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**Information technology — Multimedia  
framework (MPEG-21) —**

**Part 23:  
Smart Contracts for Media**

*Technologies de l'information — Cadre multimédia (MPEG-21) —  
Partie 23: Contrats intelligents pour les médias*



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## Foreword

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## Introduction

The Moving Picture Experts Group (MPEG) standards include a set of RDF ontologies for the codification of intellectual property (IP) rights information related to media. The ISO/IEC 21000-19 Media Value Chain Ontology (MVCO) which facilitates rights tracking for fair, timely, and transparent payment of royalties by capturing user roles and their permissible actions on a particular IP entity. The ISO/IEC 21000-19/AMD1 Audio Value Chain Ontology (AVCO) which extends MVCO functionality related to the description of IP entities in the audio domain (e.g. multitrack audio and time segments). The ISO/IEC 21000-21 Media Contract Ontology (MCO) which facilitates the conversion of narrative contracts to digital ones related to exploitation of IP rights, payments and notifications. With respect to the latter, an equivalent standard has also been developed but using XML schemas, known as ISO/IEC 21000-20 Contract Expression Language (CEL).

Furthermore, the axioms in these XML schemas and RDF ontologies can drive the execution of rights-related workflows in controlled environments, for example, Distributed Ledger Technologies (DLTs), where transparency and interoperability are favored toward fair trade of music and media. Thus, the aim of this document is to provide the means (e.g. protocols and application programming interfaces) for converting these XML and RDF media contracts to smart contracts executable on existing DLT environments.

By doing this conversion in a standard way for several smart contract languages it is going to ensure that MPEG schemas and ontologies prevail as the interlingua for transferring verified contractual data from one DLT to another.

# Information technology — Multimedia framework (MPEG-21) —

## Part 23: Smart Contracts for Media

### 1 Scope

This document specifies the means (e.g. protocols and application programming interfaces) for converting MPEG-21 XML and RDF media contracts (ISO/IEC 21000-19, ISO/IEC 21000-20, and ISO/IEC 21000-21) to smart contracts executable on existing DLT environments.

### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 21000-19, *Information technology — Multimedia framework (MPEG-21) — Part 19: Media Value Chain Ontology*

ISO/IEC 21000-20, *Information technology — Multimedia framework (MPEG-21) — Part 20: Contract Expression Language*

ISO/IEC 21000-21, *Information technology — Multimedia framework (MPEG-21) — Part 21: Media contract ontology*

### 3 Terms, definitions, symbols, and abbreviated terms

#### 3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

##### 3.1.1

##### **DLT**

##### **distributed ledger technology**

distributed network of computers, ideally organized in a decentralized way, mutually agreeing on a common state while tolerating failures (including malicious behavior) to some extent

##### 3.1.2

##### **smart contract**

code deployed in a DLT or the source code from which such code was compiled

Note 1 to entry: The execution of smart contract instructions is distributed among the nodes of the DLT in which it is deployed to. This execution is triggered via a DLT transaction and produces a change in the DLT state.

### 3.1.3

#### **smart contract language**

programming language used for creating the code of a smart contract, that is then compiled in another code deployable to a specific DLT

### 3.1.4

#### **smart contract template**

source code of a smart contract written using a specific smart contract language for defining a common behavior.

### 3.1.5

#### **smart contract specification**

set of information needed for the deployment of a smart contract and for populating the data structures that the smart contract instructions are interacting with

### 3.1.6

#### **DLT address**

product of a cryptographic schema operation used to represent identities in a DLT

### 3.1.7

#### **DLT governance**

specification indicating the set of rules followed by the specific DLT protocol

### 3.1.8

#### **token**

object stored in a DLT and managed through one or more smart contracts, representing unique tangible or intangible media assets, possessions, and accountable items

### 3.1.9

#### **fungible token**

token being changeable with other tokens

### 3.1.10

#### **non-fungible token**

token being non interchangeable with other tokens

### 3.1.11

#### **MPEG-21 CEL/MCO contract**

contract represented using ISO/IEC 21000-19, ISO/IEC 21000-20 and ISO/IEC 21000-21 elements

### 3.1.12

#### **media contractual objects**

set of machine-readable objects extracted from a specific MPEG-21 CEL/MCO contract

### 3.1.13

#### **smart contract for media**

deployed smart contract that is the result of the conversion process from a specific MPEG-21 CEL/MCO contract

### 3.1.14

#### **parser**

software component that extracts a set of media contractual objects from an MPEG-21 CEL/MCO contract or a smart contract for media

### 3.1.15

#### **generator**

software component that from a set of media contractual objects generates an MPEG-21 CEL/MCO contract or a smart contract specification



**3.1.16****DLT tokens and payments manager**

component deploying a smart contract for media on a specific DLT

**3.1.17****contract developer**

actor providing the means to generate an MPEG-21 CEL/MCO contract or a smart contract in a specific smart contract language (e.g. smart contract templates)

**3.1.18****DLT system engineer**

actor providing the information needed to deploy a smart contract in a specific DLT (e.g. DLT addresses and governance)

**3.2 Abbreviated terms**

|                |                                                          |
|----------------|----------------------------------------------------------|
| <b>MVCO</b>    | media value chain ontology                               |
| <b>AVCO</b>    | audio value chain ontology                               |
| <b>CEL</b>     | contract expression language                             |
| <b>MCO</b>     | media contract ontology                                  |
| <b>CEL/MCO</b> | ISO/IEC 21000-19, ISO/IEC 21000-20, and ISO/IEC 21000-21 |
| <b>IP</b>      | intellectual property                                    |
| <b>API</b>     | application programming interface                        |

**4 Conventions****4.1 Classes representation**

The following conventions derive from the Object-Oriented Programming paradigm. In this sense Application Programming Interfaces (APIs) are represented in terms of Classes definitions and Objects.

An Object is an instantiation of a Class while a Class contains the following properties:

- Name of the represented object.
- Type of the represented object. An object Type may be:
  - Abstract which is only showing essential information with respect to an interface, but it cannot be implemented; or,
  - Concrete which is a complete specification that can be implemented.
- Hierarchy with respect to the other objects; it also introduces the sub-class which is a class that inherits the complete set of fields and methods of its super-class.
- Fields which describe the attributes associated to the represented object; Fields consist of a specific Field Type and the number of Occurrences.
- Methods which are operations performed by manipulating the object Fields; Methods accept as input a specific set of Parameter Types and provide as output a specific set of Return Types.

In the following, [Table 1](#) shows the notation for representing Classes with respect to MPEG-21 CEL/MCO objects, while [Table 2](#) describes the Types used for Fields, Parameters and Returns.

**Table 1 — Classes notation with respect to MPEG-21 CEL/MCO**

| Class          |                                                  | CEL                          | MCO                                                          |
|----------------|--------------------------------------------------|------------------------------|--------------------------------------------------------------|
| Name           | Type and Hierarchy                               |                              |                                                              |
| ClassName1     | Abstract or Concrete, sub-class of<br>ClassName2 | <i>referenceToCELObject1</i> | <i>referenceToMCOObject1</i>                                 |
| Fields         |                                                  |                              |                                                              |
| Type           | Field and Description                            | Occ.                         |                                                              |
| FieldName1Type | FieldName1                                       | 0, 1 or<br>1, n              | <i>referenceToCELObject2</i><br><i>referenceToMCOObject2</i> |
| Methods        |                                                  |                              |                                                              |
| Parameters     | Method and Description                           |                              | Return                                                       |
| ParameterType1 | method1()                                        |                              | ReturnType1                                                  |

**Table 2 — Types used for Fields, Parameters and Returns**

| Type                             | Description                                                                                                                                                                                                                                             |
|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| string                           | A sequence of characters                                                                                                                                                                                                                                |
| ushort                           | An unsigned integer number represented through 2 bytes                                                                                                                                                                                                  |
| ulong                            | An unsigned integer number represented through 4 or 8 bytes                                                                                                                                                                                             |
| float                            | A floating-point number, that is a number that can contain a fractional part, represented through 4 or 8 bytes                                                                                                                                          |
| enum                             | A set of enumerated named elements                                                                                                                                                                                                                      |
| boolean                          | A dyadic value with two possible values, True and False                                                                                                                                                                                                 |
| typeName []                      | An array of elements of type typeName                                                                                                                                                                                                                   |
| map(<br>typeName1,<br>typeName2) | A key value mapping where the key of type typeName is used to retrieve a value of type typeName2                                                                                                                                                        |
| void                             | A type used to represent "no data"                                                                                                                                                                                                                      |
| idref                            | A type used to represent a reference to a specific object, e.g. class instance. The form of classNameIdref is used to reference objects that instantiate the class className, e.g. contractIdref refers to objects that instantiate the contract class. |

## 4.2 Namespace prefixes

[Table 3](#) below shows the namespace prefixes for the MPEG-21 CEL/MCO standards and other related schemas together with their references.

**Table 3 — Mapping of prefixes to namespaces for the MPEG-21 CEL/MCO standards and other related schemas**

| Prefix   | Corresponding namespace                                                                   | References            |
|----------|-------------------------------------------------------------------------------------------|-----------------------|
| dc       | <a href="https://purl.org/dc/elements/1.1/">https://purl.org/dc/elements/1.1/</a>         | ISO 15836 [1]         |
| dii      | urn:mpeg:mpeg21:2002:01-DII-NS#                                                           | ISO/IEC 21000-3[2]    |
| vcard    | <a href="http://www.w3.org/2006/vcard/ns#">http://www.w3.org/2006/vcard/ns#</a>           | IETF RFC 2426[3]      |
| mvco     | <a href="https://purl.oclc.org/NET/mvco.owl#">https://purl.oclc.org/NET/mvco.owl#</a>     | ISO/IEC 21000-19      |
| avco     | <a href="https://purl.oclc.org/NET/aumvco.owl#">https://purl.oclc.org/NET/aumvco.owl#</a> | ISO/IEC 21000-19/Amd1 |
| cel-core | urn:mpeg:mpeg21:cel:core:2015#                                                            | ISO/IEC 21000-20:2016 |
| cel-ipre | urn:mpeg:mpeg21:cel:ipre:2015#                                                            | ISO/IEC 21000-20:2016 |

Table 3 (continued)

| Prefix   | Corresponding namespace        | References            |
|----------|--------------------------------|-----------------------|
| cel-pane | urn:mpeg:mpeg21:cel:pane:2015# | ISO/IEC 21000-20:2016 |
| cel-rele | urn:mpeg:mpeg21:cel:rele:2015# | ISO/IEC 21000-20:2016 |
| mco-core | urn:mpeg:mpeg21:mco:core:2015# | ISO/IEC 21000-21:2017 |
| mco-ipre | urn:mpeg:mpeg21:mco:ipre:2015# | ISO/IEC 21000-21:2017 |
| mco-pane | urn:mpeg:mpeg21:mco:pane:2015# | ISO/IEC 21000-21:2017 |
| mco-rele | urn:mpeg:mpeg21:mco:rele:2015# | ISO/IEC 21000-21:2017 |

## 5 Overview

### 5.1 General aspects

MPEG-21 CEL/MCO schemas and ontologies can be used by music and media value chain stakeholders to share and exchange, in an interoperable way, all metadata and contractual information connected to creative works, leading to transparent payment of royalties and reduced time spent searching for the right data. The latter is due to inference and reasoning capabilities inherently associated with ontologies. That is, knowledge and data can be derived by evidence and logic based on rich semantic copyright models expressed by MPEG-21 CEL/MCO schemas and ontologies. In this way, the data derived are unambiguously interpretable, facilitating efficient processing in business-to-consumer (B2C) and business-to-business (B2B) music and media value chains.

Furthermore, for contractual music and media asset trading, smart contracts can be used to encode the terms and conditions of a contract. They validate contractual agreements between stakeholders before a DLT value transfer is enabled. In other words, smart contracts could allow music and media royalties to be administered almost instantaneously and manage usage allowances and restrictions. Rather than passing through intermediaries, revenue from a stream or download could be distributed automatically to rights holders, according to agreed terms and conditions (e.g. splits), as soon as an asset is downloaded or streamed.

Therefore, the challenge is converting MPEG-21 CEL/MCO standardized schemas and ontologies to smart contracts that can be executed on existing DLT environments, thus enriching DLT environments with inference and reasoning capabilities inherently associated with ontologies. Note that this process will increase trust among music and media value chain stakeholders for sharing data in the ecosystem since the data will be cryptographically secured and verified on a DLT. By addressing this challenge in a standard and agnostic way, with respect to smart contract languages and thus DLT environments, it would also ensure that MPEG-21 CEL/MCO schemas and ontologies prevail as the interlingua for transferring verified contractual data from one DLT to another<sup>[4]</sup>.

### 5.2 Relationships between MPEG-21 CEL/MCO and DLTs

This subclause describes the relationships between MPEG-21 CEL/MCO elements and DLTs components, for the conversion of MPEG-21 CEL/MCO contracts to smart contracts for media and vice versa. Smart contracts for media are distinguished from generic smart contracts since they are the result of the conversion process from a specific MPEG-21 CEL/MCO contract.

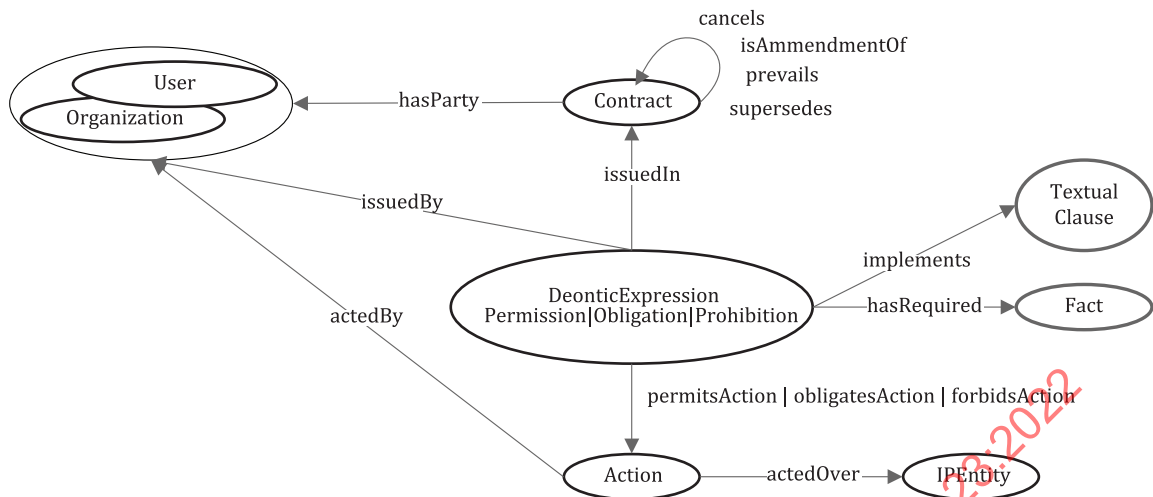
For the description of above-mentioned relationships, the main elements identified for MPEG-21 CEL/MCO are the contract, the party, the IP entity, and the deontic expression. The counterparts in a DLT-based scenario have been identified as shown in [Table 4](#).

**Table 4 — Relationships between MPEG-21 CEL/MCO elements and DLTs components**

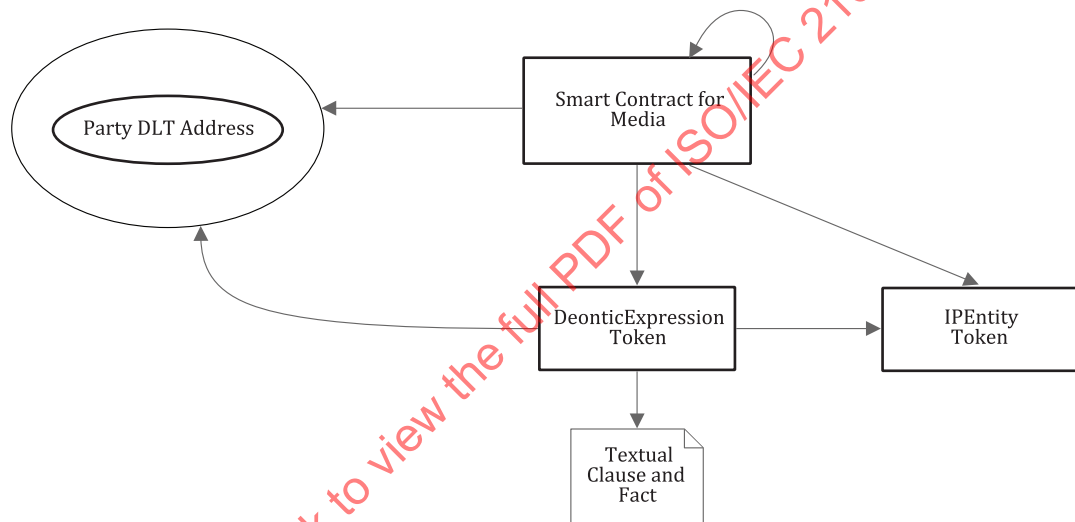
| <b>MPEG-21 CEL/MCO</b> | <b>DLTs</b>              |
|------------------------|--------------------------|
| Contract               | Smart contract for media |
| Party                  | DLT address              |
| IP entity              | Non-fungible token       |
| Deontic expression     | Non-fungible token       |

Furthermore, in [Figure 1](#), as for example, the relationships between MPEG-21 MCO and DLTs are depicted, albeit similar relationships apply between MPEG-21 CEL and DLTs. These relationships are further explained in the following.

