized in the license production and supported by all AXMEDIS tools.



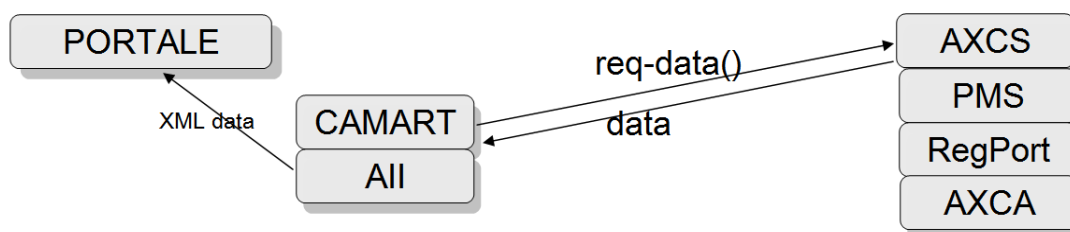
To use the AXMEDIS protected content the users must be registered on AXCS and must have and AXMEDIS player installed and certified, according to a simple certification procedure guided by the player itself. On this line, the Portal needs to produce a license with Rule B. At the moment of the fruition, the AXMEDIS player asks for the Grant Authorization to the AXMEDIS DRM in a transparent manner for the user itself. In the case of authorization, the request is stored as an Action Log (in to the AXMEDIS DRM servers) and the Grant Authorization is released in a transparent manner to the user's player. AXMEDIS players are available for PC, STB/PVR, PDA, etc. for IPTV, VOD, etc.

For the effective fruition of AXMEDIS content by the final user, it is possible to use one of the several AXMEDIS players for PC, PDA, STB, mobiles, etc. They can be freely downloaded from the AXMEDIS Portal, and at the end of this document the links are reported. Some of those players can be customized to make visible the brand/logo of the distributor. The AXMEDIS Player Active X can be used to integrate the AXMEDIS player into HTML page of the Portal so that to make simplex the integration. For details see the technical note: http://www.axmedis.org/documenti/view_documenti.php?doc_id=3845

Acquisition of Consumption data

This part is optional/additional into the AXMEDIS DRM solution. On the basis of the rights consumption specified into the licenses all the actions performed by the users (Action Log) are stored on the AXCS server. This information can be requested in an automated manner by the AXMEDIS tool CAMART, that can be installed on a remote server, or on the Portal BackOffice. All the information stored by CAMART can be exported through XML into various formats by using AXMEDIS tool All. A conversion profile can be defined according to the needs of the administrative database. The obtained can be used in producing monthly reports (or reports with different periodicity), or maybe for statistical purposes: for instance to understand the commercial data of a certain songs in a given region or period.

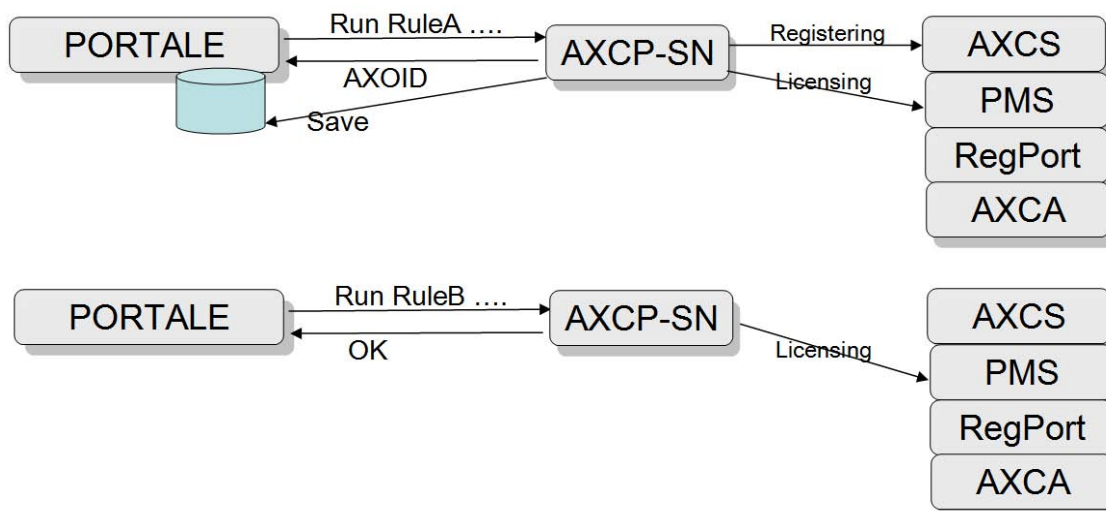
The commercialization of pay-per-play licenses can be performed before the execution of Rule B, for a certain object, for a certain User. This implies that the production of the licenses for the pay per play can be performed typically on demand. On the contrary, the collection of the activities stored (right consumed) into the Action Logs can be useful for producing a monthly and or/bill payment. The access to the Action Log is also of interest to know statistical information about the contents exploitation.



