
Geospatial Digital Rights Management Reference Model (GeoDRM RM)

*Modèle de référence pour la gestion numérique des droits d'utilisation
de l'information géographique*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 211, *Geographic information/Geomatics*, jointly with the Open Geospatial Consortium, Inc. (OGC).

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Introduction

To create a marketplace, individuals who own something of value (here a resource) shall have some level of assurance that they will be able to obtain fair value for its use or purchase. In a digital world, due to the nature of digital resources and commerce, most digital entities are not sold in the usual sense. When a user acquires an application, he actually acquires the right to use a copy of the application. Possession does not equate with ownership, and a system of software and resource licensing has grown up in the digital world that ensures the following types of things:

- The user can legitimately act upon a resource if he has a corresponding licence for that act.
- The owner will maintain the resource, fixing errors (“bug-fix”) and assuring a guaranteed level of functionality.
- Optionally, the user can be asked to pay the owner of the resource based upon agreed criteria, whether that is a one-time fee, a per-machine fee, a usage fee, or some other mechanism stated in the legal contract or licence between user and owner.
- The user agrees to protect the owner’s rights based on the agreement. This usually means he cannot backward engineer code or resource, nor redistribute the resource without proper permission.
- The owner agrees to maintain the resource and allow a reasonable access to the users for any fixes that can be required. Again, the extent or degree of maintenance is stated in the user agreement.
- To create and support a large-scale, open market in geospatial resources, this type of protection is needed to ensure that a “fair value for work (investment)” ethic can be guaranteed so that suppliers can be sure of fair return on individual sales, and users can be sure of fair value for purchases of uses of resources.

This International Standard describes how this is to be done.

This International Standard does not replace any previous ISO or OGC international standards, but it is dependent upon them. Each resource and service standard that exists or will exist becomes a resource description in this International Standard, and hopefully will be subject to the same sorts of protection that are afforded to other digital resources.

Geospatial Digital Rights Management Reference Model (GeoDRM RM)

1 Scope

This International Standard is a reference model for digital rights management (DRM) functionality for geospatial resources (GeoDRM). As such, it is connected to the general DRM market in that geospatial resources must be treated as nearly as possible like other resources, such as music, text, or services.

This International Standard defines:

- A conceptual model for digital rights management of geospatial resources, providing a framework and reference for more detailed specification in this area.
- A metadata model for the expression of rights that associate users to the acts that they can perform against a particular geospatial resource, and associated information used in the enforcement and granting of those rights, such as owner metadata, available rights, and issuer of those rights.
- Requirements that are placed on rights management systems for the enforcement of those rights.

NOTE A rights management system must be necessary and sufficient: it must implement only those restrictions necessary to enforce the rights defined therein, and it must be sufficient to enforce those rights.

- How this is to work conceptually in the larger DRM context to ensure the ubiquity of geospatial resources in the general services market.

A resource in this context is a data file, or service for geographic information or process.

This abstract descriptive International Standard builds on and complements the existing standards, and defines at an abstract level a rights model to enable the digital rights management of standards-based geospatial resources. Future GeoDRM standards will be written to implement the concepts defined in this International Standard.

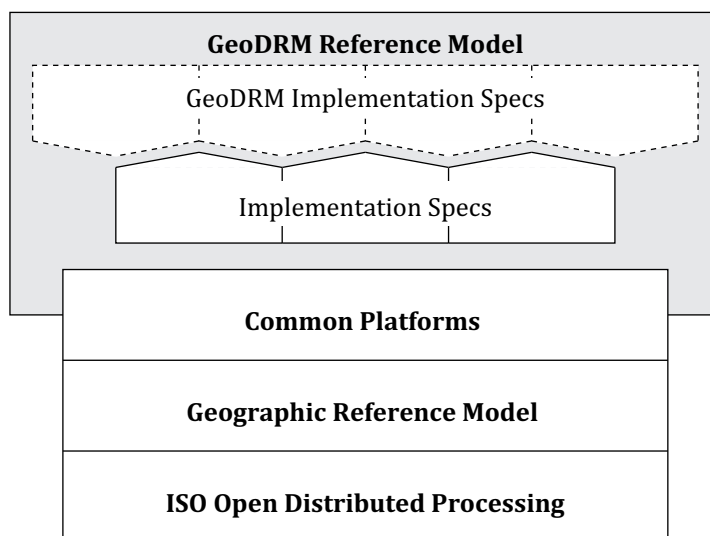


Figure 1 — GeoDRM reference model context

Figure 1 shows a simplified view of how this International Standard, the Geospatial Digital Rights Management Reference Model (indicated in grey), relates to the ISO Open Distributed Processing

standard, OGC Reference Model, and OWS Common initiative. The purpose of this International Standard is to define the conceptual framework and rights model for the future GeoDRM Implementation Standards, which will enable the digital rights management of geospatial resources.