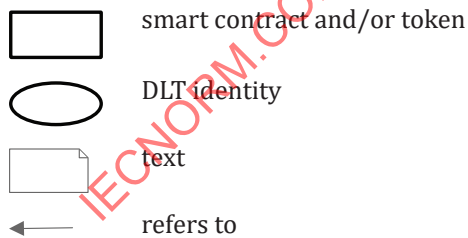
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a) ISO/IEC 21000-21:2017 Media Contract Ontology



b) Relationship between ISO/IEC 21000-21:2017 Media Contract Ontology and DLTs

**Key****Figure 1 — Relationships between MPEG-21 MCO elements and DLTs components**

- 1) **Contract – Smart contract for media:** the MPEG-21 CEL/MCO contract element is the one that includes or refers to the digitalized contractual information extracted from a narrative contract. Whilst the smart contract for media is the result of the conversion process from the MPEG-21 CEL/MCO contract. Thus, the counterpart of an instance of an MPEG-21 CEL/MCO contract is a unique smart contract for media deployed on a specific DLT.
- 2) **Party – DLT address:** a Party element is the representation of the identity of a user or organization bound by the narrative contract. Since identities in DLTs are represented through addresses, the

Party element counterpart is a DLT address. Thus, a Party identity represented by a DLT address may also be authenticated in the DLT and referenced in a smart contract for media.

- 3) **IP entity – Non-fungible token:** an IP Entity element is the representation of an asset, and the reference to this asset can be stored on a DLT. This representation of an asset may be serialized according to the concept of non-fungible tokens. Thus, in smart contracts an IP Entity may be represented by a token. Then, the entire set of information related to a specific IP Entity is linkable to the associated token. Two reasons support this approach:
  - i) the linkage between IP Entities and related smart contracts for media is maintained at a high level, particularly when DLTs offer append-only data storage and not a more complex one;
  - ii) it makes feasible the process of auditing, exploiting at best the immutability feature of DLTs; the history of all operations executed over an IP Entity, indeed, can be found in one place.
- 4) **Deontic expression – Non-fungible token:** a Deontic Expression encompasses the properties of an agreed machine-readable contract clause regulating the actions of the Parties (e.g. obligations, permissions, and prohibitions). This representation of a clause may also be serialized according to the concept of non-fungible tokens. The reasons for supporting this approach are:
  - i) it enables a unique way for storing clauses on DLTs, that is also beneficial in terms of interoperability, for sharing these clauses with other DLT-based applications;
  - ii) it allows the transfer of value in the form of obligations, permissions and prohibitions, similarly to how cryptocurrency transfers are done.

## 6 Bidirectional conversion between MPEG-21 CEL/MCO contracts and smart contracts for media

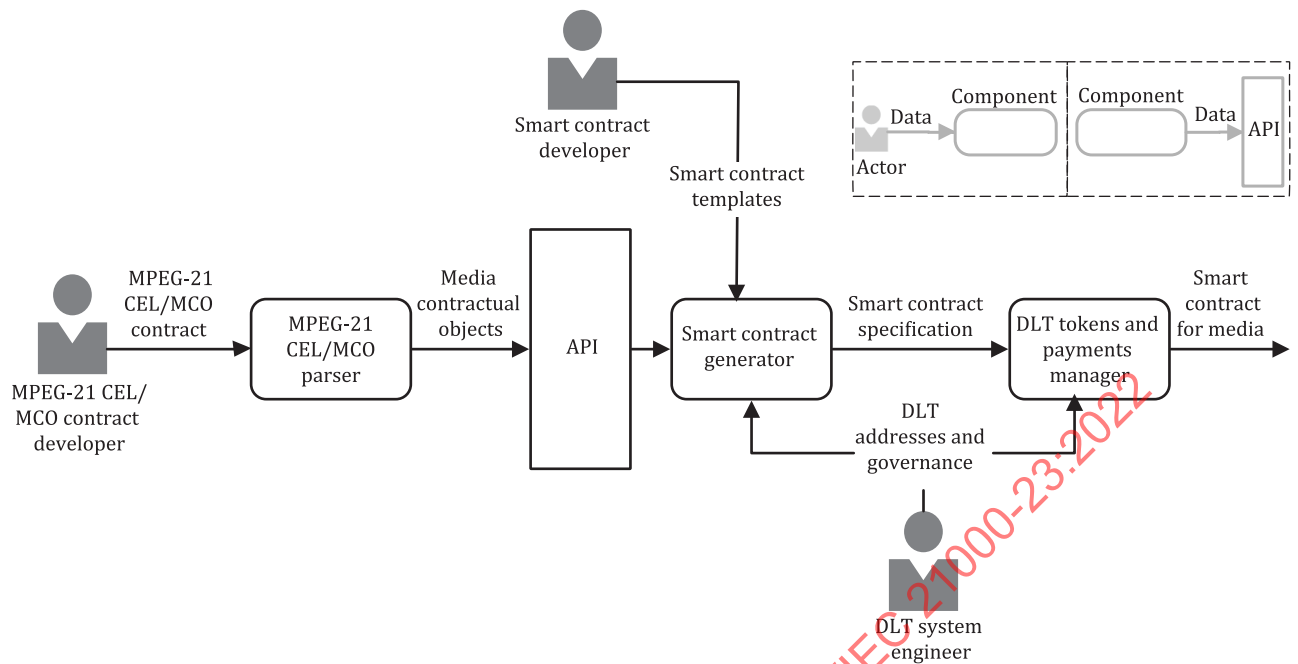
This clause describes the bidirectional conversion processes between MPEG-21 CEL/MCO contracts and smart contracts for media. In [Figure 2](#) it is shown the forward conversion from MPEG-21 CEL/MCO contracts to smart contracts for media, while, in [Figure 3](#) it is shown the backward conversion from smart contracts for media to MPEG-21 CEL/MCO contracts.

Both processes interact with several actors and DLTs where a smart contract for media would be (forward conversion) or has been (backward conversion) deployed. In the following subclauses, a set of interrelated components are described, each of which consists of a grouping of related functionality encapsulated behind a well-defined interface (e.g. inputs and outputs).

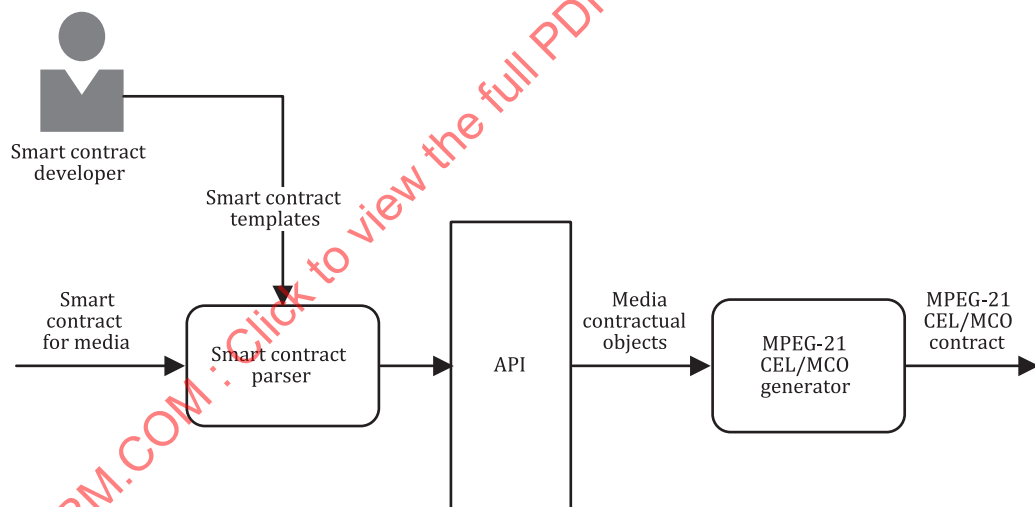
The smart contract for media may store instances of the MPEG-21 CEL/MCO contract elements either:

- in data structures of the smart contract for media; or
- in non-fungible tokens referenced by the smart contract for media, which are stored on the same DLT but managed through a different smart contract.

By storing these elements in that way, this document also facilitates the backward conversion from smart contracts for media to MPEG-21 CEL/MCO contracts in the XML<sup>[5]</sup>/RDF<sup>[6]</sup> form. In turn, MPEG-21 CEL/MCO contracts may be transformed into narrative contracts.



**Figure 2 — Conversion workflow from MPEG-21 CEL/MCO contracts to smart contracts for media**



**Figure 3 — Conversion workflow from smart contracts for media to MPEG-21 CEL/MCO contracts**

## 6.1 Conversion from MPEG-21 CEL/MCO contracts to smart contracts for media

The process of conversion from an MPEG-21 CEL/MCO contract to a smart contract for media involves the execution of several components and the interaction with three actors and a DLT. This process is graphically illustrated in [Figure 2](#).

### 6.1.1 MPEG-21 CEL/MCO parser

The MPEG-21 CEL/MCO parser component gets as input an MPEG-21 CEL/MCO contract, provided by an MPEG-21 CEL/MCO contract developer, and produces a set of media contractual objects. It is expected that the MPEG-21 CEL/MCO contract has been checked to be syntactically and semantically



valid. Otherwise, the validation result provided by the MPEG-21 CEL/MCO parser returns two levels of information:

1. **Errors:** syntactic or semantic errors are identified.
2. **Warnings:** elements of information that may be lost during the conversion process.

Input:

- **MPEG-21 CEL/MCO contract:** it consists of XML/RDF documents containing one or several MPEG-21 CEL/MCO elements that represent a contract.

Output:

- **Media contractual objects:** a structured set of information related to the deontic expressions, actions, entities, and constraints extracted from an MPEG-21 CEL/MCO contract.

These media contractual objects are only dependent upon the MPEG-21 CEL/MCO standards and as such are agnostic with respect to any specific DLT.

### 6.1.2 Smart contract generator

The smart contract generator component produces a smart contract specification by combining information related to an MPEG-21 CEL/MCO contract in the form of media contractual objects with some specific smart contracts templates. This component is meant to be dependent on the smart contract language.

Inputs:

- **Media contractual objects:** a set of media contractual objects is needed to define the information that is contained in the smart contract for media.
- **Smart contract templates:** the DLT smart contract developer (e.g. the person skilled in the specific DLT smart contract language) elaborates a set of specific smart contract templates to be utilized in the conversion process.

Output:

- **Smart contract specification:** a set of elements that represent the information needed by the DLT tokens and payments manager component to deploy the smart contract for media.

This smart contract specification includes information produced based on the objects found while traversing the set of media contractual objects. If MPEG-21 CEL/MCO obligations including payments are found, then the smart contract generator produces the information needed for creating revenue functions for each party involved. For instance, if a party is obliged to share its revenue with another party, then a smart contract method performs the revenue sharing function (e.g. royalties flow). Moreover, for each MPEG-21 CEL/MCO deontic expression and IP entity found in the media contractual objects, the smart contract generator produces the information needed for creating a new non-fungible token.

### 6.1.3 DLT tokens and payments manager

The purpose of the DLT tokens and payments manager component is to deploy the smart contract for media that derives from a smart contract specification, a set of DLT addresses and a DLT governance protocol. Both the DLT addresses and the DLT governance protocol are required for the operation in a specific DLT environment and are provided by a DLT system engineer.

Inputs:

- **Smart contract specification:** this specification enables the creation of a smart contract for media instance, which includes specific tokens and payments information.



- **DLT addresses:** this input refers to the bindings between MPEG-21 CEL/MCO contract parties and DLT addresses.
- **DLT governance:** the protocol the specific DLT adheres to that allows the DLT tokens and payments manager component to update the ledger.

Output:

- **Smart contract for media:** the result of the execution of the DLT tokens and payments manager component is the deployed smart contract for media.

The DLT tokens and payments manager component performs some checks on whether each token referenced in the smart contract specification has already been in existence on the DLT. If this is not the case, it creates a new token and stores its reference in the smart contract for media.

The DLT tokens and payments manager component may store an MPEG-21 CEL/MCO element in a token, or store in a token an immutable reference of it and then the element itself outside of the DLT. The second mechanism is preferred when the element information needs to be kept private or when the DLT disincentives data storage.

## 6.2 Conversion from smart contracts for media to MPEG-21 CEL/MCO contracts

The process of conversion from a smart contract for media to an MPEG-21 CEL/MCO contract involves the execution of two components and the interaction with a DLT and a DLT smart contract developer. This process is graphically illustrated in [Figure 3](#).

### 6.2.1 Smart contract parser

The smart contract parser is a component that fetches the data of a deployed smart contract for media, which uses to produce a set of media contractual objects.

Inputs:

- **Smart contract for media:** the parser fetches the data from a deployed smart contract for media.
- **Smart contract template:** a template is required for decoding the data structures within the smart contract for media.

Output:

- **Media contractual objects:** a set of media contractual objects extracted from the information contained in the smart contract for media.

### 6.2.2 MPEG-21 CEL/MCO generator

The MPEG-21 CEL/MCO generator is a component performing the backward operation with respect to the MPEG-21 CEL/MCO parser described previously. That is, the MPEG-21 CEL/MCO generator gets as input a set of media contractual objects and produces an MPEG-21 CEL/MCO contract.

Input:

- **Media contractual objects:** a set of media contractual objects extracted from the information contained in the smart contract for media.

Output:

- **MPEG-21 CEL/MCO contract:** an XML/RDF document containing one or several MPEG-21 CEL/MCO elements derived from the media contractual objects.

## 7 Narrative contracts

One shortcoming is that, generally, there is no way to deduce from a smart contract the clauses that the smart contract contains. Publishing the narrative contract does not ensure that the clauses of the narrative contract correspond to the clauses of the smart contract. There should be a way that allows the other party of the smart contract to know beyond doubt what the clauses stored in the smart contract express.

Thus, an important feature of this document is that it offers the possibility to bind, through persistent links, the clauses of a smart contract to the corresponding ones of the narrative contract and vice versa, e.g. the narrative clause x “user A pays \$1 to user B” is bound to its counterpart smart contract clause x “Transfer UserA UserB \$1”. In the latter, if the beneficiary of the payment is not clear, the link to its corresponding narrative clause could be handy. In the following, the MPEG-21 CEL/MCO elements enabling such bindings are further described.

For example, the narrative version of contracts is preserved in MPEG-21 CEL contracts, either in plain text (cel-core:TextVersion) or encrypted (cel-core:EncryptedTextVersion). Further structuring is possible by means of cel-core:TextClause and cel-core:TextParagraph (in clear text or encrypted). These text elements can be referenced with the attribute 'idrefs' from the operative part of the contracts, maintaining the isomorphism (e.g. the one-to-one relationship between an operative clause to its narrative counterpart) explicitly.

Equivalently, MPEG-21 MCO contracts also preserve the narrative version of the contract, either in a complete form (using the mco-core:TextVersion property) or through a number of textual clauses which can also be referenced from the operative part. These clauses are instances of the mco-core:TextualClause, with mco-core:Text as a data property.

In that way, the narrative version of a contract and its clauses is represented in MPEG-21 CEL/MCO contracts, and these relationships are also maintained all the way through the media contractual objects (textVersion and textClauses) to smart contracts and vice versa. In turn, this ensures the parties signing a smart contract to know beyond doubt what the clauses stored in the smart contract express with respect to the clauses of the narrative contract.

By doing this conversion in a standard way for several smart contract languages would ensure MPEG-21 CEL/MCO contracts prevail as the interlingua for transferring verified contractual data from one DLT to another.

## 8 API for media contractual objects

This API, by facilitating the creation and handling of media contractual objects, is fundamental for the bidirectional conversion from MPEG-21 CEL/MCO contracts to smart contracts for media. Thus, this clause specifies the media contractual objects API. This API has been derived and shall be used in conjunction with MPEG-21 XML and RDF media contracts (ISO/IEC 21000-19, ISO/IEC 21000-20, and ISO/IEC 21000-21). The specific XML schemas and RDF ontologies contained in these standards are shown in [Table 5](#). Furthermore, the presentation of this API follows the conventions (e.g. classes representation and namespace prefixes) as described in [Clause 4](#).

