

# **A model describing the use of the MPEG REL to help satisfy the requirements of the TEACH Act**

ContentGuard  
Version 1.0  
January 13, 2003

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**Abstract**

This paper is a companion to the white paper titled "THE TEACH ACT AND THE MPEG RIGHTS EXPRESSION LANGUAGE". The primary purpose of this paper is to illustrate the use of the MPEG REL language in educational scenarios that are covered by the TEACH Act. This paper provides an in-depth look at how a rights language and in particular the MPEG REL can be used to help satisfy the TEACH Act requirements.

## **Introduction**

Presented here is a model where a combination of DRM technologies and the MPEG rights expression language are used to support the requirements of the TEACH act. We pursue a far-reaching model where the rights language can be used "everywhere" to automate many of the processes that are needed to comply with the requirements. Although in practice, alternative methods can be used (for example Content Management Systems to manage access); a pervasive use of a rights language can enable a higher degree of automation and interoperability with other technologies and across components and vendors and thus serve as a common foundation among diverse technologies and systems.

Although a DRM system is assumed, the intent is not to provide a blue print for a DRM system, but to acknowledge the fact that a rights language cannot exist independent of a DRM system in order to provide a working solution. The DRM system and components presented here are modeled after working systems that have been developed by ContentGuard and other companies. For a more complete description of MPEG REL and its capabilities, the reader is encouraged to check the reference section.

## Background

The model presented here assumes a DRM system capable of supporting multi-tier scenarios. Multi-tier means that in addition to a content producer (or author) and a content consumer, there exist intermediaries involved in the distribution of content (and not -in general- consuming the content) such as retailers or libraries. The DRM system is one where licenses (encoded in MPEG REL) are issued and used to access controlled and/or protected content. In addition, multi-tier capability means that the issuing of licenses is also controlled by other licenses called distribution licenses.

Specifically, the DRM system that is assumed, consist of 3 main workflows where licenses are created, distributed and consumed.

During content consumption, the rendering application requires a license that specifies the rights that have been granted and the conditions under which the rights can be exercised (figure 1).

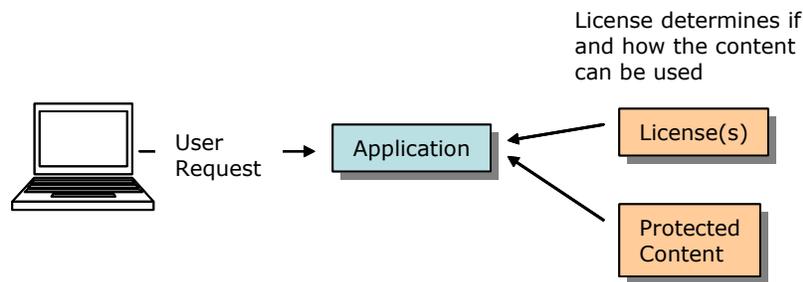


Figure 1: Usage of Content Governed by a License

During the distribution of content, licenses are issued to end-users. A distribution license controls the issuing of licenses. These licenses govern the type of license that can be issued and the conditions that need to be met (figure 2). Typically, intermediaries such as a retail shop or a library would have the task of issuing licenses to end users.

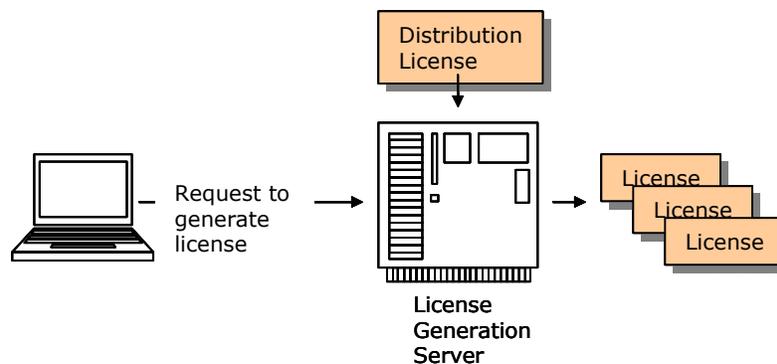


Figure 2: Generation of License Governed by a Distribution License

During the creation of content that falls under the TEACH act, the distribution licenses can be specified (figure 3).