This International Standard is not intended to delve into questions of morals, ethics, market model, or implementations any further than is necessary to express requirements against rights management functionalities and systems.

2 Conformance

Because the normative nature of a reference model is embedded in its “reference” description of the semantics of the environment which it describes, the central requirement of this International Standard is:

Any standard or implementation conformant to this International Standard shall be consistent with the semantics described within this International Standard or within the normative references of this International Standard.

Conformance with this specification shall be checked using tests specified in [Annex A](#). Conformance classes for this International Standard are

- alignment of rights expression to the abstract rights model,
- expression for applicability of rights for geospatial resources, and
- enforcement of rights for geospatial resources.

Resources that are augmented by GeoDRM licence metadata will be referred to as GeoDRM extended or enabled resources. Processing resources that have met the requirements to maintain GeoDRM resource and enforce the licensing procedures shall be referred to as GeoDRM enabled.

This is a complex subject, and [Annexes B to D](#) are informative annexes that aid in understanding the normative specification of the rights expression language.

3 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2382-6, *Information processing systems — Vocabulary — Part 6: Preparation and handling of data*

ISO/IEC 15408, *Information technology — Security techniques — Evaluation for IT security*

ISO/IEC 21000 (all parts), *Information technology — Multimedia framework (MPEG-21)*¹⁾

ISO/IEC 21000-5, *Information technology — Multimedia framework (MPEG-21) — Part 5: Rights Expression Language*

1) The MPEG 21 (ISO/IEC 21000) standard is a work in progress. It will eventually have at least 14 parts. Only the first few are available now. The intent is to eventually incorporate as much of ISO/IEC 21000 as appropriate in this International Standard in order to assure interoperability of geospatial resource DRM with that used for other multimedia information.

4 Terms and definitions

For the purposes of this document, the terms and definitions in ISO 2382-6 and ISO/IEC 15408 and the following apply.

NOTE If a term is not defined in this document, it will take the definition supplied in their original context in the last reference in the following list in which it occurs, or, if still undefined, its usual English [Oxford English Dictionary (OED) or Webster] definition.

- ISO 2382-6 for common processing terms such as read, write, copy, duplicate, input, output, collection, acquisition, transform, convert, encode, decode, search, index, edit, and extract.
- ISO/IEC 15408 for common information technology (IT) security terms such as authentication resource, authorized user, identity, security attribute, security policy, and trusted channel.
- OWS Common Implementation Specification [OGC 05-008^[13]].
- OGC Glossary^[14] for terms and examples specifically related to OGC standardized web services.
- RM-ODP^[8] for system modelling terms such as the enterprise, computational, and information viewpoints.
- ODRL,^[19] OMA DRM REL,^[15] and ISO/IEC 21000 for terms specific to rights expressions languages, such as principal, licence, right, grant, condition, and resource.

Terms that are repeatedly defined in these resources shall assume the definition supplied here in the context of GeoDRM.

4.1

access control

combination of *authentication* (4.4) and *authorization* (4.5)

4.2

agency

legal relationship of a person (called the *agent* [4.3]) who acts on behalf of another person, company, or government (called the *principal* [4.35])

4.3

agent

one who acts on behalf of another

4.4

authentication

verification that a potential partner in a conversation is capable of representing a person or organization

[SOURCE: W3C, Web Services Glossary]

4.5

authorization

determination whether a subject is allowed to have the specified types of access to a particular *resource* (4.40)

Note 1 to entry: Usually, authorization is in the context of *authentication* (4.4). Once a subject is authenticated, it can be authorized to perform different types of access.

4.6

bypass

mechanism to defeat the purpose of a subsystem by avoiding its invocation

[SOURCE: W3C, Web Services Glossary]

Note 1 to entry: Security systems are bypassed usually by using security faults in the operating system. Such *infringements* (4.21 and 4.22) are more an aspect of the operating system than of the security system. To correct this, the relationship between the security system and the operating system shall be modified to prevent bypass mechanisms.