**Table 5 — Schemas and ontologies contained in MPEG-21 CEL/MCO**

| MPEG-21 CEL/MCO                                  | Schemas and Ontologies |
|--------------------------------------------------|------------------------|
| ISO/IEC 21000-19 Media Value Chain Ontology      | MVCO                   |
| ISO/IEC 21000-19/AMD1 Audio Value Chain Ontology | AVCO                   |

Table 5 (continued)

| MPEG-21 CEL/MCO                                    | Schemas and Ontologies                                                                                                                                                            |
|----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ISO/IEC 21000-21:2017 Media Contract Ontology      | MCO-CORE,<br>MCO Intellectual Property Rights Extension (MCO-IPRE),<br>MCO Payments and Notifications Extension (MCO-PANE),<br>MCO Right Expression Language Extension (MCO-RELE) |
| ISO/IEC 21000-20:2016 Contract Expression Language | CEL-CORE,<br>CEL Intellectual Property Rights Extension (CEL-IPRE),<br>CEL Payments and Notifications Extension (CEL-PANE),<br>CEL Right Expression Language Extension (CEL-RELE) |

## 8.1 Contract

### 8.1.1 Contract

| Class                |                                                                                                            | CEL                      | MCO                                                                                                                                |
|----------------------|------------------------------------------------------------------------------------------------------------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| Name                 | Type and Hierarchy                                                                                         |                          |                                                                                                                                    |
| Contract             | Concrete, sub-class of Encryptable                                                                         | <i>cel-core:Contract</i> | <i>mco-core:Contract</i>                                                                                                           |
| Fields               |                                                                                                            |                          |                                                                                                                                    |
| Type                 | Field and Description                                                                                      | Occ.                     |                                                                                                                                    |
| string               | <b>identifier</b><br>Uniquely identifies the contract                                                      | 1                        | <i>cel-core:Contract</i><br><i>contractId (attribute)</i><br><br>Internationalized Resource Identifier (IETF Standard is RFC 3987) |
| string               | <b>governingLaw</b><br>Indicating the jurisdiction and applicable law                                      | 0, 1                     | <i>cel-core:Contract</i><br><i>governingLaw (attribute)</i><br><br><i>mco-core:hasGoverningLaw</i>                                 |
| string               | <b>court</b><br>Has exclusive jurisdiction over any dispute related to the contract's terms and conditions | 0, 1                     | <i>cel-core:Contract</i><br><i>court (attribute)</i><br><br><i>mco-core:hasCourt</i>                                               |
| boolean              | <b>isCourtJurisdictionExclusive</b>                                                                        | 0, 1                     | <i>isCourtJurisdictionExclusive</i><br><br><i>mco-core:isCourtJurisdictionExclusive</i>                                            |
| string               | <b>textVersion</b><br>Whole narrative contract text                                                        | 0, 1                     | <i>cel-core:TextVersion</i><br><br><i>mco-core:TextVersion</i>                                                                     |
| string               | <b>encryptedTextVersion</b><br>An encrypted version of the whole narrative contract text                   | 0, 1                     | <i>cel-core:EncryptedTextVersion</i><br><br><i>mco-core:encryptedContractPart</i>                                                  |
| map (string, string) | <b>metadata</b><br>For giving information about the contract itself.                                       | 0, n                     | <i>cel-core:Metadata</i> Dublin Core (ISO 15836) or others<br><br>Dublin Core (ISO 15836) or others                                |

| Class                                        |                                                                                                                                                                                                                          |      | CEL                                                                                                                                              | MCO                                                                                            |
|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| Name                                         | Type and Hierarchy                                                                                                                                                                                                       |      |                                                                                                                                                  |                                                                                                |
| map (contractIdref, enum(contractRelations)) | <b>contractRelations</b><br>Used to relate the contract to other identified contracts. The enum of the map value must be one of the following:<br>0 = supersedes<br>1 = cancels<br>2 = prevailsOver<br>3 = isAmendmentOf | 0, n | <i>cel-core</i> : ContractsRelated                                                                                                               | <i>mco-core</i> :contractObjectProperty                                                        |
| map( partyIdref, Party)                      | <b>parties</b><br>Persons or organizations for which the contract is binding                                                                                                                                             | 0, n | <i>cel-core</i> :Party                                                                                                                           | <i>mco-core</i> :Party                                                                         |
| map( personuserIdref, PersonUser)            | <b>otherPersonUsers</b><br>Referenced Persons/Users for which the contract is not binding                                                                                                                                | 0, n | <i>cel-core</i> :Person                                                                                                                          | <i>cel-core</i> :User                                                                          |
| map( deonticIdref, Deontic)                  | <b>deontics</b><br>Machine-readable operative parts of the contract used to represent agreements                                                                                                                         | 1, n | list of <i>cel-core</i> :DeonticStructuredClause                                                                                                 | list of <i>mco-core</i> :DeonticExpression                                                     |
| map( actionIdref, Action)                    | <b>actions</b><br>Specifies the rights that are permitted / obligated / prohibited to parties                                                                                                                            | 1, n | list of <i>cel-core</i> :Act within a <i>cel-core</i> :DeonticStructuredClause                                                                   | list of <i>mco-core</i> :GenericAction within a <i>mco-core</i> :DeonticExpression             |
| map( objectIdref, Object)                    | <b>objects</b><br>Resources against which the deontics will apply                                                                                                                                                        | 0, n | list of <i>cel-core</i> :Object                                                                                                                  | list of<br><i>mco-core</i> :actedOver<br><i>mco-core</i> :IPEntity<br><i>mco-core</i> :Service |
| map( factIdref, Fact)                        | <b>facts</b><br>Conditions, restrictions and constraints within each deontic                                                                                                                                             | 0, n | <i>cel-core</i> :Constraint                                                                                                                      | <i>mvco</i> :Fact                                                                              |
| map(textIdref, TextClause)                   | <b>textClauses</b><br>Text clauses to reference from a deontic expression to narrative contract excerpts of which it makes the operative part                                                                            | 1, n | list of <i>cel-core</i> :TextClause                                                                                                              | list of <i>mco-core</i> :TextualClause                                                         |
| map (encryptedIdref, string)                 | <b>encryptedContractParts</b><br>For addressing the encryption needs regarding a part, or the entirety, of a contract document.<br><br>The key value of the map must be the identifier of the part.                      | 0, n | <i>cel-core</i> : EncryptedContract<br><i>cel-core</i> : EncryptedParty<br><i>cel-core</i> : EncryptedClause<br><i>cel-core</i> : EncryptedBlock | list of <i>mco-core</i> :encryptedContractPart                                                 |

| Class                                                       |                                                                                                                                                                                                            |      | CEL                                                                       | MCO                         |
|-------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------------------------------------------------|-----------------------------|
| Name                                                        | Type and Hierarchy                                                                                                                                                                                         |      |                                                                           |                             |
| map(deonticStructuredBlockIdref, CELDeonticStructuredBlock) | <b>operativePart</b><br>The contract part which contains the deontic expressions of the operative part.<br>It embodies the set of related deontic clauses grouped as a nested structure (Specific for CEL) | 0, n | <i>cel-core</i> :OperativePart<br><i>cel-core</i> :DeonticStructuredBlock | /                           |
| personuserIdref[]                                           | <b>signatories</b><br>A signatory of a contract when different from a party (Specific for MCO)                                                                                                             | 0, n | /                                                                         | <i>mco-core</i> :isSignedBy |

| Methods         |                                                                                                                 |                                              |
|-----------------|-----------------------------------------------------------------------------------------------------------------|----------------------------------------------|
| Parameters      | Method and Description                                                                                          | Return                                       |
| void            | <b>getIdentifier()</b>                                                                                          | string                                       |
| void            | <b>getGoverningLaw()</b>                                                                                        | string                                       |
| void            | <b>getCourt()</b><br>Has exclusive jurisdiction over any dispute related to the contract's terms and conditions | string                                       |
| void            | <b>getIsCourtJurisdictionExclusive()</b>                                                                        | boolean                                      |
| void            | <b>getTextVersion()</b>                                                                                         | string                                       |
| void            | <b>getEncryptedTextVersion()</b>                                                                                | string                                       |
| void            | <b>getMetadata()</b>                                                                                            | map (string, string)                         |
| string          | <b>getMetadataBy()</b>                                                                                          | string                                       |
| void            | <b>getContractRelations()</b>                                                                                   | map (contractIdref, enum(contractRelations)) |
| contractIdref   | <b>getContractRelationsBy()</b>                                                                                 | enum(contractRelations)                      |
| void            | <b>getParties()</b>                                                                                             | map(partyIdref, Parties)                     |
| partyIdref      | <b>getPartyBy()</b>                                                                                             | Party                                        |
| personuserIdref | <b>getPersonUserBy()</b><br>This method searches and possibly returns a PersonUser from the parties' map field  | PersonUser                                   |
| void            | <b>getOtherPersonUsers()</b>                                                                                    | map(personuserIdref, PersonUser)             |
| personuserIdref | <b>getOtherPersonUsersBy()</b>                                                                                  | PersonUser                                   |
| void            | <b>getDeontics()</b>                                                                                            | map(deonticIdref, Deontic)                   |
| deonticIdref    | <b>getDeonticBy()</b>                                                                                           | Deontic                                      |
| void            | <b>getActions()</b>                                                                                             | map(actionIdref, Action)                     |
| actionIdref     | <b>getActionBy()</b>                                                                                            | Action                                       |
| void            | <b>getObjects()</b>                                                                                             | map(objectIdref, Object)                     |
| objectIdref     | <b>getObjectBy()</b>                                                                                            | Object                                       |

| Methods                                                                                  |                                                                                                            |                                                             |
|------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| Parameters                                                                               | Method and Description                                                                                     | Return                                                      |
| itemIdref                                                                                | <b>getItemBy()</b><br>This method searches and possibly returns an Item from the objects map field         | Item                                                        |
| ipentityIdref                                                                            | <b>getIPEntityBy()</b><br>This method searches and possibly returns an IPEntity from the objects map field | IPEntity                                                    |
| void                                                                                     | <b>getFacts()</b>                                                                                          | map(factIdref, Fact)                                        |
| factIdref                                                                                | <b>getFactBy()</b>                                                                                         | Fact                                                        |
| void                                                                                     | <b>getTextClauses()</b>                                                                                    | map(textIdref, TextClause)                                  |
| textIdref                                                                                | <b>getTextClausesBy()</b>                                                                                  | TextClause                                                  |
| void                                                                                     | <b>getEncryptedContractParts()</b>                                                                         | map(encryptedIdref, string)                                 |
| encryptedIdref                                                                           | <b>getEncryptedContractPartsBy()</b>                                                                       | string                                                      |
| void                                                                                     | <b>getOperativePart()</b>                                                                                  | map(deonticStructuredBlockIdref, CELDeonticStructuredBlock) |
| deonticStructuredBlockIdref                                                              | <b>getDeonticStructuredBlock()</b><br>This method returns information about a deontic structured block     | CELDeonticStructuredBlock                                   |
| void                                                                                     | <b>getConstraints()</b><br>This method consists in a call to the method getFacts()                         | map(factIdref, Fact)                                        |
| void                                                                                     | <b>getExpressions()</b><br>This methods consists in a call to the method getDeontics()                     | deonticIdref[]                                              |
| void                                                                                     | <b>getSignatories()</b>                                                                                    | personuserIdref[]                                           |
| string                                                                                   | <b>Contract()</b><br>This method constructs a new object and gets as input only the identifier             | void                                                        |
| string, map(deonticIdref, Deontic), map(actionIdref, Action), map(textIdref, TextClause) | <b>Contract()</b><br>This method constructs a new object and gets as input all the required fields         | void                                                        |
| string                                                                                   | <b>setIdentifier()</b>                                                                                     | void                                                        |
| string                                                                                   | <b>setGoverningLaw()</b>                                                                                   | void                                                        |
| string                                                                                   | <b>setCourt()</b>                                                                                          | void                                                        |
| boolean                                                                                  | <b>setIsCourtJurisdictionExclusive()</b>                                                                   | void                                                        |
| string                                                                                   | <b>setTextVersion()</b>                                                                                    | void                                                        |
| string                                                                                   | <b>setEncryptedTextVersion()</b>                                                                           | void                                                        |
| map (string, string)                                                                     | <b>setMetadata()</b>                                                                                       | void                                                        |
| string, string                                                                           | <b>addMetadata()</b>                                                                                       | void                                                        |
| map(contractIdref, enum(contractRelations))                                              | <b>setContractRelations()</b>                                                                              | void                                                        |
| contractIdref, enum(contractRelations)                                                   | <b>addContractRelations()</b>                                                                              | void                                                        |
| map(partyIdref, Parties)                                                                 | <b>setParties()</b>                                                                                        | void                                                        |
| partyIdref, Parties                                                                      | <b>addParties()</b>                                                                                        | void                                                        |

| Methods                                                     |                                     |        |
|-------------------------------------------------------------|-------------------------------------|--------|
| Parameters                                                  | Method and Description              | Return |
| map(deonticIdref, Deontic)                                  | <b>setDeontics()</b>                | void   |
| deonticIdref, Deontic                                       | <b>addDeontics()</b>                | void   |
| map(actionIdref, Action)                                    | <b>setActions()</b>                 | void   |
| actionIdref, Action                                         | <b>addActions()</b>                 | void   |
| map(objectIdref, Object)                                    | <b>setObjects()</b>                 | void   |
| objectIdref, Object                                         | <b>addObjects()</b>                 | void   |
| map(factIdref, Fact)                                        | <b>setFacts()</b>                   | void   |
| factIdref, Fact                                             | <b>addFacts()</b>                   | void   |
| map(textIdref, TextClause)                                  | <b>setTextClauses()</b>             | void   |
| textIdref, TextClause                                       | <b>addTextClauses()</b>             | void   |
| map(encryptedIdref, string)                                 | <b>setEncryptedContractParts()</b>  | void   |
| encryptedIdref, string                                      | <b>addEncryptedContractParts()</b>  | void   |
| map(deonticStructuredBlockIdref, CELDeonticStructuredBlock) | <b>setOperativePart()</b>           | void   |
| deonticStructuredBlockIdref, CELDeonticStructuredBlock      | <b>addOperativePart()</b>           | void   |
| deonticStructuredBlockIdref                                 | <b>setDeonticStructuredBlocks()</b> | void   |
| map(factIdref, Fact)                                        | <b>setConstraints()</b>             | void   |
| factIdref, Fact                                             | <b>addConstraints()</b>             | void   |
| deonticIdref[]                                              | <b>setExpressions()</b>             | void   |
| deonticIdref                                                | <b>addExpressions()</b>             | void   |
| personuserIdref[]                                           | <b>setSignatories()</b>             | void   |
| personuserIdref                                             | <b>addSignatories()</b>             | void   |

### 8.1.2 Encryptable

| Class          |                                                                                                              | CEL                                                                                                                          | MCO                            |
|----------------|--------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Name           | Type and Hierarchy                                                                                           |                                                                                                                              |                                |
| Encryptable    | Abstract                                                                                                     | cel-core:<br>EncryptedContract<br>cel-core:<br>EncryptedParty<br>cel-core:<br>EncryptedClause<br>cel-core:<br>EncryptedBlock | mco-core:encryptedContractPart |
| Fields         |                                                                                                              |                                                                                                                              |                                |
| Type           | Field and Description                                                                                        | Occ.                                                                                                                         |                                |
| encryptedIdref | <b>encryptedRepresentation</b><br>A full version of the current contract part in an encrypted representation | 0, 1                                                                                                                         | /                              |



| Methods    |                                     |                |
|------------|-------------------------------------|----------------|
| Parameters | Method and Description              | Return         |
| void       | <b>getEncryptedRepresentation()</b> | encryptedIdref |