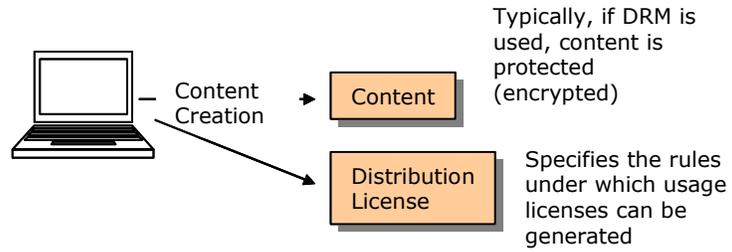


Figure 3: Creating Content for use under the TEACH act

## **Meeting the Requirements of the TEACH Act**

Use cases have been developed to illustrate the requirements of the TEACH Act

### Case 1: Use of A/V Content in a Synchronous Distance Education Class

A History class professor wishes to use a clip from a copyrighted film as part of instruction in a distance education class. The professor plans to provide the clip to students in a synchronous format. The institution owns a copy of the film on videotape. The professor and her institution must meet the following (base) criteria.

Base Criteria:

1. The institution is an accredited, non-profit educational organization;
2. The institution complies with requirements regarding establishment and notification of copyright policy to faculty and notification to students that content provided in the class is subject to copyright law;
3. The video clip is of "material assistance" to the teaching of the course;
4. The length of the video clip is a "reasonable and limited portion" that is less than the entire copyrighted work;
5. The video clip used is from a legally obtained copy of the copyrighted work;
6. The broadcast of the video clip is limited to students enrolled in the course
7. The institution applies technological measures that prohibit the retention of the video clip by recipients (students) for longer than the class session as well as further dissemination of the video clip;
8. The video clip is provided under the direction or supervision of the instructor.

### Case 1-A: Use of A/V Content in an Asynchronous Distance Education Class

The class being taught is asynchronous and the instructor still wants students to be able to access the clip from the film.

In addition to the Base Criteria, the professor and her institution must meet the following criteria:

9. The video clip is stored on secure servers under the control of the institution
10. Multiple copies of the video clip may be made to facilitate asynchronous transmission
11. The video clip is made available to students for no more than one class session

### Case 1-B: Use of Copy Protected A/V Content in a Synchronous/Asynchronous Distance Ed Class

The university owns a DVD version of the film, but the DVD is copy protected in a way that makes it impossible for the university to copy the contents of the DVD onto its server. In that case the TEACH act allows the university to digitize or otherwise obtain a copy that can be placed on the server. It does not allow the university to defeat the copy protection measures on the DVD. That would violate the Digital Millennium Copyright Act (DMCA). An additional criteria is relevant.

## 12. The DMCA still applies

### Case 2: Creating a class from material in a repository

A large school district notices that portions of the same films are used in many classes in the district. In response to this, the district creates a library of digitized films and news clips. Teachers in the district use commercial course management systems to create online portions of classes. The district would like to integrate this system with the digital library so that teachers can drop links to portions of the digitized material into their online course components when they are creating them.

To do this, the district must ensure that the TEACH act requirements are met. For example:

13. Digitized content must be available only when its use is authorized and being used in accordance with TEACH act requirements. Precautions must be taken that prevent direct access to the digital library that circumvent the course management system and hence circumvent the "under the direction or supervision of an instructor" requirement.
14. Safeguards must be put in place to allow only limited portions of a digitized film to be viewed without knowing what portions an instructor might choose.
15. Responsibility for ensuring that content is legally and properly obtained must lie with the digital library, not with the teacher or the student, but copyright notices must still be displayed when the material is accessed.

### Case 2-A: Repository Open to Public Search and Educational Use

The district successfully creates a digital library as above but now wants to make it available to all educational institutions. It allows the public to search for material and makes material available via appropriate links for proper educational use.

16. To do this, there must be assurance that the material is being used properly (e.g., by an accredited institution and under instructor direction or supervision). Possible, rights information can be used as part of the searchable metadata.

### Case 3: Students create class project

A foreign language class is asked to put together a fictional news report on a day in the life of a small city where the language is spoken. The class draws material from sources (under fair use) and creates a new work. The class itself wishes to view this work and the teacher wishes to make it available for use by future classes.