4.7
chain of agency
sequence of *agency* (4.2) where the *agent* (4.3) in each relationship is the *principal* (4.35) of the next in the chain

Note 1 to entry: A chain of agency, with the proper agreements at each step creates a transitive agency between the agent of the first link and the principal of the last. This chain can be spoken of in either direction, either as “principal → agent = principal → agent” (normal or granting order) or “agent → principal = agent → principal” (reverse, acceptance, verification, or tracing order).

4.8
chain of licence
sequence of *licences* (4.26) that traces a *chain of agency* (4.7), where a licence is granted at each link of the chain, allowing the *agent* (4.3) at that link to act as the *principal* (4.35) in the next

Note 1 to entry: As with the chain of agency, this chain can be spoken of in either direction.

4.9
contract
agreement between two or more *principals* (4.35) that creates in each principal a duty to do or not do something and a right to performance of the other’s duty or a remedy for the breach of the other’s duty

[SOURCE: FindLaw, modified]

4.10
copyleft
licence (4.26) that accompanies some open source software that details how the software and its accompanying source code can be freely copied, distributed, and modified

Note 1 to entry: A copyleft is a form of *general public licence* (4.15).

4.11
digital licence
document or its representation that specifies the *rights* (4.42) granted to a particular user or organization with respect to a specific content or group of content

Note 1 to entry: The core concept in *DRM* (4.12) is the use of digital licences. Instead of buying the digital content, the consumer purchases a *licence* (4.26) granting certain rights with respect to the content. A licence is the mechanism by which a *rights holder* (4.43) conveys rights to another *party* (4.35), such as a consumer or distributor.

4.12
digital rights management
DRM
packaging, distributing, controlling, and tracking content based on *rights* (4.42) and licensing information

Note 1 to entry: DRM covers a much broader spectrum of capabilities and underlying technologies supporting description, identification, trading, protecting, monitoring, and tracking of all forms of rights usages for both tangible and intangible (electronic) assets, including the management of rights-holders relationships. See, for example, Reference [5]. “Digital” refers to the material over which the rights exist. “Rights” applies to the Intellectual Property rights linked to the material. “Management” covers both the defining of policy and enforcing that policy in such a way that rights are respected. The ultimate goal of a distributed DRM system is for content authors to be able to project policies governing their content into remote environments with confidence that those policies will be respected by the remote nodes.[12] For the purposes of this International Standard, DRM is taken to mean technology that enables the secure distribution (and where appropriate, sale) of digital media content on the Internet.[26]

4.13
expected risk
expected value (statistics) of loss

Note 1 to entry: Expected *risk* (4.45) is calculated by multiplying the probability of the types of *infringement* (4.21 and 4.22) by the cost of that infringement, summed up over all types of infringement.

4.14**fair use**

uses of content that are considered valid defences to copyright *infringement* (4.21 and 4.22), such as for criticism or educational purposes

[SOURCE: U.S. legal term derived from Title 17 of the United States Code, Section 107]

Note 1 to entry: Fair use is based on case-law precedents derived from general principles. The term is often misapplied to refer to the reasonable expectations of consumers to be able to use purchased content on all owned devices.[29]

4.15**general public licence****GPL**

licence (4.26) containing *rights* (4.42) accorded to the general public without an existing agreement

Note 1 to entry: GPLs can be granted by the *owner* (4.34) of a *resource* (4.40) or can be applied to a resource by law, usually as part of the copyright law. The most obvious GPL concept is *fair use* (4.14) in the United States for copyrighted material. Other GPL rights can be demanded by the source of the resource or other “public good” considerations.

Note 2 to entry: The most widespread use of GPL is in reference to the GNU GPL, which is commonly abbreviated simply as GPL when it is understood that the term refers to the GNU GPL. One of the basic tenets of the GPL is that anyone who acquires the material shall make it available to anyone else under the same licensing agreement. The GPL does not cover activities other than the copying, distributing, and modifying of the source code. A GPL is also referred to as a *copyleft* (4.10), in contrast to a copyright, which identifies the proprietary rights of material.[29]

4.16**GeoDRM enabled**

capable of maintaining *GeoDRM extended* (4.17) *resources* (4.40) and enforcing GeoDRM defined *rights* (4.42) and *protections* (4.38)

Note 1 to entry: Applied to processing resources.