Alternative approach to simplify the integration

As an alternative, the AXCP Scheduler plus the AXCP Nodes can be substituted by a single process executed into an MS Windows Shell to execute directly a single Rule (e.g., Rule A and/or Rule B). This option is advisable only in case in which the Portal presents a light workload, in other words, in the case it is needed to produce a restricted number of objects and licenses per day, hour, or minute. In that case, what has been called previously "AXMEDIS Back office" could be installed completely into the Portal server computer. Thus, when in presence of limited workloads, the AXCP solution (AXCP Scheduler plus Nodes) can be substituted by a single process to be put in execution by the Portal. That process is named as AXCP-SN (AXCP Standalone Rule Executor), and it is capable of executing a single rule for each execution simply with a command such as: "c:\> axruleexecutor.exe Rule A-ID"

If the requests in terms of performances in producing contents and/or licenses are high, the solution based on AXCP allows is a scalable solution which distributes all the requests on GRID Nodes. This can be performed even by activating a rule from the Standalone Rule Executor requesting the execution of other rules on the AXCP Scheduler (realizing in this manner a decoupled hierarchical scalable solution).





The solution based on the Standalone Rule Executor is certainly simpler and cheaper (in terms of integration development), but at the same time less flexible. It is advisable to start with that minimal and simpler solution, and then to adopt a more complete solution based on a Web Service and an AXCP Scheduler, with one or more Nodes, when the Portal workload grows. Each rule, even if put in execution by the Standalone Rule Executor can produce calls on eventual Web Services or http to communicate the AXOID and/or the fulfillment of the rule itself.

Integration and set up

On the basis of the previous description the introduction is limited to:

- o Installation of an AXCP Scheduler/AXCP Node, even also on a single server with a single node. Or maybe of a single Standalone Rule Executor for the execution of rules from the system command line directly on the Portal;
- o Installation of AXMEDIS DRM: AXCS, PMS, RegPort and CA (they are MS Windows application). For the first trial phase, it is suggested to use those provided by AXMEDIS and installed in DSI DISIT;
- o optional installation of AXMEDIS CAMART and All (they are MS Windows applications) on the Portal Server. They are strictly necessary only when the business model is based on consumption, billing;
- o set-up of Rule A for object production. For details and examples related to this aspect, please refer to the following draft in the document
- o Set-up of Rule B for license production. For details and examples related to this aspect, please refer to the following draft in the document;
- o set-up of a Client Web Service on the Portal to call the AXCP WS Server for the invocation of rules according to the WSDL described in [axmedis-de3-1-2-3-6-spec-of-ax-content-processing-update-v1-7.pdf](#). In case of the solution AXCP Scheduler and Nodes has been chosen, the AXMEDIS Framework collects some WS Clients
 - o As an alternative, it is possible to use the Standalone Rule Executor for the execution of a rule directly on the portal, or to call the scheduler from a further rule. In this way, it is possible to avoid to set up the Web Service Client.
- o Set up of a Web Service Server on the Portal which has to be called by AXCP Rule for the delivery/reception of ACK and other information such as the AXOID, etc. (please refer to rule A). In the language, in which the Rules are written (JavaScript), there are many facilitations to create a WS Client on the basis of WSDL, so that to call any WS. On AXMEDIS.ORG there are many examples that can be chosen as model to start coding.
 - o As an alternative, all the information coming from ACK (notification of a concluded process) or everything else coming from the rules, can be transmitted writing some files in common areas or with HTTP/HTTPS commands, avoiding in this case to set up the Web Service Server,
- o Set up of a Web Service Client (on the Portal) calling the AXCS WS Server for user registration according the WSDL described in [axmedis-de3-1-2-2-13-spec-of-axcs-and-networks-v1-5.pdf](#). On the AXMEDIS Framework there are some examples of these WS Clients. This permits at the Portal to maintains and controls the user registration.
 - o In alternative, the users can be pushed to make the registration into the AXMEDIS RegPort, avoiding, in this case, to set up the Web Service Client.
 - o as an additional alternative, it is possible to delegate a Rule to make the registrations of one or many users on the basis of an object database an User list and business models. In this manner, it is possible to avoid to set up the Web Service Client. This Rule can be executed by the AXCP Scheduler and its nodes or by a Standalone Rule Executor.