## 8.2 Party

### 8.2.1 Party

| Class                |                                                                                                                | CEL            | MCO                                                                                                                                                                       |
|----------------------|----------------------------------------------------------------------------------------------------------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name                 | Type and Hierarchy                                                                                             |                |                                                                                                                                                                           |
| Contract             | Abstract, sub-class of Encryptable                                                                             | cel-core:Party | mco-core:Party                                                                                                                                                            |
| Fields               |                                                                                                                |                |                                                                                                                                                                           |
| Type                 | Field and Description                                                                                          | Occ.           |                                                                                                                                                                           |
| string               | <b>identifier</b><br>Uniquely identifies the party                                                             | 1              | cel-core:Party id (attribute)<br><br>rdf:about                                                                                                                            |
| string               | <b>name</b><br>The name of the party                                                                           | 1              | cel-core:Name<br><br>/                                                                                                                                                    |
| map (string, string) | <b>details</b><br>To provide further detailed contact information                                              | 0, n           | cel-core:Details<br>xmlns:vCard<br><br>mco-core:hasVCard                                                                                                                  |
| map (string, string) | <b>metadata</b><br>For giving information about the contract itself.                                           | 0, n           | dc:description<br>dc:identifier<br>Dublin Core (ISO 15836) or others<br><br>Dublin Core (ISO 15836) or others                                                             |
| string               | <b>address</b><br>Party address as free text                                                                   | 0, 1           | cel-core:Address<br><br>mco-core:Address                                                                                                                                  |
| deonticIdref[]       | <b>deonticsIssued</b><br>Machine-readable operative parts of the contract issued by the party                  | 0, n           | list of cel-core:Issuer relations<br><br>list of mco-core:issuedBy relations                                                                                              |
| actionIdref[]        | <b>actionsIsSubject</b><br>The acts that the party may / must / must not / did execute, specified in a Deontic | 0, n           | cel-core:Act and cel-core:Subject relation within a cel-core:DeonticStructuredClause<br><br>mco-core:actedBy for a mco-core:GenericAction in a mco-core:DeonticExpression |

| Methods    |                        |                      |
|------------|------------------------|----------------------|
| Parameters | Method and Description | Return               |
| void       | <b>getIdentifier()</b> | string               |
| void       | <b>getName()</b>       | string               |
| void       | <b>getDetails()</b>    | map (string, string) |
| string     | <b>getDetailBy()</b>   | string               |
| void       | <b>getMetadata()</b>   | map (string, string) |
| string     | <b>getMetadataBy()</b> | string               |
| void       | <b>getAddress()</b>    | string               |



| Methods              |                                                                                                 |                |
|----------------------|-------------------------------------------------------------------------------------------------|----------------|
| Parameters           | Method and Description                                                                          | Return         |
| void                 | <b>getDeonticsIssued()</b>                                                                      | deonticIdref[] |
| void                 | <b>getActionsIsSubject()</b>                                                                    | actionIdref[]  |
| string               | <b>Party()</b><br>This method constructs a new object and gets as input only the identifier     | void           |
| string, string       | <b>Party()</b><br>This method constructs a new object and gets as input all the required fields | void           |
| string               | <b>setIdentifier()</b>                                                                          | void           |
| string               | <b>setName()</b>                                                                                | void           |
| map (string, string) | <b>setDetails()</b>                                                                             | void           |
| string, string       | <b>addDetails()</b>                                                                             | void           |
| map (string, string) | <b>setMetadata()</b>                                                                            | void           |
| string, string       | <b>addMetadata()</b>                                                                            | void           |
| string               | <b>setAddress()</b>                                                                             | void           |
| deonticIdref[]       | <b>setDeonticsIssued()</b>                                                                      | void           |
| deonticIdref         | <b>addDeonticsIssued()</b>                                                                      | void           |
| actionIdref[]        | <b>setActionsIsSubject()</b>                                                                    | void           |
| actionIdref          | <b>addActionsIsSubject()</b>                                                                    | void           |

### 8.2.2 Person/User

| Class      |                                                | CEL                    | MCO                                                |
|------------|------------------------------------------------|------------------------|----------------------------------------------------|
| Name       | Type and Hierarchy                             |                        |                                                    |
| PersonUser | Abstract, sub-class of Party                   | <i>cel-core:Person</i> | <i>mco-core:User</i>                               |
| Fields     |                                                |                        |                                                    |
| Type       | Field and Description                          | Occ.                   |                                                    |
| string     | <b>signature</b><br>Contract binding signature | 0, 1                   | <i>dsig:Signature</i><br><i>mco-core:Signature</i> |

| Methods        |                                                                                                                                                            |        |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Parameters     | Method and Description                                                                                                                                     | Return |
| void           | <b>getSignature()</b>                                                                                                                                      | string |
| string         | <b>PersonUser()</b><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor.     | void   |
| string, string | <b>PersonUser()</b><br>This method constructs a new object and gets as input all the required fields. This constructor invokes the superclass constructor. | void   |
| string         | <b>setSignature()</b>                                                                                                                                      | void   |

## 8.2.3 CELPerson

| Class     |                                   | CEL                                                 | MCO |
|-----------|-----------------------------------|-----------------------------------------------------|-----|
| Name      | Type and Hierarchy                |                                                     |     |
| CELPerson | Concrete, sub-class of PersonUser | <i>cel-core:Person</i><br><i>cel-core:Signatory</i> | /   |
| Fields    |                                   |                                                     |     |
| Type      | Field and Description             | Occ.                                                |     |
| /         | /                                 | /                                                   | /   |

| Methods        |                                                                                                                                                           |        |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Parameters     | Method and Description                                                                                                                                    | Return |
| string         | <b>CELPerson()</b><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor.     | void   |
| string, string | <b>CELPerson()</b><br>This method constructs a new object and gets as input all the required fields. This constructor invokes the superclass constructor. | void   |

## 8.2.4 MCOUser

| Class             |                                                                                                                                                                                                  | CEL  | MCO                  |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------------------|
| Name              | Type and Hierarchy                                                                                                                                                                               |      |                      |
| User              | Concrete, sub-class of Person                                                                                                                                                                    | /    | <i>mco-core:User</i> |
| Fields            |                                                                                                                                                                                                  |      |                      |
| Type              | Field and Description                                                                                                                                                                            | Occ. |                      |
| enum (role)       | <b>role</b><br>The user role. The enum value must be:<br>0 = User (simple)<br>1 = Creator<br>2 = Adaptor<br>3 = Instantiator<br>4 = Producer<br>5 = Distributor<br>6 = EndUser<br>7 = Collective | 1    | /                    |
| string            | <b>socialTag</b>                                                                                                                                                                                 | 0, 1 | /                    |
| personuserIdref[] | <b>actOnBehalfOf</b>                                                                                                                                                                             | 0, n | /                    |
| personuserIdref[] | <b>belongsToCollective</b>                                                                                                                                                                       | 0, n | /                    |
| ipentityIdref[]   | <b>isRightsOwnerOf</b>                                                                                                                                                                           | 0, n | /                    |

| Methods                     |                                                                                                                                                         |                   |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| Parameters                  | Method and Description                                                                                                                                  | Return            |
| void                        | <b>getRole()</b>                                                                                                                                        | enum (role)       |
| void                        | <b>getSocialTag()</b>                                                                                                                                   | string            |
| void                        | <b>getActOnBehalfOf()</b>                                                                                                                               | personuserIdref[] |
| void                        | <b>getBelongsToCollective()</b>                                                                                                                         | personuserIdref[] |
| void                        | <b>getIsRightsOwnerOf()</b>                                                                                                                             | ipentityIdref[]   |
| string                      | <b>MCOUser()</b><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor.     | void              |
| string, string, enum (role) | <b>MCOUser()</b><br>This method constructs a new object and gets as input all the required fields. This constructor invokes the superclass constructor. | void              |
| enum (role)                 | <b>setRole()</b>                                                                                                                                        | void              |
| string                      | <b>setSocialTag()</b>                                                                                                                                   | void              |
| personuserIdref[]           | <b>setActOnBehalfOf()</b>                                                                                                                               | void              |
| personuserIdref             | <b>addActOnBehalfOf()</b>                                                                                                                               | void              |
| personuserIdref[]           | <b>setBelongsToCollective()</b>                                                                                                                         | void              |
| personuserIdref             | <b>addBelongsToCollective()</b>                                                                                                                         | void              |
| ipentityIdref[]             | <b>setIsRightsOwnerOf()</b>                                                                                                                             | void              |
| ipentityIdref               | <b>addIsRightsOwnerOf()</b>                                                                                                                             | void              |

## 8.2.5 Organization

| Class           |                                                                             | CEL                              | MCO                                                         |
|-----------------|-----------------------------------------------------------------------------|----------------------------------|-------------------------------------------------------------|
| Name            | Type and Hierarchy                                                          |                                  |                                                             |
| Organization    | Concrete, sub-class of Party                                                | <i>cel-core:</i><br>Organization | <i>mco-core:</i><br>Organization                            |
| Fields          |                                                                             |                                  |                                                             |
| Type            | Field and Description                                                       | Occ.                             |                                                             |
| personuserIdref | <b>signatory</b><br>A signatory person optionally given for an Organization | 0, 1                             | <i>cel-core:</i> Signatory<br><i>mco-core:</i> hasSignatory |

| Methods         |                                                                                                                                                              |                 |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| Parameters      | Method and Description                                                                                                                                       | Return          |
| void            | <b>getSignatory()</b>                                                                                                                                        | personuserIdref |
| string          | <b>Organization()</b><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor.     | void            |
| string, string  | <b>Organization()</b><br>This method constructs a new object and gets as input all the required fields. This constructor invokes the superclass constructor. | void            |
| personuserIdref | <b>setSignatory()</b>                                                                                                                                        | void            |

## 8.3 Deontic

### 8.3.1 DeonticStructuredClause/DeonticExpression

| Class                |                                                                                            | CEL  |                                                                                                                         | MCO                                                                                                                             |
|----------------------|--------------------------------------------------------------------------------------------|------|-------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Name                 | Type and Hierarchy                                                                         |      |                                                                                                                         |                                                                                                                                 |
| Deontic              | Abstract, sub-class of Encryptable                                                         |      | <i>cel-core:DeonticStructuredClause</i>                                                                                 | <i>mco-core:DeonticExpression</i>                                                                                               |
| Fields               |                                                                                            |      |                                                                                                                         |                                                                                                                                 |
| Type                 | Field and Description                                                                      | Occ. |                                                                                                                         |                                                                                                                                 |
| string               | <b>identifier</b><br>Uniquely identifies the deontic                                       | 1    | <i>cel-core:DeonticStructuredClause id (attribute)</i>                                                                  | <i>rdf:about</i>                                                                                                                |
| enum (type)          | <b>type</b><br>0 = Statement/Simple<br>1 = Permission<br>2 = Obligation<br>3 = Prohibition | 1    | <i>cel-core:Statement</i> , <i>cel-core:Permission</i> ,<br><i>cel-core:Obligation</i> ,<br><i>cel-core:Prohibition</i> | <i>mco-core:DeonticExpression</i> , <i>mco-core:Permission</i> ,<br><i>mco-core:Obligation</i> ,<br><i>mco-core:Prohibition</i> |
| textIdref[]          | <b>textClauses</b><br>The text clauses that represents                                     | 0, n | <i>cel-core:DeonticStructuredClause idrefs (attribute)</i>                                                              | <i>mco-core:implements</i>                                                                                                      |
| map (string, string) | <b>metadata</b><br>For giving information about the contract itself.                       | 0, n | <i>cel-core:Metadata</i><br>Dublin Core (ISO 15836) or others                                                           | Dublin Core (ISO 15836) or others                                                                                               |
| actionIdref          | <b>act</b><br>Specifies the right that is permitted / obligated / prohibited               | 1    | <i>cel-core:Act</i>                                                                                                     | <i>mco-core:obligatesAction</i><br><i>mco-core:permitsAction</i><br><i>mco-core:forbidsAction</i>                               |
| partyIdref           | <b>actedBySubject</b><br>Party to which the deontic clause applies                         | 1    | <i>cel-core:Act</i> and <i>cel-core:Subject</i> relation within a <i>cel-core:DeonticStructuredClause</i>               | <i>mco-core:actedBy</i> for a <i>mco-core:GenericAction</i> in a <i>mco-core:DeonticExpression</i>                              |
| objectIdref[]        | <b>actObjects</b><br>Resources against which the deontic expression will apply             | 0, n | <i>cel-core:Object</i>                                                                                                  | <i>mco-core:actedOver</i><br><i>mvco:Action</i> <i>mco-core:IPEntity</i><br><i>mco-core:Service</i>                             |
| itemIdref[]          | <b>resultantObject</b><br>Resource resultant of applying the act over the actObjects       | 0, n | <i>cel-core:ResultantObject</i>                                                                                         | inverse of <i>mvco:ResultFrom</i><br>in the relation between <i>mvco:Action</i> and <i>mvco:IPEntity</i>                        |
| factIdref[]          | <b>constraints</b>                                                                         | 0, n | <i>cel-core:Constraint</i>                                                                                              | <i>mco-core:hasRequired</i>                                                                                                     |
| partyIdref           | <b>issuer</b>                                                                              | 0, 1 | <i>cel-core:Issuer</i>                                                                                                  | <i>mco-core:issuedBy</i>                                                                                                        |

| Methods                                         |                                                                                                    |                      |
|-------------------------------------------------|----------------------------------------------------------------------------------------------------|----------------------|
| Parameters                                      | Method and Description                                                                             | Return               |
| void                                            | <b>getIdentifier()</b>                                                                             | string               |
| void                                            | <b>getType()</b>                                                                                   | enum (type)          |
| void                                            | <b>getTextClauses()</b>                                                                            | textIdref[]          |
|                                                 |                                                                                                    |                      |
| void                                            | <b>getMetadata()</b>                                                                               | map (string, string) |
| string                                          | <b>getMetadataBy()</b>                                                                             | string               |
| void                                            | <b>getAct()</b>                                                                                    | actionIdref          |
| void                                            | <b>getActedBySubject()</b>                                                                         | partyIdref           |
| void                                            | <b>getActObjects()</b>                                                                             | objectIdref[]        |
| void                                            | <b>getResultantObject()</b>                                                                        | itemIdref[]          |
| void                                            | <b>getConstraints()</b>                                                                            | factIdref[]          |
| void                                            | <b>getIssuer()</b>                                                                                 | partyIdref           |
| string                                          | <b>Deontic()</b><br>This method constructs a new object and gets as input only the identifier.     | void                 |
| string, enum (type),<br>actionIdref, partyIdref | <b>Deontic()</b><br>This method constructs a new object and gets as input all the required fields. | void                 |
| string                                          | <b>setIdentifier()</b>                                                                             | void                 |
| enum (type)                                     | <b>setType()</b>                                                                                   | void                 |
| textIdref[]                                     | <b>setTextClauses()</b>                                                                            | void                 |
| textIdref                                       | <b>addTextClauses()</b>                                                                            | void                 |
| map (string, string)                            | <b>setMetadata()</b>                                                                               | void                 |
| string, string                                  | <b>addMetadata()</b>                                                                               | void                 |
| actionIdref                                     | <b>setAct()</b>                                                                                    | void                 |
| partyIdref                                      | <b>setActedBySubject()</b>                                                                         | void                 |
| objectIdref[]                                   | <b>setActObjects()</b>                                                                             | void                 |
| objectIdref                                     | <b>addActObjects()</b>                                                                             | void                 |
| itemIdref[]                                     | <b>setResultantObject()</b>                                                                        | void                 |
| itemIdref                                       | <b>addResultantObject()</b>                                                                        | void                 |
| factIdref[]                                     | <b>setConstraints()</b>                                                                            | void                 |
| factIdref                                       | <b>addConstraints()</b>                                                                            | void                 |
| partyIdref                                      | <b>setIssuer()</b>                                                                                 | void                 |