17. In cases like this, local laws, policies, and restrictions may apply. It may be necessary to obtain releases from all students involved in the project, or from their parents or legal guardians, to use their material in another setting. Furthermore, Fair Use, which is completely independent of the TEACH act, may need to be policed in some way.

Following is a table listing the requirements/criteria developed in the use cases and how can DRM and the MPEG REL help meet those requirements

TEACH Requirement	How can DRM/DRL contribute
<p>1. The institution is an accredited, non-profit educational organization</p>	<p>In order to regulate the use of content under the TEACH act one can manage or control the issuing of licenses that are needed to access such content. In MPEG REL, "distribution licenses" are used encode the rules under which content can be distributed. Distribution licenses can also define the rules under which the content can be consumed.</p> <p>Distribution licenses are created during content creation (this is the content that a professor decides to share with a class under the TEACH Act). For example, consider the following workflow: A professor requests that a librarian prepares some content for a class. The librarian creates/prepares the content and defines and associates a distribution license. This distribution license grants the professor the right to issue usage licenses to the students in the class. As a method of meeting this requirement, the distribution license can require that the professor possesses some attribute. In this case, the attribute may be that the "professor is a current professor at an accredited, non-profit educational organization".</p> <p>These attributes can themselves be encoded with the MPEG REL in the form of a "license-certificate", and can be issued to professors by the institution or a third party.</p> <p>During the issuing of usage licenses, a license generation server would interpret the distribution license and determine that certain conditions apply. In this scenario, it requires that the entity requesting the issuing of usage licenses (the professor), possesses an attribute (a license-certificate) specifying that indeed the professor is employed in an institution that is educational, non-profit and accredited.</p> <p>Figure 4 illustrates this process.</p>
<p>2. The institution complies with requirements regarding establishment and notification of copyright policy to faculty and notification to students that content provided in the class is subject to copyright law</p>	<p>A DRL (an MPEG REL license) can regulate use of content at the point of consumption. In this scenario, the usage license can specify as a condition that the student (the user) have been notified (and read) of the copyright policy and the conditions under which such content can be used.</p> <p>One way to meet this requirement is to issue students or users license-certificates similar to the one described above, but this time "certifying that the student has read and understood the copyright policy" [one mechanism is to post the policy on a web site and have students go through a click through process, resulting on the issuing of the license-certificate]</p> <p>The usage license can then express as a condition, that the student (or user) present or possess such license-certificate</p> <p>Similarly, a distribution license can also specify such condition.</p> <p>Combining this scenario with the scenario above, the distribution license would then require that the requester present 2 license-certificates: one about being part of a non-profit, accredited education institution and the other about having read the copyright policy.</p>
<p>3. The video clip is of "material assistance" to the teaching of the course</p>	<p>This is a requirement of the TEACH act, and can be met without the assistance of a DRM/DRL. It is the instructor who would determine of material is necessary for the teaching of the course. Once the determination is made a DRL can be used to denote the determination of suitability for a course (see item 17 below).</p>