AXCP Rule A

Main steps of Rule A:

- o rule parameters reading, for example the identification of the resources to be used in the object to be produced, the metadata ID, etc.;
- o acquisition from the database of metadata and digital resources of the AXMEDIS object to be produced;
- o creation of an AXMEDIS object on the basis of such information:
 - o eventual conversion and adaptation of digital resources and metadata into preferred formats;
 - o eventual storage of a non-protected AXMEDIS object once produced;
- o registration of the AXMEDIS object produced on AXCS and acquisition of the corresponding AXOID.



- o eventual saving of an non-protected but registered object;
- o protection of an object with one of the available protection algorithms (automatic communication of protection model and information to the AXCS);
- o object saving on disk and/or database, one or more.
 - o eventual sending of the object through various communication/distribution channels, as well as the possible publishing on the AXMEDIS P2P;
- o production of a mother-license (license that authorizes the distributor to produce final user licenses) and sending it to the AXMEDIS PMS.
 - o Eventual production of a final user license and sending it to the AXMEDIS PMS. The child license authorize itself (AXDID) for the exploitation of the content rights;
- o Return of the AXOID as a return parameter to the Portal. Return of the completion of the procedure through the invocation of a WS or via an HTTP call, or by writing of a file or database, etc.

This rule can be simply realized in code by starting from those described and available as examples into the bibliography, and on AXMEDIS Wiki portal:

<http://www.axmedis.org/tiki/tiki-index.php?page=AXMEDIS+Content+Processing+Scripts>

AXCP Rule B

Rule B main steps:

- o parameters reading as AXOID, AXIUD, etc. (or lists, located for instance in a file or via XML), business model, and/or kind of license;
- o creation of a license according to the business model. For license creation it is possible to start from already prepared templates (it needs just to substitute the user, object IDs and conditions);
- o posting of the license on the AXMEDIS DRM (PMS);
- o return to the Portal about the completion of the procedure by means of the invocation of a WS or HTTP call, writing on a file or database, etc.

This rule could be realized starting from those available on the AXMEDIS portal. The same rule can also create groups of licenses on the basis of AXOID and AXUID of groups, etc.

General Technical Information on AXMEDIS DRM and AXCP

AXMEDIS DRM is developed to work on MSWindows operating system (some of them can also work on Linux). The AXMEDIS servers can provide: portals and registration services, authority certification (all the instruments and AXMEDIS users are certified, standard X.509), AXMEDIS Certifier e Supervisor (AXCS) and AXMEDIS PMS. Customizations can be produced according to users' needs.

The AXCP solution is

- o capable to work on MS Windows operating system. The AXCP Scheduler and Nodes can be executed on high performances multi-CPU, or even on single computers.
- o available as a software solution or as integrated hardware/software solution, ready to be integrated into the Portal.
- o reliable, scalable, fault-tolerant. The Nodes AXCP can run many instances of the same rules on the same contents, allowing the set up fault tolerant solutions and the recovery in case of server/disk error. The AXCP nodes are capable if reconnecting automatically to the server after interrupt of connection. They can be allocated in a local network as remote.
- o the state of the AXCP Scheduler is continuously saved allowing recovery of the latest stable status.
- o scalable for what concerns the number of the nodes and AXCP schedulers. It may work on a single computer, as well as dozens computers both industrial and desktop. Each note can share the file system and the access to the network and databases.