### 8.3.2 TextClause

| Class      |                                                    | CEL                 | MCO                                                  |
|------------|----------------------------------------------------|---------------------|------------------------------------------------------|
| Name       | Type and Hierarchy                                 |                     |                                                      |
| TextClause | Concrete                                           | cel-core:TextClause | mco-core:TextualClause                               |
| Fields     |                                                    |                     |                                                      |
| Type       | Field and Description                              | Occ.                |                                                      |
| string     | <b>identifier</b><br>Uniquely identifies the party | 1                   | cel-core:TextClause<br>id (attribute)      rdf:about |

| Class                  |                                                                                                       |      | CEL                             | MCO           |
|------------------------|-------------------------------------------------------------------------------------------------------|------|---------------------------------|---------------|
| Name                   | Type and Hierarchy                                                                                    |      |                                 |               |
| textIdref[]            | <b>innerTextClauses</b><br>TextClauses objects considered within this one                             | 0, n | cel-core:TextClause             | /             |
| map(textIdref, string) | <b>paragraphs</b><br>Containing the actual text                                                       | 0, n | cel-core:TextParagraph          | /             |
| encrypted-Idref[]      | <b>encryptedParagraphs</b><br>Encrypted representation of a paragraph                                 | 0, 1 | cel-core:EncryptedTextParagraph | /             |
| string                 | <b>text</b><br>Optional representation of the clause as a whole text instead of paragraph subdivision | 0, 1 | /                               | mco-core:Text |

| Methods                |                                                                                                      |                         |
|------------------------|------------------------------------------------------------------------------------------------------|-------------------------|
| Parameters             | Method and Description                                                                               | Return                  |
| void                   | <b>getIdentifier()</b>                                                                               | string                  |
| void                   | <b>getInnerTextClauses()</b>                                                                         | textIdref[]             |
| void                   | <b>getParagraphs()</b>                                                                               | map (textIdref, string) |
| string                 | <b>getParagraphsBy()</b>                                                                             | textIdref               |
| void                   | <b>getEncryptedParagraphs()</b>                                                                      | encryptedIdref[]        |
| void                   | <b>getText()</b>                                                                                     | string                  |
| string                 | <b>setTextClause()</b><br>This method constructs a new object and gets as input only the identifier. | void                    |
| string                 | <b>setIdentifier()</b>                                                                               | void                    |
| textIdref[]            | <b>setInnerTextClauses()</b>                                                                         | void                    |
| textIdref              | <b>addInnerTextClauses()</b>                                                                         | void                    |
| map(textIdref, string) | <b>setParagraphs()</b>                                                                               | void                    |
| textIdref, string      | <b>addParagraphs()</b>                                                                               | void                    |
| encryptedIdref[]       | <b>setEncryptedParagraphs()</b>                                                                      | void                    |
| encryptedIdref         | <b>addEncryptedParagraphs()</b>                                                                      | void                    |
| string                 | <b>setText()</b>                                                                                     | void                    |

### 8.3.3 CELDeonticStructuredBlock

| Class                       |                                                    |      | CEL                                            | MCO |
|-----------------------------|----------------------------------------------------|------|------------------------------------------------|-----|
| Name                        | Type and Hierarchy                                 |      |                                                |     |
| CELDeontic-Structured-Block | Concrete, sub-class of Encryptable                 |      | cel-core:DeonticStructuredBlock                | /   |
| Fields                      |                                                    |      |                                                |     |
| Type                        | Field and Description                              | Occ. |                                                |     |
| string                      | <b>identifier</b><br>Uniquely identifies the party | 1    | cel-core:DeonticStructuredBlock id (attribute) | /   |

| Class                         |                                                                                                  |      | CEL                                               | MCO |
|-------------------------------|--------------------------------------------------------------------------------------------------|------|---------------------------------------------------|-----|
| Name                          | Type and Hierarchy                                                                               |      |                                                   |     |
| textIdref[]                   | <b>textClauses</b><br>The text clauses that represent this block                                 | 0, n | cel-core:DeonticStructuredBlockIdrefs (attribute) | /   |
| deonticStructuredBlockIdref[] | <b>innerDeonticStructuredBlocks</b><br>DeonticStructuredBlock objects considered within this one | 0, n | cel-core:DeonticStructuredBlock                   | /   |
| deonticIdref[]                | <b>deontics</b><br>Deontics within a block                                                       | 0, n | cel-core:DeonticStructuredClause                  | /   |

| Methods                       |                                                                                                                 |                               |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------|-------------------------------|
| Parameters                    | Method and Description                                                                                          | Return                        |
| void                          | <b>getIdentifier()</b>                                                                                          | string                        |
| void                          | <b>getTextClauses()</b>                                                                                         | textIdref[]                   |
| void                          | <b>getInnerDeonticStructuredBlocks()</b>                                                                        | deonticStructuredBlockIdref[] |
| void                          | <b>getDeontics()</b>                                                                                            | deonticIdref[]                |
| string                        | <b>CELDeonticStructureBlock()</b><br>This method constructs a new object and gets as input only the identifier. | void                          |
| string                        | <b>setIdentifier()</b>                                                                                          | void                          |
| textIdref[]                   | <b>setTextClauses()</b>                                                                                         | void                          |
| textIdref                     | <b>addTextClauses()</b>                                                                                         | void                          |
| deonticStructuredBlockIdref[] | <b>setInnerDeonticStructuredBlocks()</b>                                                                        | void                          |
| deonticStructuredBlockIdref   | <b>addInnerDeonticStructuredBlocks()</b>                                                                        | void                          |
| deonticIdref[]                | <b>setDeontics()</b>                                                                                            | void                          |
| deonticIdref                  | <b>addDeontics()</b>                                                                                            | void                          |

### 8.3.4 CELDeonticStructuredClause

| Class                      |                                                                                                       |      | CEL                                                    | MCO |
|----------------------------|-------------------------------------------------------------------------------------------------------|------|--------------------------------------------------------|-----|
| Name                       | Type and Hierarchy                                                                                    |      |                                                        |     |
| CELDeonticStructuredClause | Concrete, sub-class of Deontic                                                                        |      | cel-core:DeonticStructuredClause                       | /   |
| Fields                     |                                                                                                       |      |                                                        |     |
| Type                       | Field and Description                                                                                 | Occ. |                                                        |     |
| string                     | <b>number</b>                                                                                         | 0, 1 | cel-core:DeonticStructuredClause<br>number (attribute) | /   |
| string[]                   | <b>context</b><br>Contextual information of any type that can be added to a deontic structured clause | 0, n | cel-core:Context                                       | /   |

| Class                             |                                                              |      | CEL                    | MCO |
|-----------------------------------|--------------------------------------------------------------|------|------------------------|-----|
| Name                              | Type and Hierarchy                                           |      |                        |     |
| map(conditionIdref, CELCondition) | <b>preCondition</b><br>Pre-conditions of the deontic clause  | 0, n | cel-core:PreCondition  | /   |
| CELCondition                      | <b>postCondition</b><br>Post-condition of the deontic clause | 0, 1 | cel-core:PostCondition | /   |

| Methods                                      |                                                                                                                                                                            |                                   |
|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| Parameters                                   | Method and Description                                                                                                                                                     | Return                            |
| void                                         | <b>getNumber()</b>                                                                                                                                                         | string                            |
| void                                         | <b>getContext()</b>                                                                                                                                                        | string[]                          |
| void                                         | <b>getPreCondition()</b>                                                                                                                                                   | map(conditionIdref, CELCondition) |
| conditionIdref                               | <b>getPreConditionBy()</b>                                                                                                                                                 | CELCondition                      |
| void                                         | <b>getPostCondition()</b>                                                                                                                                                  | CELCondition                      |
| string                                       | <b>CELDeonticStructuredClause()</b><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor.     | void                              |
| string, enum (type), actionIdref, partyIdref | <b>CELDeonticStructuredClause()</b><br>This method constructs a new object and gets as input all the required fields. This constructor invokes the superclass constructor. | void                              |
| string                                       | <b>setNumber()</b>                                                                                                                                                         | void                              |
| string[]                                     | <b>setContext()</b>                                                                                                                                                        | void                              |
| string                                       | <b>addContext()</b>                                                                                                                                                        | void                              |
| map(conditionIdref, CELCondition)            | <b>setPreCondition()</b>                                                                                                                                                   | void                              |
| conditionIdref, CELCondition                 | <b>addPreCondition()</b>                                                                                                                                                   | void                              |
| CELCondition                                 | <b>setPostCondition()</b>                                                                                                                                                  | void                              |

### 8.3.5 CELCondition

| Class        |                                                        |      | CEL                                                               | MCO |
|--------------|--------------------------------------------------------|------|-------------------------------------------------------------------|-----|
| Name         | Type and Hierarchy                                     |      |                                                                   |     |
| CELCondition | Concrete                                               |      | cel-core:PreCondition<br>cel-core:PostCondition                   | /   |
| Fields       |                                                        |      |                                                                   |     |
| Type         | Field and Description                                  | Occ. |                                                                   |     |
| string       | <b>identifier</b><br>Uniquely identifies the condition | 1    | cel-core:PreCondition<br>cel-core:PostCondition<br>id (attribute) | /   |



| Class                |                                                                                                                                                                               | CEL  | MCO                                 |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------------------------|
| Name                 | Type and Hierarchy                                                                                                                                                            |      |                                     |
| enum (action-Status) | <b>actionStatus</b><br>Indicates the status of the action in the deontic clause to which the condition refers. The enum value must be:<br>0 = ActionStarted<br>1 = ActionDone | 0, 1 | actionStatus ( <i>attribute</i> ) / |
| string               | <b>withDelay</b><br>The elapsed time after which the deontic clause has to be considered valid                                                                                | 0, 1 | withDelay ( <i>attribute</i> ) /    |
| string               | <b>validity</b><br>the time of validity of the deontic clause                                                                                                                 | 0, 1 | validity ( <i>attribute</i> ) /     |

| Methods             |                                                                                                     |                     |
|---------------------|-----------------------------------------------------------------------------------------------------|---------------------|
| Parameters          | Method and Description                                                                              | Return              |
| void                | <b>getIdentifier()</b>                                                                              | string              |
| void                | <b>getActionStatus()</b>                                                                            | enum (actionStatus) |
| void                | <b>getWithDelay()</b>                                                                               | string              |
| void                | <b>getValidity()</b>                                                                                | string              |
| string              | <b>CELCondition()</b><br>This method constructs a new object and gets as input only the identifier. | void                |
| string              | <b>setIdentifier()</b>                                                                              | void                |
| enum (actionStatus) | <b>setActionStatus()</b>                                                                            | void                |
| string              | <b>setWithDelay()</b>                                                                               | void                |
| string              | <b>setValidity()</b>                                                                                | void                |

### 8.3.6 MCODEonticExpression

| Class                |                                | CEL  | MCO                         |
|----------------------|--------------------------------|------|-----------------------------|
| Name                 | Type and Hierarchy             |      |                             |
| MCODEonticExpression | Concrete, sub-class of Deontic | /    | mco-core: DeonticExpression |
| Fields               |                                |      |                             |
| Type                 | Field and Description          | Occ. |                             |
| /                    | /                              | /    | /                           |

| Methods    |                                                                                                                                                                  |                      |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| Parameters | Method and Description                                                                                                                                           | Return               |
| void       | <b>getRequiredFacts()</b><br>This method calls the super-method getConstraints().                                                                                | map(factIdref, Fact) |
| string     | <b>MCODEonticExpression()</b><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor. | void                 |

| Methods                                         |                                                                                                                                                                      |        |
|-------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Parameters                                      | Method and Description                                                                                                                                               | Return |
| string, enum (type),<br>actionIdref, partyIdref | <b>MCODeonticExpression()</b><br>This method constructs a new object and gets as input all the required fields. This constructor invokes the superclass constructor. | void   |
| map(factIdref, Fact)                            | <b>setRequiredFacts()</b><br>This method calls the super-method setConstraints().                                                                                    | void   |
| factIdref, Fact                                 | <b>addRequiredFacts()</b><br>This method calls the super-method addConstraints().                                                                                    | void   |

### 8.3.7 Permission

| Class       |                                                                                                                                      | CEL                        | MCO                                                                                                      |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------------------------------------------------------------------------------------------|
| Name        | Type and Hierarchy                                                                                                                   |                            |                                                                                                          |
| Permission  | Abstract, sub-class of Deontic                                                                                                       | <i>cel-ipre:Permission</i> | <i>mvc:Permission</i>                                                                                    |
| Fields      |                                                                                                                                      |                            |                                                                                                          |
| Type        | Field and Description                                                                                                                | Occ.                       |                                                                                                          |
| enum (type) | <b>type</b><br>1 = Permission<br>(super-class field override)                                                                        | 1                          | <i>cel-core:Permission</i><br><i>mco-core:Permission</i>                                                 |
| float       | <b>percentage</b><br>Indicates when the permission is shared with other parties                                                      | 0, 1                       | <i>cel-core:Permission</i><br><i>percentage (attribute)</i><br><i>mco-ipre:hasPercentage</i>             |
| float       | <b>incomePercentage</b><br>Indicates when the income of the exploitation of the permission has to be shared                          | 0, 1                       | <i>cel-core:Permission</i><br><i>incomePercentage (attribute)</i><br><i>mco-ipre:hasIncomePercentage</i> |
| boolean     | <b>isExclusive</b><br>Indicates if this exploitation might be granted by the issuer to multiple licensees in the same context or not | 0, 1                       | <i>cel-core:Permission</i><br><i>isExclusive (attribute)</i><br><i>mco-ipre:isExclusive</i>              |
| boolean     | <b>hasSublicenseRight</b><br>Indicates if it is possible to sub-license a granted right                                              | 0, 1                       | <i>cel-core:Permission</i><br><i>sublicenseRight (attribute)</i><br><i>mco-ipre:hasSublicenseRight</i>   |

| Methods    |                                                                                                                                                        |         |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Parameters | Method and Description                                                                                                                                 | Return  |
| void       | <b>getPercentage()</b>                                                                                                                                 | float   |
| void       | <b>getIncomePercentage()</b>                                                                                                                           | float   |
| void       | <b>getIsExclusive()</b>                                                                                                                                | boolean |
| void       | <b>getHasSublicenseRight()</b>                                                                                                                         | boolean |
| string     | <b>Permission()</b><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor. | void    |

| Methods                         |                                                                                                                                                            |        |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Parameters                      | Method and Description                                                                                                                                     | Return |
| string, actionIdref, partyIdref | <b>Permission()</b><br>This method constructs a new object and gets as input all the required fields. This constructor invokes the superclass constructor. | void   |
| float                           | <b>setPercentage()</b>                                                                                                                                     | void   |
| float                           | <b>setIncomePercentage()</b>                                                                                                                               | void   |
| boolean                         | <b>setIsExclusive()</b>                                                                                                                                    | void   |
| boolean                         | <b>setHasSublicenseRight()</b>                                                                                                                             | void   |

### 8.3.8 CELPermission

| Class      |                                                                            | CEL                 | MCO |
|------------|----------------------------------------------------------------------------|---------------------|-----|
| Name       | Type and Hierarchy                                                         |                     |     |
| Permission | Concrete, sub-class of Permission, sub-class of CELDeonticStructuredClause | cel-ipre:Permission | /   |
| Fields     |                                                                            |                     |     |
| Type       | Field and Description                                                      | Occ.                |     |
| /          | /                                                                          | /                   | /   |

| Methods                         |                                                                                                                                                               |        |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Parameters                      | Method and Description                                                                                                                                        | Return |
| string                          | <b>CELPermission()</b><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor.     | void   |
| string, actionIdref, partyIdref | <b>CELPermission()</b><br>This method constructs a new object and gets as input all the required fields. This constructor invokes the superclass constructor. | void   |

### 8.3.9 MCOPermission

| Class         |                                                               | CEL  | MCO             |
|---------------|---------------------------------------------------------------|------|-----------------|
| Name          | Type and Hierarchy                                            |      |                 |
| MCOPermission | Concrete, sub-class of Permission, sub-class of MCOPermission | /    | mvco:Permission |
| Fields        |                                                               |      |                 |
| Type          | Field and Description                                         | Occ. |                 |
| /             | /                                                             | /    | /               |

| Methods    |                                                                                                                                                           |        |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Parameters | Method and Description                                                                                                                                    | Return |
| string     | <b>MCOPermission()</b><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor. | void   |

| Methods                         |                                                                                                                                                               |        |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Parameters                      | Method and Description                                                                                                                                        | Return |
| string, actionIdref, partyIdref | <b>MCOPermission()</b><br>This method constructs a new object and gets as input all the required fields. This constructor invokes the superclass constructor. | void   |