4.17**GeoDRM extended (applied to resources)**

associated to GeoDRM metadata indicating types of *licences* (4.26) that apply

4.18**GeoLicence**

licence (4.26) related to geoinformation

4.19**GeoLicence resolution**

settling or resolving the status of a *GeoLicence* (4.18)

4.20**GeoLicence infringement**

act or an instance of the unauthorized access or use of protected, copyrighted, or patented material or of a trademark, trade name, or trade dress

[SOURCE: FindLaw, modified]

4.21**infringement (of a licence)**

act of a *principal* (4.35) contrary to *rights* (4.42) granted to that principal on a *resource* (4.40)

Note 1 to entry: Infringement of a *licence* (4.26) will require the *DRM* (4.12) system to be bypassed in some manner. If licences can be infringed without bypassing the DRM system, then the system is not *sufficient* (4.48).

4.22

infringement (of a right)

prevention of an act of a *principal* (4.35) consistent with *rights* (4.42) granted to that principal on a *resource* (4.40)

Note 1 to entry: Infringement of a right is a fault in the *DRM* (4.12) system. If rights can be infringed without bypassing the DRM system, then the system is not properly restricted to that which is *necessary* (4.33).

4.23

joint ownership

ownership by two or more persons each having undivided shares in the property as a whole

[SOURCE: FindLaw, modified]

Note 1 to entry: In this case, the *principal* (4.35) as *owner* (4.34) is a principal group, i.e. a group of other principals.

4.24

lease

allowing the *resource* (4.40) to be made available for a fixed period of time then returned

Note 1 to entry: During this period, the resource is only available to the lessee. Temporal constraints are required for downstream use.

4.25

lend

lease (4.24) without exchange of value

4.26

licence

representation of grants that convey to *principals* (4.35) the *rights* (4.42) to use specified *resources* (4.40) subject to specified conditions

[SOURCE: XrML 2.0 specification, part 5, modified]

Note 1 to entry: A licence represents, but is not, a *contract* (4.9) that grants a *party* (4.35) explicit rights to use Intellectual Property.

4.27

licence extents

scope or applicability of a *licence* (4.26)

Note 1 to entry: The extent can be described in spatial, temporal, or any other parameter range appropriate to the *rights* (4.42) described in the licence.

4.28

licence manager

application that tracks *licences* (4.26) available within an organization and coordinates the issuing of these licences to requesting clients

[SOURCE: New Concepts In BASIS Licensing, modified]

4.29

licensee

one to whom a *licence* (4.26) is given

[SOURCE: FindLaw]

4.30

licensing agent

principal (4.35) authorized to act on behalf of and under the control of another in dealing with third parties in the context of issuing *licences* (4.26) for specified *resources* (4.40)

[SOURCE: Derived from FindLaw for "agent"]

4.31**licensor**

issuer of a *licence* (4.26)

[SOURCE: FindLaw, modified]

Note 1 to entry: The licensor is a content *owner* (4.34) or a *licensing agent* (4.30).

4.32**map**

portrayal of geographic information as a digital image file suitable for display on a computer screen

[SOURCE: ISO 19128:2005, 4.7]

Note 1 to entry: A map is not the *resource* (4.40) itself. A Web Map Service (WMS) produces maps of georeferenced resource. Therefore, a WMS can provide many different representations of the same underlying geoinformation.

4.33**necessary**

capable of recognizing and properly acting upon all legitimate requests, as defined by the requirements of the system

Note 1 to entry: All aspects of a *DRM* (4.12) system are necessary if they do not prevent legitimate requests from execution.

4.34**owner**

one with an interest in and dominion over content as a) “legal owner” in this entry, b) one with the *right* (4.42) to exclusive use, control, or possession of content, c) a purchaser under a *contract* (4.9) for the sale of real content

[SOURCE: FindLaw, modified]

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4.35**party****principal**

person or organization that plays a role in a *rights* (4.42) *transaction* (4.49)

Note 1 to entry: These two terms are used as near synonyms from ORDL and ISO 21000. There will be no distinction between these two terms made here, but there can be distinctions in legal documents depending on local laws.

EXAMPLE In some legal traditions, “party” refers to person in a legal dispute, while “principal” can be the entity initiating a *contract* (4.9), such as an *agency* (4.2).

4.36**payment provider**

party (4.35) that has an established billing relation with a consumer

Note 1 to entry: Payment providers can be telephone and cellular companies, banks, credit card corporations, ISPs, network operators, and utility companies. The payment provider bills the consumer, deducts a fee, and forwards the payment to the content provider. The payment provider is thus responsible for the balancing of accounts.