AXMEDIS Affiliation and Adoption

AXMEDIS has been adopted and currently trialed by several industrial partners, who have expressed their appreciation (see <http://www.axmedis.org/ibc2007/>). AXMEDIS is open and allows you to access source code, reports, technical support, training days, tutorial material, technical notes and documentation, by means of the affiliation program. AXMEDIS consists of over 38 partners (such as: TISCALI, EUTELSAT, Telecom Italia, TEO, ELION, HP, BBC, Giunti Labs, AFI, ACIT, EXITECH, XIM, SIAE, SDAE, etc.). AXMEDIS allows you to exploit innovative results with new tools and solutions for your needs.



References

- o AXMEDIS Affiliation:
http://www.axmedis.org/com/index.php?option=com_content&task=view&id=12&Itemid=39
- o Affiliation document: http://www.axmedis.org/documenti/view_documenti.php?doc_id=1751
- AXMEDIS General overview and Tools , Flyer on General Overview: [High-quality](#), [Low Quality](#)
 - o Slides: [100 and more reasons to adopt AXMEDIS](#)
 - o Video: [Flash executable, 100 and more reasons to adopt AXMEDIS](#)
 - o Report: [AXMEDIS Framework for all, an overview of AXMEDIS](#)
 - o Slides on: [AXMEDIS overview at the last USER GROUP meeting, July 2007](#)
 - o Slides on: [AXMEDIS INTEGRATED DEMOS shown at the last USER GROUP meeting, July 2007](#)
 - o Video of: [TEO VOD distribution on Kreatel STB with AXMEDIS MPEG-21](#)
 - o Video of: [BBC trial of AXMEDIS, content recording and production](#)
 - o Video of: [AXMEDIS MPEG-21 STB/PVR of MBI, July 2007](#)
 - o AXMEDIS PC Player: [AXMEDIS Player for PC, MPEG-21 player, SMIL, HTML, MPEG-4, cross media, more than 200 file formats](#)
 - o AXMEDIS MultiSkin PC Player: [AXMEDIS Multiskin Player for PC, MPEG-21 player, SMIL, HTML, MPEG-4, cross media, more than 200 file formats](#)
 - o AXMEDIS ActiveX and .Net PC Player: [AXMEDIS Active X Player for PC for Web Pages, AXMEDIS .Net Player, MPEG-21 player, SMIL, HTML, MPEG-4, cross media, more than 200 file formats](#)
- **AXMEDIS Content Processing Tools**
 - Technical Notes EN on: [AXMEDIS Content Processing GRID all features listed](#)
 - Technical Notes IT on: [AXMEDIS Content Processing GRID Tutte le caratteristiche descritte](#)
 - Flyer on: [AXMEDIS Content Processing GRID, AXCP](#)
 - Examples: [A collection of AXMEDIS content processing scripts for the automated content production and backoffice management](#)
 - Manual: [AXMEDIS Content Processing GRID Script language user manual](#)
 - Development Tool Kit: [AXMEDIS Plug in Development tool Kit with examples \(for creating your content processing and protection tools\)](#)
 - Tutorial on: [Content Processing, HOW TO Automatically produce AXMEDIS objects from your CMS](#)
 - AXMEDIS Content Production Tools: [AXMEDIS editor and GRID AXCP tools, PnP, DRM editor, etc., all what you need to create AXMEDIS objects and process any kind of content manually and automatically: SMIL, HTML, content adaptation,, fingerprint, crawling, indexing, cms, search, retrieval, control of P2P, etc.](#)
- **AXMEDIS P2P Network Tools**
 - Technical Notes EN on: [AXMEDIS P2P Controlled network all features listed with cases](#)
 - Technical Notes IT on: [AXMEDIS P2P Controlled network tutte le caratteristiche, con alcune casistiche](#)
 - Flyer on: [AXMEDIS P2P Controlled Network](#)
 - Manual: [AXMEDIS P2P tools user manual](#)
 - P2P Tool: [AXEPTool a P2P B2B tool for B2B, install and join the P2P network of AXMEDIS to get cross media content and TOOLS, tutorials, slides, etc. you can start downloading a file from the P2P with simple click on AXMEDIS portal web pages, look for bittorrent supported files](#)
- **AXMEDIS model and Tools for cross media content, multimedia and MPEG-21 Digital Item**
 - Technical Notes EN on: [AXMEDIS Content Model and Tools, Authoring Tools, Players for MPEG-21, PC, PDA, Mobile, STB, PVR, HDR, etc.](#)
 - Technical Notes IT on: [AXMEDIS Content Model and Tools, Authoring Tools, Players for MPEG-21, PC, PDA, Mobile, STB, PVR, HDR, etc.](#)
 - Flyer on: [MPEG-21 Editor, MPEG-21 Authoring, MPEG-21 players \(PC, PDA, STB, Mobile, etc.\) and model](#)
 - Examples: [A collection of AXMEDIS MPEG-21 OBJECTS that can be authored and played by AXMEDIS tools](#)
 - Tutorial on: [Content Production Tutorial, HOW TO produce AXMEDIS objects](#)
 - Report: [An overview of AXMEDIS MPEG-21 TOOLS](#)
- AXMEDIS MPEG-21 Tools for DRM
 - o Technical Notes EN on: [AXMEDIS DRM, MPEG-21 DRM, Interoperable DRM](#)
 - o Technical Notes IT on: [AXMEDIS DRM, MPEG-21 DRM, DRM interoperable](#)
 - o Flyer on: [AXMEDIS MPEG-21 DRM](#)
 - o Report: [An overview of AXMEDIS MPEG-21 TOOLS](#)
- AXMEDIS PDA player