## 8.4 Action

### 8.4.1 Act/GenericAction/Action

| Class       |                                                                                                                                                                                                             | CEL                 | MCO                                                                                                                                                                 |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name        | Type and Hierarchy                                                                                                                                                                                          |                     |                                                                                                                                                                     |
| Action      | Concrete                                                                                                                                                                                                    | <i>cel-core:Act</i> | <i>mco-core:GenericAction</i><br><i>mvco:Action</i>                                                                                                                 |
| Fields      |                                                                                                                                                                                                             |                     |                                                                                                                                                                     |
| Type        | Field and Description                                                                                                                                                                                       | Occ.                |                                                                                                                                                                     |
| string      | <b>identifier</b><br>Uniquely identifies the action                                                                                                                                                         | 1                   | <i>cel-core:Act id (attribute)</i><br><i>rdf:about</i>                                                                                                              |
| enum (type) | <b>type</b><br>0 = Action (simple)<br>1 = CreateWork<br>2 = Distribute<br>3 = EndUserAction<br>4 = ModifyCopy<br>5 = Dub<br>6 = MoveContent<br>7 = Render<br>8 = MakeAdaptation<br>9 = MakeCopy (Duplicate) | 1                   | <i>cel-core</i><br><i>cel-ipre</i><br><i>cel-pane</i><br><i>cel-rele</i><br><i>mco-core</i><br><i>mco-ipre</i><br><i>mco-pane</i><br><i>mco-rele</i><br><i>mvco</i> |

| Class |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | CEL | MCO |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|
| Name  | Type and Hierarchy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     |
|       | 10 = MakeAdaptationInstanceCopy<br>11 = MakeAdaptationManifestationCopy<br>12 = MakeWorkInstanceCopy<br>13 = MakeWorkManifestationCopy<br>14 = MakeInstance (Fixate)<br>15 = MakeAdaptationInstance<br>16 = MakeWorkInstance<br>17 = MakeManifestation<br>18 = MakeAdaptationManifestation<br>19 = MakeWorkManifestation<br>20 = Produce<br>21 = PublicCommunication<br>22 = Broadcast<br>23 = Download<br>24 = Stream<br>25 = CommunicationToThePublic<br>26 = PublicPerformance<br>27 = Synchronise<br>28 = GenericAction<br>29 = Reuse<br><br>30 = ExploitIPRights<br>31 = Transform<br>32 = Translate<br>33 = MakeCutAndEdit<br>34 = MakeExcerpt<br>35 = MakeRadioProduct<br>36 = Remix<br>37 = CreativeTransform<br>38 = Novelization<br>39 = Prequel<br>38 = Sequel<br>39 = Remake<br>40 = Spinoff |     |     |

| Class             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | CEL  | MCO               |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------|
| Name              | Type and Hierarchy                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |                   |
|                   | 41 = RelAct<br>42 = Issue<br>43 = Obtain<br>44 = PossessProperty<br>45 = Revoke<br>46 = Rel-mx-Act<br>47 = Rel-sx-Act<br>48 = Adapt<br>49 = Delete<br>50 = Diminish<br>51 = Embed<br>52 = Enhance<br>53 = Enlarge<br>54 = Execute<br>55 = Install<br>56 = Modify<br>57 = Move<br>58 = Play<br>59 = Print<br>60 = Reduce<br>61 = Uninstall<br>62 = RightUri<br><br>63 = Trade<br>64 = Consume<br>65 = Match<br>66 = Provide<br>67 = Payment<br>68 = Notify<br>69 = UserDefinedAction |      |                   |
| actionIdref[]     | <b>impliesAlso</b><br>Other actions implied                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0, n | /                 |
| personuserIdref[] | <b>rightGivenBy</b><br>The Persons/Users that provide the right to perform the action                                                                                                                                                                                                                                                                                                                                                                                               | 0, n | /                 |
|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |      | mvco:impliesAlso  |
|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |      | mvco:rightGivenBy |

| Methods    |                        |             |
|------------|------------------------|-------------|
| Parameters | Method and Description | Return      |
| void       | <b>getIdentifier()</b> | string      |
| void       | <b>getType()</b>       | enum (type) |

| Methods             |                                                                                                   |                   |
|---------------------|---------------------------------------------------------------------------------------------------|-------------------|
| Parameters          | Method and Description                                                                            | Return            |
| void                | <b>getImpliesAlso()</b>                                                                           | actionIdref[]     |
| void                | <b>getRightGivenBy()</b>                                                                          | personuserIdref[] |
| string              | <b>Action()</b><br>This method constructs a new object and gets as input only the identifier.     | void              |
| string, enum (type) | <b>Action()</b><br>This method constructs a new object and gets as input all the required fields. | void              |
| string              | <b>setIdentifier()</b>                                                                            | void              |
| enum (type)         | <b>setType()</b>                                                                                  | void              |
| actionIdref[]       | <b>setImpliesAlso()</b>                                                                           | void              |
| actionIdref         | <b>addImpliesAlso()</b>                                                                           | void              |
| personuserIdref[]   | <b>getRightGivenBy()</b>                                                                          | void              |
| personuserIdref     | <b>addRightGivenBy()</b>                                                                          | void              |

#### 8.4.2 Trade

| Class        |                                                           | CEL  | MCO                   |
|--------------|-----------------------------------------------------------|------|-----------------------|
| Name         | Type and Hierarchy                                        |      |                       |
| Trade        | Concrete, sub-class of Action                             | /    | mco-core:Trade        |
| Fields       |                                                           |      |                       |
| Type         | Field and Description                                     | Occ. |                       |
| enum (type)  | <b>type</b><br>63 = Trade<br>(super-class field override) | 1    | mco-core:Trade        |
| deonticIdref | <b>sellsDeontic</b>                                       | 1    | mco-ipre:sellsDeontic |

| Methods              |                                                                                                                                                       |              |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| Parameters           | Method and Description                                                                                                                                | Return       |
| void                 | <b>getSellsDeontic()</b>                                                                                                                              | deonticIdref |
| string               | <b>Trade()</b><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor.     | void         |
| string, deonticIdref | <b>Trade()</b><br>This method constructs a new object and gets as input all the required fields. This constructor invokes the superclass constructor. | void         |
| deonticIdref         | <b>setSellsDeontic()</b>                                                                                                                              | void         |

#### 8.4.3 Provide

| Class   |                               | CEL              | MCO              |
|---------|-------------------------------|------------------|------------------|
| Name    | Type and Hierarchy            |                  |                  |
| Provide | Concrete, sub-class of Action | cel-core:Provide | mco-core:Provide |

| Class       |                                                             |      | CEL                                                         | MCO                          |
|-------------|-------------------------------------------------------------|------|-------------------------------------------------------------|------------------------------|
| Name        | Type and Hierarchy                                          |      |                                                             |                              |
| Fields      |                                                             |      |                                                             |                              |
| Type        | Field and Description                                       | Occ. |                                                             |                              |
| enum (type) | <b>type</b><br>66 = Provide<br>(super-class field override) | 1    | /                                                           | <i>mco-core:Provide</i>      |
| boolean     | <b>isOnLoan</b>                                             | 0, 1 | <i>cel-core:Provide</i><br><i>isOnLoan</i> (attribute)      | <i>mco-core:isOnLoan</i>     |
| partyRef[]  | <b>recipients</b>                                           | 0, n | <i>cel-core:Provide</i><br><i>recipients</i><br>(attribute) | <i>mco-core:hasRecipient</i> |

| Methods    |                                                                                                                                                     |            |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| Parameters | Method and Description                                                                                                                              | Return     |
| void       | <b>getIsOnLoan()</b>                                                                                                                                | boolean    |
| void       | <b>getRecipients()</b>                                                                                                                              | partyRef[] |
| string     | <b>Provide()</b><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor. | void       |
| boolean    | <b>setIsOnLoan()</b>                                                                                                                                | void       |
| partyRef[] | <b>setRecipients()</b>                                                                                                                              | void       |
| partyRef   | <b>addRecipients()</b>                                                                                                                              | void       |

#### 8.4.4 Payment

| Class         |                                                             |      | CEL                                                | MCO                             |
|---------------|-------------------------------------------------------------|------|----------------------------------------------------|---------------------------------|
| Name          | Type and Hierarchy                                          |      |                                                    |                                 |
| Payment       | Concrete, sub-class of Action                               |      | <i>cel-pane:Payment</i>                            | <i>mco-pane:Payment</i>         |
| Fields        |                                                             |      |                                                    |                                 |
| Type          | Field and Description                                       | Occ. |                                                    |                                 |
| enum (type)   | <b>type</b><br>67 = Payment<br>(super-class field override) | 1    | <i>cel-pane:Payment</i>                            | <i>mco-pane:Payment</i>         |
| partyIdref[]  | <b>beneficiaries</b>                                        | 1, n | <i>cel-pane:Beneficiary</i>                        | <i>mco-pane:hasBeneficiary</i>  |
| actionIdref[] | <b>incomeSources</b>                                        | 0, n | <i>cel-pane:IncomeSource</i>                       | <i>mco-pane:hasIncomeSource</i> |
| float         | <b>amount</b>                                               | 0, 1 | <i>cel-pane:Payment</i><br>amount (attribute)      | <i>mco-pane:hasAmount</i>       |
| string        | <b>currency</b>                                             | 0, 1 | <i>cel-pane:Payment</i><br>currency<br>(attribute) | <i>mco-pane:hasCurrency</i>     |



| Class |                         |      | CEL                                                        | MCO                                     |
|-------|-------------------------|------|------------------------------------------------------------|-----------------------------------------|
| Name  | Type and Hierarchy      |      |                                                            |                                         |
| float | <b>incomePercentage</b> | 0, 1 | <i>cel-pane:Payment</i><br>incomePercentage<br>(attribute) | <i>mco-pane:</i><br>hasIncomePercentage |

| Methods              |                                                                                                                                                         |               |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Parameters           | Method and Description                                                                                                                                  | Return        |
| void                 | <b>getBeneficiaries()</b>                                                                                                                               | partyIdref[]  |
| void                 | <b>getIncomeSources()</b>                                                                                                                               | actionIdref[] |
| void                 | <b>getAmount()</b>                                                                                                                                      | float         |
| void                 | <b>getCurrency()</b>                                                                                                                                    | string        |
| void                 | <b>getIncomePercentage()</b>                                                                                                                            | float         |
| string               | <b>Payment()</b><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor.     | void          |
| string, partyIdref[] | <b>Payment()</b><br>This method constructs a new object and gets as input all the required fields. This constructor invokes the superclass constructor. | void          |
| partyIdref[]         | <b>setBeneficiaries()</b>                                                                                                                               | void          |
| partyIdref           | <b>addBeneficiaries()</b>                                                                                                                               | void          |
| actionIdref[]        | <b>setIncomeSources()</b>                                                                                                                               | void          |
| actionIdref          | <b>addIncomeSources()</b>                                                                                                                               | void          |
| float                | <b>setAmount()</b>                                                                                                                                      | void          |
| string               | <b>setCurrency()</b>                                                                                                                                    | void          |
| float                | <b>setIncomePercentage()</b>                                                                                                                            | void          |

#### 8.4.5 Notify

| Class         |                                                            |      | CEL                       | MCO                              |
|---------------|------------------------------------------------------------|------|---------------------------|----------------------------------|
| Name          | Type and Hierarchy                                         |      |                           |                                  |
| Notify        | Concrete, sub-class of Action                              |      | <i>cel-pane:Notify</i>    | <i>mco-pane:Notify</i>           |
| Fields        |                                                            |      |                           |                                  |
| Type          | Field and Description                                      | Occ. |                           |                                  |
| enum (type)   | <b>type</b><br>68 = Notify<br>(super-class field override) | 1    | <i>cel-pane:Notify</i>    | <i>mco-pane:</i><br>Notify       |
| partyIdref[]  | <b>recipients</b>                                          | 1, n | <i>cel-pane:Recipient</i> | <i>mco-pane:</i><br>hasRecipient |
| actionIdref[] | <b>isAbout</b>                                             | 0, n | <i>cel-pane:About</i>     | <i>mco-pane:isAbout</i>          |

| Methods    |                        |              |
|------------|------------------------|--------------|
| Parameters | Method and Description | Return       |
| void       | <b>getRecipients()</b> | partyIdref[] |

| Methods              |                                                                                                                                                        |               |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Parameters           | Method and Description                                                                                                                                 | Return        |
| void                 | <b>getIsAbout()</b>                                                                                                                                    | actionIdref[] |
| string               | <b>Notify()</b><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor.     | void          |
| string, partyIdref[] | <b>Notify()</b><br>This method constructs a new object and gets as input all the required fields. This constructor invokes the superclass constructor. | void          |
| partyIdref[]         | <b>setRecipients()</b>                                                                                                                                 | void          |
| partyIdref           | <b>addRecipients()</b>                                                                                                                                 | void          |
| actionIdref[]        | <b>setIsAbout()</b>                                                                                                                                    | void          |
| actionIdref          | <b>addIsAbout()</b>                                                                                                                                    | void          |

#### 8.4.6 UserDefinedAction

| Class             |                                                                       | CEL                            | MCO                                                |
|-------------------|-----------------------------------------------------------------------|--------------------------------|----------------------------------------------------|
| Name              | Type and Hierarchy                                                    |                                |                                                    |
| UserDefinedAction | Concrete, sub-class of Action                                         | cel-core:<br>UserDefinedAction | /                                                  |
| Fields            |                                                                       |                                |                                                    |
| Type              | Field and Description                                                 | Occ.                           |                                                    |
| enum (type)       | <b>type</b><br>69 = UserDefinedAction<br>(super-class field override) | 1                              | cel-core:<br>UserDefinedAction                     |
| string            | <b>href</b>                                                           | 0, 1                           | cel-core:<br>UserDefinedAction<br>href (attribute) |
| string            | <b>name</b>                                                           | 1                              | cel-core:Name                                      |
| string            | <b>standardReference</b>                                              | 0, 1                           | cel-core:<br>StandardReference                     |
| string            | <b>definition</b>                                                     | 0, 1                           | cel-core:Definition                                |

| Methods        |                                                                                                                                                                   |        |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Parameters     | Method and Description                                                                                                                                            | Return |
| void           | <b>getHref()</b>                                                                                                                                                  | string |
| void           | <b>getName()</b>                                                                                                                                                  | string |
| void           | <b>getStandardReference()</b>                                                                                                                                     | string |
| void           | <b>getDefinition()</b>                                                                                                                                            | string |
| string         | <b>UserDefinedAction()</b><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor.     | void   |
| string, string | <b>UserDefinedAction()</b><br>This method constructs a new object and gets as input all the required fields. This constructor invokes the superclass constructor. | void   |

| Methods    |                               |        |
|------------|-------------------------------|--------|
| Parameters | Method and Description        | Return |
| string     | <b>setHref()</b>              | void   |
| string     | <b>setName()</b>              | void   |
| string     | <b>setStandardReference()</b> | void   |
| string     | <b>setDefinition()</b>        | void   |

## 8.5 Object

### 8.5.1 Object

| Class  |                       | CEL                    | MCO |
|--------|-----------------------|------------------------|-----|
| Name   | Type and Hierarchy    |                        |     |
| Object | Abstract              | <i>cel-core:Object</i> | /   |
| Fields |                       |                        |     |
| Type   | Field and Description | Occ.                   |     |
| /      | /                     | /                      | /   |

| Methods    |                        |        |
|------------|------------------------|--------|
| Parameters | Method and Description | Return |
| /          | /                      | /      |

### 8.5.2 Item

| Class    |                                                   | CEL                  | MCO                                                   |
|----------|---------------------------------------------------|----------------------|-------------------------------------------------------|
| Name     | Type and Hierarchy                                |                      |                                                       |
| Item     | Concrete, sub-class of Object                     | <i>cel-core:Item</i> | /                                                     |
| Fields   |                                                   |                      |                                                       |
| Type     | Field and Description                             | Occ.                 |                                                       |
| string   | <b>identifier</b><br>Uniquely identifies the item | 0, 1                 | <i>dii:Identifier</i><br>dii:Identifier               |
| string[] | <b>relatedIdentifiers</b>                         | 0, n                 | <i>dii:RelatedIdentifier</i><br>dii:RelatedIdentifier |
| string   | name                                              | 0, 1                 | <i>cel-core:Item</i><br>name (attribute)              |

| Methods    |                                                                                             |          |
|------------|---------------------------------------------------------------------------------------------|----------|
| Parameters | Method and Description                                                                      | Return   |
| void       | <b>getIdentifier()</b>                                                                      | string   |
| void       | <b>getRelatedIdentifiers()</b>                                                              | string[] |
| void       | <b>getName()</b>                                                                            | string   |
| string     | <b>Item()</b><br>This method constructs a new object and gets as input only the identifier. | void     |
| string     | <b>setIdentifier()</b>                                                                      | void     |
| string[]   | <b>setRelatedIdentifiers()</b>                                                              | void     |

| Methods    |                                |        |
|------------|--------------------------------|--------|
| Parameters | Method and Description         | Return |
| string     | <b>addRelatedIdentifiers()</b> | void   |