4.37**persistent protection mechanism**

protection (4.38) mechanism that remains in force regardless of where the content of the original *resource* (4.40) is located or reproduced

Note 1 to entry: Persistent protection mechanisms involve *authentication* (4.4), *authorization* (4.5), and encryption technologies for effectively locking digital contents and limiting distribution to those who pay.

4.38**protection**

aspect of the system that lowers the capability of a *party* (4.35) to commit *infringement* (4.21 and 4.22)

4.39

provenance

information on the place and time of origin or derivation or a *resource* (4.40) or a record or proof of authenticity or of past ownership

4.40

resource

<GeoDRM> entity that is protected by a *licence* (4.26)

Note 1 to entry: In general, a resource is data, metadata (a type of data describing other resources), or some service or process that can be invoked on other resources. Licences describe *rights* (4.42) on resources and, as such, are resources in themselves.

4.41

remediation

act or process of correcting a fault or deficiency

Note 1 to entry: Remediation allows more *trust* (4.50) because it lowers *expected risk* (4.13). The first act in a remediation sequence is detection of the fault.

4.42

right

<GeoDRM> permission to act that makes a *party* (4.35) entitled to act with respect to all or part of a specified *resource* (4.40) under the terms of the license

[SOURCE: ISO/IEC 21000-5, modified]

Note 1 to entry: A right specifies an action (or activity) or a class of actions that a *principal* (4.35) can perform on or using the associated resource. A right is essentially a legally recognized entitlement to do something to or with the content of a resource.

4.43

rights holder

principal (4.35) that owns the *right* (4.42) to license rights to a *resource* (4.40)

Note 1 to entry: Rights can be by law (copyright), by agreement, or by *contract* (4.9) [the *licence* (4.26) agreement]. In the case of digital commerce, *DRM* (4.12) ensures that licences are adhered to, and that rights holders are compensated as appropriate for each *transaction* (4.49). *Agents* (4.3) of the original rights holder can also issue licences, but their ability is only under the *agency* (4.2) contract to the original principal.

4.44

rights management

<GeoDRM> tracking and controlling the use of content, *rights* (4.42), *licences* (4.26), and associated information

[SOURCE: See Bibliography reference 18, modified]

4.45

risk

value of what can be lost if *infringement* (4.21 and 4.22) occurs

4.46

sublicence

licence (4.26) granted by the original *licensee* (4.29) to a third *party* (4.35) under the grants and condition of the original licence granted to the original licensee by his *licensor* (4.31)

[SOURCE: Derived from Palmer & Dodge, LLP; (FindLaw)]

Note 1 to entry: This is essentially the *right* (4.42) to loan one's licence to another *principal* (4.35).

4.47

sublicensee

principal (4.35) granted a *sublicence* (4.46)

4.48 sufficient

capable of enforcing the requirements of a system

Note 1 to entry: A sufficient *DRM* (4.12) system would have to be bypassed if an *infringement* (4.21 and 4.22) would be possible. Proof of sufficiency can be difficult because it can be dependent on an “attack model”, which describes the sorts of attacks to which the system is immune.

4.49 transaction

set of actions joined into the same unit of work, such that the actions either succeed or fail as a unit

[SOURCE: Web Services Glossary, modified]

4.50 trust

sum total of all mitigating factors with respect to a particular *licensee* (4.29) that reduces *expected risk* (4.13)

Note 1 to entry: Trust allows the *owner* (4.34) [or his *agent* (4.3)] to act with a higher potential *risk* (4.45) because the expected risk has been lowered. This is slightly different from the plain language of trust. Normally, trust requires something, but if the *principal* (4.35) at risk decides that no risk exists, then trust exists (in the sense here) because risk has been reduced, whatever the reason.

5 Conventions

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5.1 Abbreviated terms (standards.iteh.ai)

Abbreviated terms found in the references used in [Clause 4](#) apply to this International Standard, plus the following abbreviated terms.

API	Application Program Interface
DCE	Distributed Computing Environment
DRM	Digital Rights Management
GeoDRM	Geospatial Digital Rights Management
GI	Geographic Information (services/systems) as an extension of IT
GPL	General Public License
IDL	Interface Definition Language
IT	Information Technology
ODRL	Open Digital Rights Language
REL	Rights Expression Language
SDI	Spatial Data Infrastructure (a distributed information system for geographic data)
UML	Unified Modeling Language

5.2 UML notation

Diagrams that appear in this International Standard as conceptual models of software and information systems are presented using the Unified Modeling Language, version 2.0 (UML 2.0), as described in ISO/IEC 15901 and the follow-up OMG specifications.