- Tools and demos: [AXMEDIS PDA player for AXMEDIS MPEG-21 content please unzip, copy the CAB in your PDA and click to install, the other zip into the zip contains a lot of AXMEDIS objects adapted for PDA including resources with presentations layer based on MPEG-4, HTML and SMIL](#)
- Additional Content: [Additional AXMEDIS MPEG-21 objects for PDA: HTML, SMIL and MPEG-4](#)
- Video and demos: [AXMEDIS PDA player at work](#)
- [SLIDES of the General Tutorial to understand and start with AXMEDIS:](#)
 - [Part 1 Video General Tutorial](#)
 - [Part 2 Video General Tutorial](#)
 - [Part 3 Video General Tutorial](#)
 - [Part 4 Video General Tutorial](#)
 - [Part 5 Video General Tutorial](#)
 - [Part 6 Video General Tutorial](#)
- [Content Distribution Tutorial, multichannel distribution](#)

Examples of distribution channels based on AXMEDIS

- Content Distribution via Internet toward PC
 - [Distribution on Internet the TISCALI demonstrator](#)
 - [DE9.4.4 Integrated Prototype of content production and distribution on-demand for PC](#)
- Content Distribution toward PDAs and mobiles
 - [Distribution on PDAs and mobiles the ILABS demonstrator](#)
 - [DE9.5.4 Integrated Prototype of content production and distribution on-demand for Mobile phones, and new generation of PDAs](#)
 - [DE9.6.4 Integrated Prototype of content production and distribution to kiosks and local PDAs](#)
- Content Distribution via satellite data broadcast (DVB-S) toward PC and STB
 - Technical note 6401: "[AXMEDIS content via Satellite Data Broadcast](#)"
 - [Distribution via Satellite data broadcast the EUTELSAT Demonstrator](#)
 - http://www.axmedis.org/tiki/tiki-index.php?page_ref_id=422
 - [DE9.3.4 Integrated Prototype of content production and distribution in push and on-demand for i-TV](#)
- Content sharing with P2P AXEPTool already active:
http://www.axmedis.org/documenti/view_documenti.php?doc_id=3840
- Content distribution to licensing domains via DVB-T and P2P integration of metadata and additional information
 - [Content distribution for TV recording, the BBC case:](#)
- Content Distribution toward mobiles based on OMA
 - [Content distribution with OMA, AXMEDIS back office, the Telecom Italia case](#)
- IPTV distribution to STB
 - Technical note 6001: "[VIDEO on demand distribution for IPTV digital set-top-box](#)"
 - [Content distribution for Video on STB, the TEO case](#)
- Video on Demand, VOD, distribution to PC
 - Technical note 6501: "[ELION content on demand distribution for PC](#)"
 - [Content distribution for Video on demand, the ELION case](#)
- Multichannel and multi/interoperable DRM distribution
 - [AXMEDIS Multichannel Support and DRM interoperability](#)

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