TEACH Requirement	How can DRM/DRL contribute
4. The length of the video clip is a "reasonable and limited portion" that is less than the entire copyrighted work	The MPEG REL can stipulate conditions such as time conditions, counts (number of chapters) and other metrics that can be detected and enforced by the application. For example, the license can specify as a condition that the user can only any 10 minutes portion of a video
5. The video clip used is from a legally obtained copy of the copyrighted work	<p>The possession of a license can be a "proof of purchase" for (digital) content. This is assuming that digital content is traded and controlled by licenses like the ones supported by DRM systems.</p> <p>Supposing now that a video clip is extracted and digitized, a system that allows the issuing of licenses for the video clip, can in addition require as a condition that an original license exists to "prove" that the content was legally obtained.</p> <p>This method allows that the "proof of purchase" be always checked to ensure the legality of the original material.</p>
6. The broadcast of the video clip is limited to students enrolled in the course	<p>A method to limit access to a video broadcast is to limit its usage at the point of consumption. In this scenario, a usage license regulates the use of content after it is interpreted by the rendering application. The usage can specify as a condition that the user "be a student enrolled in the course".</p> <p>This attribute that a student may possess can be encoded in a license-certificate. Example: Students enroll in class. Upon enrollment a license-certificate is issued indicating that the holder is a student enrolled in a class i.e., "enrolled in class 105A". When instructor issues license for some content, one of the conditions in the license is the possession of the aforementioned license-certificate.</p> <p>Figure 5 illustrates this scenario.</p>
7. The institution applies technological measures that prohibit the retention of the video clip by recipients (students) for longer than the class session as well as further dissemination of the video clip	<p>The MPEG REL is part of the technological measures. One example to limit access to content is to express as conditions time limits or express as conditions the possession of a license-certificate which itself has time limits (for example a license-certificate asserting the fact that student is actively enrolled in a certain class, and the license is valid until the end of the class period).</p> <p>The MPEG REL can also specify "tracking" conditions. For example a condition requiring the checking with the registrar database whenever a license is exercised. MPEG REL can also specify as conditions other constrains such as a specific rendering application, a specific domain where the content can be consumed.</p> <p>Often in DRM technologies, the content can be protected through encryption, so that "retention" of content is not an issue. Upon expiration of the licenses, the decryption keys are no longer accessible.</p>
8. The video clip is provided under the direction or supervision of the instructor	The model here is that the instructor (or delegate) would be the "issuer" of the licenses. Instructors are given permission (which can be further controlled by the issuance of distribution licenses) to issue licenses to their students.
9. The video clip is stored on secure servers under the control of the institution	One way that MPEG REL can help in this area is to first issue licenses that point to content on servers. Then the "accessing" of the license can result in a link to the content. In practice, many DRM systems encrypt the content so that storage in secured servers is not necessary.
10. Multiple copies of the video clip may be made to facilitate asynchronous transmission	Modern technology allows asynchronous access even on a single copy if content is delivered through streaming. DRM can make available any number of copies and disallow their indiscriminate use through the use of encryption and usage licenses.

TEACH Requirement	How can DRM/DRL contribute
11. The video clip is made available to students for no more than one class session	In a DRM system an application would only access (display, etc) the video clip upon verification of a valid license. MPEG REL Licenses can include as a condition a time period, which can expire at the end of a class session. Modern DRM systems such as Microsoft Windows Media 9 operate in this fashion.
12. The DMCA still applies	<p>This requirement addresses the fact that even though the TEACH act allows uses of protected content under certain educational settings, it does not allow the use of software to defeat protection mechanisms.</p> <p>However, in a model where a rights language is used to specify rights in a more granular way than the currently binary mode protection mechanisms, a license can be used as a record of which rights have indeed be granted.</p> <p>Therefore, when there are usages that are more granular than play-not play, a license can help determine whether there has been a breach of the DMCA.</p>
13. Digitized content must be available only when its use is authorized and being used in accordance with TEACH act requirements. Precautions must be taken that prevent direct access to the digital library that circumvent the course management system and hence circumvent the "under the direction or supervision of an instructor" requirement.	<p>There are different methods to protect content in a repository: Content can be encrypted so that it is inherently protected no matter where it is. Access to repositories can be controlled so that only authorized request are allowed.</p> <p>MPEG REL can express both authorization to content and authorization to repositories. For example, MPEG REL can express a license to play a video clip and can also express a license that allows browsing a digital library.</p> <p>The strength of the protection is determined by the choice of technology, for example, the following are inherently more secured mechanisms: encrypted streaming, encrypted content download, anti-tamper methods and trusted devices and applications.</p>
14. Safeguards must be put in place to allow only limited portions of a digitized film to be viewed without knowing what portions an instructor might choose.	This depends on the granularity of describing the content. Some of this technology is being invented by the MPEG standards (Digital Item Declaration part). An example of how MPEG REL can be used is to have the entire content protected (encrypted) and to have the issuer of a license (the instructor) specify in the license the parts of the content to which rights are granted.
15. Responsibility for ensuring that content is legally and properly obtained must lie with the digital library, not with the teacher or the student, but copyright notices must still be displayed when the material is accessed.	<p>(Also see requirement 5 above).</p> <p>Display of a copyright notice can be specified in every license as a condition of exercising the rights granted by the license.</p> <p>However, the task of displaying a copyright notice that is not part (but associated with) of the content is not a trivial task; however different technologies (such as a pop-up window, javascript, etc.) can be utilized.</p> <p>The license can trigger this event by specifying such condition. One emerging technology is to invoke a web service that can interact with a terminal (a PC, wireless device, etc). The MPEG-REL can specify that a web service is to be invoked and encode the requirement of displaying copyright as a condition for the exercise of rights.</p>