### 8.5.3 IPEntity

| Class                |                                                                                                                                                                                                                                                                                                                                                                                                                   | CEL  | MCO                                                                    |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------------------------------------------------------------------------|
| Name                 | Type and Hierarchy                                                                                                                                                                                                                                                                                                                                                                                                |      |                                                                        |
| IPEntity             | Concrete, sub-class of Item                                                                                                                                                                                                                                                                                                                                                                                       | /    | <i>mvco</i> :IPEntity                                                  |
| Fields               |                                                                                                                                                                                                                                                                                                                                                                                                                   |      |                                                                        |
| Type                 | Field and Description                                                                                                                                                                                                                                                                                                                                                                                             | Occ. |                                                                        |
| enum (type)          | <b>type</b><br>0 = IPEntity (simple)<br>1 = Adaptation<br>2 = Excerpt<br>3 = Copy<br>4 = AdaptationInstanceCopy<br>5 = AdaptationManifestationCopy<br>6 = WorkInstanceCopy<br>7 = WorkManifestationCopy<br>8 = Instance<br>9 = AdaptationInstance<br>10 = WorkInstance<br>11 = Manifestation<br>12 = AdaptationManifestation<br>13 = WorkManifestation<br>14 = Product<br>15 = Work<br>16 = Event<br>17 = Segment | 1    | /<br><br><i>mvco</i><br><i>mco-core</i> :Event<br><i>avco</i> :Segment |
| map (string, string) | <b>metadata</b><br>For giving information about the contract itself.                                                                                                                                                                                                                                                                                                                                              | 0, n | <i>cel-core</i> :Metadata<br>Dublin Core (ISO 15836) or others         |
| string               | <b>socialTag</b>                                                                                                                                                                                                                                                                                                                                                                                                  | 0, 1 | / <i>mvco</i> :hasSocialTag                                            |
| boolean              | <b>isDigital</b>                                                                                                                                                                                                                                                                                                                                                                                                  | 0, 1 | / <i>avco</i> :hasSocialTag                                            |
| personuserldref[]    | <b>rightsOwners</b>                                                                                                                                                                                                                                                                                                                                                                                               | 0, n | / <i>mvco</i> :hasRightsOwner                                          |
| ipentityldref[]      | <b>isMadeUpOf</b>                                                                                                                                                                                                                                                                                                                                                                                                 | 0, n | / <i>mvco</i> :isMadeUpOf                                              |
| actionldref[]        | <b>resultedFrom</b>                                                                                                                                                                                                                                                                                                                                                                                               | 0, n | / <i>mvco</i> :resultedFrom                                            |
| boolean              | <b>isAudio</b>                                                                                                                                                                                                                                                                                                                                                                                                    | 0, 1 | / <i>avco</i> :isAudio                                                 |
| ipentityldref[]      | <b>segments</b>                                                                                                                                                                                                                                                                                                                                                                                                   | 0, n | / <i>avco</i> :hasSegment                                              |
| trackldref[]         | <b>tracks</b>                                                                                                                                                                                                                                                                                                                                                                                                     | 0, n | / <i>avco</i> :hasTrack                                                |
| intervalldref[]      | <b>intervals</b>                                                                                                                                                                                                                                                                                                                                                                                                  | 0, n | / <i>avco</i> :interval                                                |

| Methods              |                                                                                                     |                      |
|----------------------|-----------------------------------------------------------------------------------------------------|----------------------|
| Parameters           | Method and Description                                                                              | Return               |
| void                 | <b>getType()</b>                                                                                    | enum (type)          |
| void                 | <b>getMetadata()</b>                                                                                | map (string, string) |
| string               | <b>getMetadataBy()</b>                                                                              | string               |
| void                 | <b>getSocialTag()</b>                                                                               | string               |
| void                 | <b>getIsDigital()</b>                                                                               | boolean              |
| void                 | <b>getRightsOwners()</b>                                                                            | personuserldref[]    |
| void                 | <b>getIsMadeUpOf()</b>                                                                              | ipentityldref[]      |
| void                 | <b>getResultFrom()</b>                                                                              | actionldref[]        |
| void                 | <b>getIsAudio()</b>                                                                                 | boolean              |
| void                 | <b>getSegments()</b>                                                                                | ipentityldref[]      |
| void                 | <b>getTracks()</b>                                                                                  | trackldref[]         |
| void                 | <b>getIntervals()</b>                                                                               | intervalldref[]      |
| string               | <b>IPEntity()</b><br>This method constructs a new object and gets as input only the identifier.     | void                 |
| string, enum (type)  | <b>IPEntity()</b><br>This method constructs a new object and gets as input all the required fields. | void                 |
| enum (type)          | <b>setType()</b>                                                                                    | void                 |
| map (string, string) | <b>setMetadata()</b>                                                                                | void                 |
| string, string       | <b>addMetadata()</b>                                                                                | void                 |
| string               | <b>setSocialTag()</b>                                                                               | void                 |
| boolean              | <b>setIsDigital()</b>                                                                               | void                 |
| personuserldref[]    | <b>setRightsOwners()</b>                                                                            | void                 |
| personuserldref      | <b>addRightsOwners()</b>                                                                            | void                 |
| ipentityldref[]      | <b>setIsMadeUpOf()</b>                                                                              | void                 |
| ipentityldref        | <b>addIsMadeUpOf()</b>                                                                              | void                 |
| actionldref[]        | <b>setResultFrom()</b>                                                                              | void                 |
| actionldref          | <b>addResultFrom()</b>                                                                              | void                 |
| boolean              | <b>setIsAudio()</b>                                                                                 | void                 |
| ipentityldref[]      | <b>setSegments()</b>                                                                                | void                 |
| ipentityldref        | <b>addSegments()</b>                                                                                | void                 |
| trackldref[]         | <b>setTracks()</b>                                                                                  | void                 |
| trackldref           | <b>addTracks()</b>                                                                                  | void                 |
| intervalldref[]      | <b>setIntervals()</b>                                                                               | void                 |
| intervalldref        | <b>addIntervals()</b>                                                                               | void                 |

#### 8.5.4 Event

| Class  |                                 | CEL                   | MCO                   |
|--------|---------------------------------|-----------------------|-----------------------|
| Name   | Type and Hierarchy              |                       |                       |
| Event  | Concrete, sub-class of IPEntity | <i>cel-core:Event</i> | <i>mco-core:Event</i> |
| Fields |                                 |                       |                       |
| Type   | Field and Description           | Occ.                  |                       |

| Class       |                                                           |   | CEL                   | MCO                   |
|-------------|-----------------------------------------------------------|---|-----------------------|-----------------------|
| Name        | Type and Hierarchy                                        |   |                       |                       |
| enum (type) | <b>type</b><br>16 = Event<br>(super-class field override) | 1 | <i>cel-core:Event</i> | <i>mco-core:Event</i> |

| Methods    |                                                                                                                                                   |        |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Parameters | Method and Description                                                                                                                            | Return |
| string     | <b>Event()</b><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor. | void   |

### 8.5.5 Segment

| Class           |                                                             | CEL  | MCO          |
|-----------------|-------------------------------------------------------------|------|--------------|
| Name            | Type and Hierarchy                                          |      |              |
| Segment         | Concrete, sub-class of IPEntity                             | /    | avco:Segment |
| Fields          |                                                             |      |              |
| Type            | Field and Description                                       | Occ. |              |
| enum (type)     | <b>type</b><br>17 = Segment<br>(super-class field override) | 1    | /            |
| ipentityIdref   | <b>segmentOf</b>                                            | 0, 1 | /            |
| ipentityIdref[] | <b>contains</b>                                             | 0, n | /            |
| trackIdref[]    | <b>onTrack</b>                                              | 0, n | /            |

| Methods         |                                                                                                                                                     |                 |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| Parameters      | Method and Description                                                                                                                              | Return          |
| void            | <b>getSegmentOf()</b>                                                                                                                               | ipentityIdref   |
| void            | <b>getContains()</b>                                                                                                                                | ipentityIdref[] |
| void            | <b>getOnTrack()</b>                                                                                                                                 | trackIdref[]    |
| string          | <b>Segment()</b><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor. | void            |
| ipentityIdref   | <b>setSegmentOf()</b>                                                                                                                               | void            |
| ipentityIdref[] | <b>setContains()</b>                                                                                                                                | void            |
| ipentityIdref   | <b>addContains()</b>                                                                                                                                | void            |
| trackIdref[]    | <b>setOnTrack()</b>                                                                                                                                 | void            |
| trackIdref      | <b>addOnTrack()</b>                                                                                                                                 | void            |

### 8.5.6 Service

| Class   |                               |  | CEL                     | MCO                     |
|---------|-------------------------------|--|-------------------------|-------------------------|
| Name    | Type and Hierarchy            |  |                         |                         |
| Service | Concrete, sub-class of Object |  | <i>cel-core:Service</i> | <i>mco-core:Service</i> |

| Class       |                                                                                                                                                                                                                  |      | CEL                     | MCO                     |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------------|-------------------------|
| Name        | Type and Hierarchy                                                                                                                                                                                               |      |                         |                         |
| Fields      |                                                                                                                                                                                                                  |      |                         |                         |
| Type        | Field and Description                                                                                                                                                                                            | Occ. |                         |                         |
| string      | <b>identifier</b><br>Uniquely identifies the service                                                                                                                                                             | 1    | /                       | <i>rdf:about</i>        |
| enum (type) | <b>type</b><br>0 = Service (simple)<br>1 = Authenticate<br>2 = Deliver<br>3 = Describe<br>4 = Identify<br>5 = InteractWith<br>6 = Package<br>7 = Post<br>8 = Present<br>9 = Process<br>10 = Store<br>11 = Verify | 1    | <i>cel-core:Service</i> | <i>mco-core:Service</i> |

| Methods             |                                                                                                    |             |
|---------------------|----------------------------------------------------------------------------------------------------|-------------|
| Parameters          | Method and Description                                                                             | Return      |
| void                | <b>getIdentifier()</b>                                                                             | string      |
| void                | <b>getType()</b>                                                                                   | enum (type) |
| string              | <b>Service()</b><br>This method constructs a new object and gets as input only the identifier.     | void        |
| string, enum (type) | <b>Service()</b><br>This method constructs a new object and gets as input all the required fields. | void        |
| string              | <b>setIdentifier()</b>                                                                             | void        |
| enum                | <b>setType()</b>                                                                                   | void        |

### 8.5.7 SubjectWrapperObject

| Class                |                                                                   |                  | CEL            | MCO |
|----------------------|-------------------------------------------------------------------|------------------|----------------|-----|
| Name                 | Type and Hierarchy                                                |                  |                |     |
| SubjectWrapperObject | Concrete, sub-class of Object                                     | cel-core:Subject | mco-core:Party |     |
| Fields               |                                                                   |                  |                |     |
| Type                 | Field and Description                                             | Occ.             |                |     |
| string               | <b>identifier</b><br>Uniquely identifies the SubjectWrapperObject | 1                | /              | /   |

| Class      |                                                      |   | CEL                     | MCO                   |
|------------|------------------------------------------------------|---|-------------------------|-----------------------|
| Name       | Type and Hierarchy                                   |   |                         |                       |
| partyIdref | <b>partyRefersTo</b><br>The party referred as object | 1 | <i>cel-core:Subject</i> | <i>mco-core:Party</i> |

| Methods            |                                                                                                                 |            |
|--------------------|-----------------------------------------------------------------------------------------------------------------|------------|
| Parameters         | Method and Description                                                                                          | Return     |
| void               | <b>getIdentifier()</b>                                                                                          | string     |
| void               | <b>getPartyRefersTo()</b>                                                                                       | partyIdref |
| string             | <b>SubjectWrapperObject()</b><br>This method constructs a new object and gets as input only the identifier.     | void       |
| string, partyIdref | <b>SubjectWrapperObject()</b><br>This method constructs a new object and gets as input all the required fields. | void       |
| string             | <b>setIdentifier()</b>                                                                                          | void       |
| partyIdref         | <b>setPartyRefersTo()</b>                                                                                       | void       |

### 8.5.8 Track

| Class  |                                                    |      | CEL | MCO                     |
|--------|----------------------------------------------------|------|-----|-------------------------|
| Name   | Type and Hierarchy                                 |      |     |                         |
| Track  | Concrete, sub-class of Object                      | /    |     | <i>avco:Track</i>       |
| Fields |                                                    |      |     |                         |
| Type   | Field and Description                              | Occ. |     |                         |
| string | <b>identifier</b><br>Uniquely identifies the track | 1    | /   | <i>rdf:about</i>        |
| ulong  | <b>trackNumber</b>                                 | 1    | /   | <i>avco:trackNumber</i> |

| Methods       |                                                                                                  |        |
|---------------|--------------------------------------------------------------------------------------------------|--------|
| Parameters    | Method and Description                                                                           | Return |
| void          | <b>getIdentifier()</b>                                                                           | string |
| void          | <b>getTrackNumber()</b>                                                                          | ulong  |
| string        | <b>Track()</b><br>This method constructs a new object and gets as input only the identifier.     | void   |
| string, ulong | <b>Track()</b><br>This method constructs a new object and gets as input all the required fields. | void   |
| string        | <b>setIdentifier()</b>                                                                           | void   |
| ulong         | <b>setTrackNumber()</b>                                                                          | void   |



### 8.5.9 Interval

| Class    |                                                       | CEL  | MCO           |
|----------|-------------------------------------------------------|------|---------------|
| Name     | Type and Hierarchy                                    |      |               |
| Interval | Concrete, sub-class of Object                         | /    | avco:Interval |
| Fields   |                                                       |      |               |
| Type     | Field and Description                                 | Occ. |               |
| string   | <b>identifier</b><br>Uniquely identifies the interval | 1    | /             |
| string   | <b>start</b>                                          | 1    | /             |
| string   | <b>end</b>                                            | 1    | /             |
| string   | <b>duration</b>                                       | 1    | /             |
| string   | <b>onTimeline</b>                                     | 0, 1 | /             |

| Methods                        |                                                                                                     |        |
|--------------------------------|-----------------------------------------------------------------------------------------------------|--------|
| Parameters                     | Method and Description                                                                              | Return |
| void                           | <b>getIdentifier()</b>                                                                              | string |
| void                           | <b>getStart()</b>                                                                                   | string |
| void                           | <b>getEnd()</b>                                                                                     | string |
| void                           | <b>getDuration()</b>                                                                                | string |
| void                           | <b>getOnTimeline()</b>                                                                              | string |
| string                         | <b>Interval()</b><br>This method constructs a new object and gets as input only the identifier.     | void   |
| string, string, string, string | <b>Interval()</b><br>This method constructs a new object and gets as input all the required fields. | void   |
| string                         | <b>setIdentifier()</b>                                                                              | void   |
| string                         | <b>setStart()</b>                                                                                   | void   |
| string                         | <b>setEnd()</b>                                                                                     | void   |
| string                         | <b>setDuration()</b>                                                                                | void   |
| string                         | <b>setOnTimeline()</b>                                                                              | void   |

## 8.6 Fact

### 8.6.1 Constraint/Fact

| Class  |                                                       | CEL                                | MCO       |
|--------|-------------------------------------------------------|------------------------------------|-----------|
| Name   | Type and Hierarchy                                    |                                    |           |
| Fact   | Concrete                                              | cel-core:Constraint, cel-core:Fact | mvco:Fact |
| Fields |                                                       |                                    |           |
| Type   | Field and Description                                 | Occ.                               |           |
| string | <b>identifier</b><br>Uniquely identifies the interval | 1                                  | /         |

| Class          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | CEL | MCO                                                                                                                                                                                                                                                                                                                    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| Name           | Type and Hierarchy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |                                                                                                                                                                                                                                                                                                                        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| enum<br>(type) | <b>type</b><br>0 = Fact (simple)<br>1 = FactCoposition<br>2 = ActionEventFact<br>3 = TogetherWith<br>4 = ExploitationCondition (simple)<br>5 = AccessPolicy<br>6 = CopyrightExceptionFact<br>7 = DeliveryModality<br>8 = Device<br>9 = IPEntityContext<br>10 = Language<br>11 = Length<br>12 = MaterialFormat<br>13 = Means<br>14 = Runs<br>15 = ServiceAccessPolicy<br>16 = ServiceChannelContext<br>17 = SpatialContext<br>18 = TemporalContext<br>19 = UserTimeAccess<br>20 = UserDefinedFact<br>21 = RelCondition (Simple)<br>22 = AllConditions<br>23 = CallForConditions<br>24 = Destination<br>25 = DiCriteria<br>26 = DIPartOf<br>27 = ExerciseLimit<br>28 = ExerciseMechanism | 1   | <i>cel-core:Fact</i><br><br><i>cel-ipre:ExploitationCondition</i><br><br><i>cel-rele</i><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br>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|

| Class   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | CEL  |   | MCO         |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---|-------------|
| Name    | Type and Hierarchy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |   |             |
|         | 29 = ExistsRight<br>30 = FeeFlat<br>31 = FeeMetered<br>32 = FeePerInterval<br>33 = FeePerUse<br>34 = FeePerUsePrePay<br>35 = Fulfiller<br>36 = Helper<br>37 = IsMarked<br>38 = Mark<br>39 = PrerequisiteRight<br>40 = ProhibitedAttributeChanges<br>41 = ResourceSignedBy<br>42 = RevocationFreshness<br>43 = SeekApproval<br>44 = Source<br>45 = Territory<br>46 = TrackQuery<br>47 = TrackReport<br>48 = Transaction<br>49 = TransferControl<br>50 = ValidityInterval<br>51 = ValidityIntervalFloating<br>52 = ValidityIntervalStartsNow<br>53 = ValidityTimeMetered<br>54 = ValidityTimePeriodic |      |   |             |
| boolean | isTrue                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0, 1 | / | mvco:isTrue |

| Methods             |                                                                                                 |             |
|---------------------|-------------------------------------------------------------------------------------------------|-------------|
| Parameters          | Method and Description                                                                          | Return      |
| void                | <b>getIdentifier()</b>                                                                          | string      |
| void                | <b>getType()</b>                                                                                | enum (type) |
| void                | <b>getIsTrue()</b>                                                                              | boolean     |
| string              | <b>Fact()</b><br>This method constructs a new object and gets as input only the identifier.     | void        |
| string, enum (type) | <b>Fact()</b><br>This method constructs a new object and gets as input all the required fields. | void        |

| Methods     |                        |        |
|-------------|------------------------|--------|
| Parameters  | Method and Description | Return |
| string      | <b>setIdentifier()</b> | void   |
| enum (type) | <b>setType()</b>       | void   |
| boolean     | <b>setIsTrue()</b>     | void   |