TEACH Requirement	How can DRM/DRL contribute
<p>16. Repository open to public search and educational use</p>	<p>MPEG REL can express both authorization to content and authorization to repositories. For example, MPEG REL can express a license to play a video clip and can also express a license that allows browsing a digital library.</p> <p>Opening to "the public" can be implemented with controlling the access to the digital library. Once content is identified, the same process can be used to issue licenses to entities outside of the institution. In this scenario, an administrator of the library could issue distribution licenses to the instructor at the other institution. That instructor would in turn issue license to her students.</p> <p>Both internally and externally, the contents in the digital library can also be associated with rights specifications as part of the metadata. This can provide another dimension for searches and can give the user precise information on what kind of rights can be obtained. As part of metadata, rights expressions can be in the form of "offers" or in MPEG-REL terms "license to obtain rights"</p>
<p>17. Students create a class project and wish to share the results of the project</p>	<p>It is assumed that content obtained and aggregated under fair use rights can be considered a "legally obtained" copy of the work. Having this as starting point, the processes previously described can be used to further distribute the work under the TEACH act.</p> <p>MPEG REL can be used to record the rights that are explicitly granted by the authors (the students or guardians) of the work (such as the courses it which it can be used).</p> <p>MPEG REL can be used to associate distribution licenses to these works, thereby controlling (within a DRM system) its distribution</p> <p>MPEG REL can be used to associate usage licenses to these works, thereby controlling (within a DRM system) its consumption</p>

## **Some concepts in detail**

### Multi-tier model

A multi-tier model is one where more than one layer participates in the distribution of content. For example, a professor or a librarian prepares content that is going to be used in a class. Then an instructor distributes the content and issues licenses to his/her students. The students then consume the content in accordance to the issued licenses.

During the content creation or preparation step, the distribution rules can be defined through a distribution license. Distribution licenses determine the conditions under which usage licenses can be issued. Distribution licenses can also determine the type of usage licenses that can be issued. Usage licenses are those used by end-users to consume content. A distribution license can require that the issuer (i.e., the professor) possesses some attribute. In this case, the attribute may be that the "professor is a current professor at an accredited, non-profit educational organization".

During the issuing of usage licenses, a license generation server would interpret the distribution license associated with the content and determine that certain conditions apply. In this scenario, it requires that the entity requesting the issuing of usage licenses, possesses an attribute (a license-certificate) specifying that indeed the institution is educational, non-profit and accredited. Figure 4 illustrates this scenario.

A generic method to "certify" that an entity has certain attributes is to generate what we called "license-certificate". A license-certificate is just an MPEG REL license asserting that the principal possesses some property such as a title or a role. As an example, a license certificate can assert that a holder of the license is a professor at a particular institution.

### Restricting use to a particular set of users

In All DRM systems, usage of content can be controlled at the point of consumption. With a DRM system that utilizes an MPEG REL, a usage license regulates the use of content. The license is typically interpreted by the rendering application.

One way to control access to a specific set of users is to specify a condition that requires the user to "show" or possess some credential. In an MPEG REL license, this is accomplished by specifying a condition that requires the holder of the license possession of some attributes.

This means that a user would "present" a license-certificate at the time of content consumption. A license-certificate is just an MPEG REL license asserting that the principal possesses some property such as a title or a role. As an example, the license-certificate can assert that the license holder is an enrolled student of a specific course.

Figure 5 illustrates this scenario.

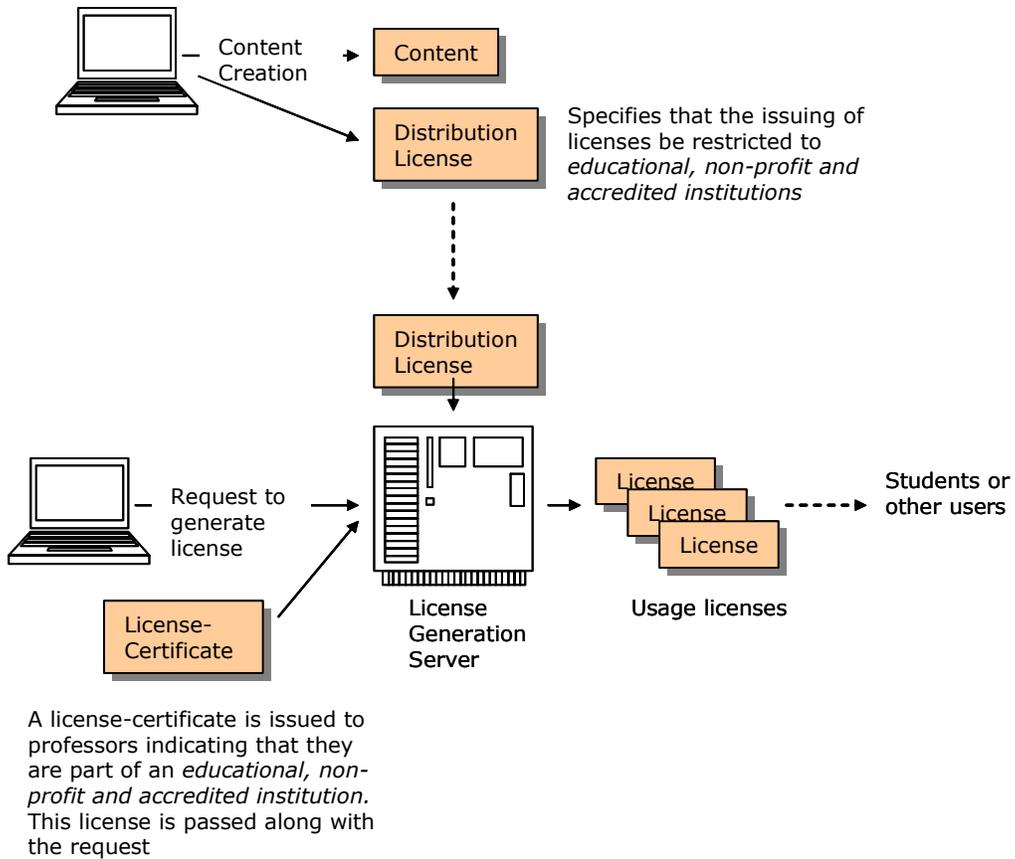


Figure 4: Creating Content for use under the TEACH act

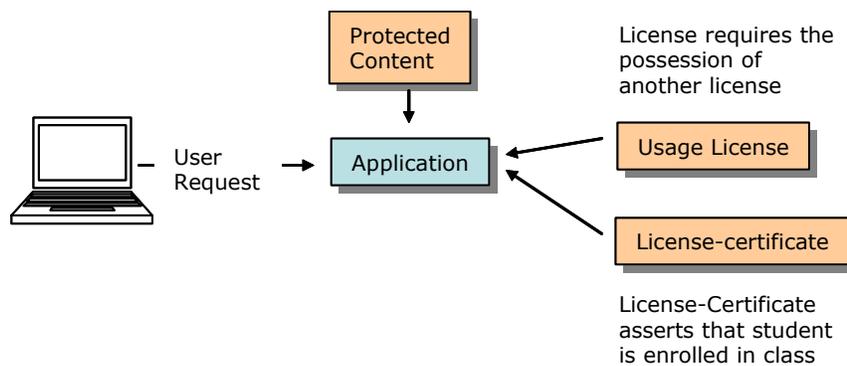


Figure 5: Usage of Content Governed by students enrolled in class

## **Acknowledgments**

The TEACH ACT scenarios and requirements were derived from work by Robby Robson of Eduworks ([www.eduworks.com](http://www.eduworks.com))

## References

MPEG-21 Rights Expression Language.

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Examples on how a rights language can be used in diverse content distribution and usage scenarios.

<http://www.contentguard.com/reference.asp>

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