### 8.6.2 FactComposition

| Class                  |                                                                         | CEL                                                                                           | MCO                                                                                           |
|------------------------|-------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Name                   | Type and Hierarchy                                                      |                                                                                               |                                                                                               |
| FactComposition        | Concrete, sub-class of Fact                                             | <i>cel-core:FactNegation</i><br><i>cel-core:FactIntersection</i><br><i>cel-core:FactUnion</i> | <i>mco-core:FactComposition</i>                                                               |
| Fields                 |                                                                         |                                                                                               |                                                                                               |
| Type                   | Field and Description                                                   | Occ.                                                                                          |                                                                                               |
| enum (type)            | <b>type</b><br>1 = FactComposition<br>(super-class field override)      | 1                                                                                             | /                                                                                             |
| enum (compositionType) | <b>compositionType</b><br>0 = Negation<br>1 = Union<br>2 = Intersection | 1                                                                                             | <i>cel-core:FactNegation</i><br><i>cel-core:FactIntersection</i><br><i>cel-core:FactUnion</i> |
| factIdref[]            | <b>composedFacts</b>                                                    | 1..n                                                                                          | /                                                                                             |
|                        |                                                                         |                                                                                               | <i>mco-core:hasFact</i>                                                                       |

| Methods                                    |                                                                                                                                                                 |                        |
|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| Parameters                                 | Method and Description                                                                                                                                          | Return                 |
| void                                       | <b>getCompositionType()</b>                                                                                                                                     | enum(composition-Type) |
| void                                       | <b>getComposedFacts()</b>                                                                                                                                       | factIdref[]            |
| string                                     | <b>FactComposition()</b><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor.     | void                   |
| string, enum(compositionType), factIdref[] | <b>FactComposition()</b><br>This method constructs a new object and gets as input all the required fields. This constructor invokes the superclass constructor. | void                   |
| enum(composition-Type)                     | <b>setCompositionType()</b>                                                                                                                                     | void                   |
| factIdref[]                                | <b>setComposedFacts()</b>                                                                                                                                       | void                   |
| factIdref                                  | <b>addComposedFacts()</b>                                                                                                                                       | void                   |

## 8.6.3 ActionEventFact

| Class           |                                                                                                                                               | CEL                          | MCO                                                      |                                |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|----------------------------------------------------------|--------------------------------|
| Name            | Type and Hierarchy                                                                                                                            |                              |                                                          |                                |
| ActionEventFact | Concrete, sub-class of Fact                                                                                                                   | cel-core:<br>ActionEventFact | mco-core:<br>ActionEventFact                             |                                |
| Fields          |                                                                                                                                               |                              |                                                          |                                |
| Type            | Field and Description                                                                                                                         | Occ.                         |                                                          |                                |
| enum (type)     | <b>type</b><br>2 = ActionEventFact<br>(super-class field override)                                                                            | 1                            | cel-core:<br>ActionEventFact                             | mco-core:<br>ActionEventFact   |
| string          | <b>validity</b>                                                                                                                               | 0, 1                         | cel-core:<br>ActionEventFact<br>validity<br>(attribute)  | mco-ipre:hasValidity           |
| string          | <b>withDelay</b>                                                                                                                              | 0, 1                         | cel-core:<br>ActionEventFact<br>withDelay<br>(attribute) | mco-ipre:withDelay             |
| enum (status)   | <b>status</b><br>Indicates the status of the action or the event to which the fact refers. The enum value must be:<br>0 = Started<br>1 = Done | 1                            | cel-core:<br>ActionEventFact<br>status<br>(attribute)    | mco-core:Started mco-core:Done |
| ipentityIdref   | <b>eventThatMakesTrue</b>                                                                                                                     | 0, 1                         | cel-core:<br>ActionEventFact<br>ref<br>(attribute)       | mco-core:makesTrue             |
| actionIdref     | <b>actionThatMakesTrue</b>                                                                                                                    | 0, 1                         | cel-core:<br>ActionEventFact<br>ref<br>(attribute)       | mco-core:makesTrue             |

| Methods    |                                                                                                                                                                 |               |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Parameters | Method and Description                                                                                                                                          | Return        |
| void       | <b>getValidity()</b>                                                                                                                                            | string        |
| void       | <b>getWithDelay()</b>                                                                                                                                           | string        |
| void       | <b>getStatus()</b>                                                                                                                                              | enum (status) |
| void       | <b>getEventThatMakesTrue()</b>                                                                                                                                  | ipentityIdref |
| void       | <b>getActionThatMakesTrue()</b>                                                                                                                                 | actionIdref   |
| string     | <b>ActionEventFact()</b><br><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor. | void          |

| Methods              |                                                                                                                                                                 |        |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Parameters           | Method and Description                                                                                                                                          | Return |
| string, enum(status) | <b>ActionEventFact()</b><br>This method constructs a new object and gets as input all the required fields. This constructor invokes the superclass constructor. | void   |
| string               | <b>setValidity()</b>                                                                                                                                            | void   |
| string               | <b>setWithDelay()</b>                                                                                                                                           | void   |
| enum (status)        | <b>setActionStatus()</b>                                                                                                                                        | void   |
| ipentityIdref        | <b>setEventThatMakesTrue()</b>                                                                                                                                  | void   |
| actionIdref          | <b>setActionThatMakesTrue()</b>                                                                                                                                 | void   |

#### 8.6.4 TogetherWith

| Class         |                                                                 | CEL                              | MCO                                                                  |
|---------------|-----------------------------------------------------------------|----------------------------------|----------------------------------------------------------------------|
| Name          | Type and Hierarchy                                              |                                  |                                                                      |
| TogetherWith  | Concrete, sub-class of Fact                                     | <i>cel-core:</i><br>TogetherWith | <i>mco-core:</i><br>TogetherWith                                     |
| Fields        |                                                                 |                                  |                                                                      |
| Type          | Field and Description                                           | Occ.                             |                                                                      |
| enum (type)   | <b>type</b><br>3 = TogetherWith<br>(super-class field override) | 1                                | <i>cel-core:</i><br>TogetherWith<br><i>mco-core:</i><br>TogetherWith |
| ipentityIdref | <b>withIPEntity</b>                                             | 0, 1                             | <i>mco-ipre:</i><br>withIPEntity                                     |

| Methods       |                                                                                                                                                          |               |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Parameters    | Method and Description                                                                                                                                   | Return        |
| void          | <b>getWithIPEntity()</b>                                                                                                                                 | ipentityIdref |
| string        | <b>TogetherWith()</b><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor. | void          |
| ipentityIdref | <b>setWithIPEntity()</b>                                                                                                                                 | void          |

#### 8.6.5 AccessPolicy

| Class        |                                                                 | CEL                           | MCO                                                               |
|--------------|-----------------------------------------------------------------|-------------------------------|-------------------------------------------------------------------|
| Name         | Type and Hierarchy                                              |                               |                                                                   |
| AccessPolicy | Concrete, sub-class of Fact                                     | <i>cel-ipre:</i> AccessPolicy | <i>mco-ipre:</i><br>AccessPolicy                                  |
| Fields       |                                                                 |                               |                                                                   |
| Type         | Field and Description                                           | Occ.                          |                                                                   |
| enum (type)  | <b>type</b><br>5 = AccessPolicy<br>(super-class field override) | 1                             | <i>cel-ipre:</i> AccessPolicy<br><i>mco-ipre:</i><br>AccessPolicy |

| Class              |                                                                                                              |   | CEL                                  | MCO                                             |
|--------------------|--------------------------------------------------------------------------------------------------------------|---|--------------------------------------|-------------------------------------------------|
| Name               | Type and Hierarchy                                                                                           |   |                                      |                                                 |
| enum (restriction) | <b>restriction</b><br>0 = FreeOfCharge<br>1 = Pay<br>2 = PayPerPackage<br>3 = PayPerView<br>4 = Subscription | 1 | <i>cel-ipre:</i><br>AccessPolicyType | <i>mco-ipre:</i><br>AccessPolicy<br>sub-classes |

| Methods                   |                                                                                                                                                              |                    |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| Parameters                | Method and Description                                                                                                                                       | Return             |
| void                      | <b>getRestriction()</b>                                                                                                                                      | enum (restriction) |
| string                    | <b>AccessPolicy()</b><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor.     | void               |
| string, enum(restriction) | <b>AccessPolicy()</b><br>This method constructs a new object and gets as input all the required fields. This constructor invokes the superclass constructor. | void               |
| enum (restriction)        | <b>setRestriction()</b>                                                                                                                                      | void               |

### 8.6.6 DeliveryModality

| Class              |                                                                                                                                                               | CEL                       | MCO                                                                           |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-------------------------------------------------------------------------------|
| Name               | Type and Hierarchy                                                                                                                                            |                           |                                                                               |
| DeliveryModality   | Concrete, sub-class of Fact                                                                                                                                   | cel-ipre:DeliveryModality | mco-ipre:DeliveryModality                                                     |
| Fields             |                                                                                                                                                               |                           |                                                                               |
| Type               | Field and Description                                                                                                                                         | Occ.                      |                                                                               |
| enum (type)        | <b>type</b><br>7 = DeliveryModality<br>(super-class field override)                                                                                           | 1                         | cel-ipre:DeliveryModality<br><br>mco-ipre:DeliveryModality                    |
| enum (restriction) | <b>restriction</b><br>0 = Linear<br>1 = Broadcasting<br>2 = Webcasting<br>3 = NonLinear<br>4 = OnDemandBasis<br>5 = OnDemandDownload<br>6 = OnDemandStreaming | 1                         | cel-ipre:DeliveryModalityType<br><br>mco-ipre:DeliveryModality<br>sub-classes |

| Methods    |                         |                    |
|------------|-------------------------|--------------------|
| Parameters | Method and Description  | Return             |
| void       | <b>getRestriction()</b> | enum (restriction) |

| Methods                   |                                                                                                                                                                  |        |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Parameters                | Method and Description                                                                                                                                           | Return |
| string                    | <b>DeliveryModality()</b><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor.     | void   |
| string, enum(restriction) | <b>DeliveryModality()</b><br>This method constructs a new object and gets as input all the required fields. This constructor invokes the superclass constructor. | void   |
| enum (restriction)        | <b>setRestriction()</b>                                                                                                                                          | void   |

### 8.6.7 Device

| Class              |                                                                                                                                                                                                               | CEL                    | MCO                                                                 |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------------------------------------------------------------|
| Name               | Type and Hierarchy                                                                                                                                                                                            |                        |                                                                     |
| Device             | Concrete, sub-class of Fact                                                                                                                                                                                   | <i>cel-ipre:Device</i> | <i>mco-ipre:Device</i>                                              |
| Fields             |                                                                                                                                                                                                               |                        |                                                                     |
| Type               | Field and Description                                                                                                                                                                                         | Occ.                   |                                                                     |
| enum (type)        | <b>type</b><br>8 = Device<br>(super-class field override)                                                                                                                                                     | 1                      | <i>cel-ipre:Device</i><br><i>mco-ipre:Device</i>                    |
| enum (restriction) | <b>restriction</b><br>0 = Computer<br>1 = MobileDevice<br>2 = MobileBroadcastDevice<br>3 = MobileTelecommunicationDevice<br>4 = RobotDevice<br>5 = StorageDevice<br>6 = TelevisionDevice<br>7 = TelevisionSet | 1                      | <i>cel-ipre:DeviceType</i><br><i>mco-ipre:Device</i><br>sub-classes |

| Methods                   |                                                                                                                                                        |                    |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| Parameters                | Method and Description                                                                                                                                 | Return             |
| void                      | <b>getRestriction()</b>                                                                                                                                | enum (restriction) |
| string                    | <b>Device()</b><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor.     | void               |
| string, enum(restriction) | <b>Device()</b><br>This method constructs a new object and gets as input all the required fields. This constructor invokes the superclass constructor. | void               |
| enum (restriction)        | <b>setRestriction()</b>                                                                                                                                | void               |



## 8.6.8 IPEntityContext

| Class           |                                                                    | CEL                                 | MCO                                                                        |
|-----------------|--------------------------------------------------------------------|-------------------------------------|----------------------------------------------------------------------------|
| Name            | Type and Hierarchy                                                 |                                     |                                                                            |
| IPEntityContext | Concrete, sub-class of Fact                                        | <i>cel-ipre:</i><br>IPEntityContext | <i>mco-ipre:</i><br>IPEntityContext                                        |
| Fields          |                                                                    |                                     |                                                                            |
| Type            | Field and Description                                              | Occ.                                |                                                                            |
| enum (type)     | <b>type</b><br>9 = IPEntityContext<br>(super-class field override) | 1                                   | <i>cel-ipre:</i><br>IPEntityContext<br><i>mco-ipre:</i><br>IPEntityContext |
| ipentityIdref[] | <b>partOf</b>                                                      | 1                                   | <i>cel-ipre:</i><br>IPEntityContext<br><i>mco-ipre:</i> partOf             |

| Methods                 |                                                                                                                                                                 |                 |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| Parameters              | Method and Description                                                                                                                                          | Return          |
| void                    | <b>getPartOf()</b>                                                                                                                                              | ipentityIdref[] |
| string                  | <b>IPEntityContext()</b><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor.     | void            |
| string, ipentityIdref[] | <b>IPEntityContext()</b><br>This method constructs a new object and gets as input all the required fields. This constructor invokes the superclass constructor. | void            |
| ipentityIdref[]         | <b>setPartOf()</b>                                                                                                                                              | void            |
| ipentityIdref           | <b>addPartOf()</b>                                                                                                                                              | void            |

## 8.6.9 Language

| Class       |                                                              | CEL                       | MCO                                                                                    |
|-------------|--------------------------------------------------------------|---------------------------|----------------------------------------------------------------------------------------|
| Name        | Type and Hierarchy                                           |                           |                                                                                        |
| Language    | Concrete, sub-class of Fact                                  | <i>cel-ipre:</i> Language | <i>mco-ipre:</i> Language                                                              |
| Fields      |                                                              |                           |                                                                                        |
| Type        | Field and Description                                        | Occ.                      |                                                                                        |
| enum (type) | <b>type</b><br>10 = Language<br>(super-class field override) | 1                         | <i>cel-ipre:</i> Language<br><i>mco-ipre:</i> Language                                 |
| string[]    | <b>languages</b>                                             | 1                         | <i>cel-ipre:</i> Language<br>languages (attribute)<br><i>mco-ipre:</i><br>hasLanguages |

| Methods    |                        |          |
|------------|------------------------|----------|
| Parameters | Method and Description | Return   |
| void       | <b>getLanguages()</b>  | string[] |

| Methods          |                                                                                                                                                          |        |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Parameters       | Method and Description                                                                                                                                   | Return |
| string           | <b>Language()</b><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor.     | void   |
| string, string[] | <b>Language()</b><br>This method constructs a new object and gets as input all the required fields. This constructor invokes the superclass constructor. | void   |
| string[]         | <b>setLanguages()</b>                                                                                                                                    | void   |
| string           | <b>addLanguages()</b>                                                                                                                                    | void   |

### 8.6.10 Length

| Class       |                                                            | CEL                    | MCO                                                                          |
|-------------|------------------------------------------------------------|------------------------|------------------------------------------------------------------------------|
| Name        | Type and Hierarchy                                         |                        |                                                                              |
| Length      | Concrete, sub-class of Fact                                | <i>cel-ipre:Length</i> | <i>mco-ipre:Length</i>                                                       |
| Fields      |                                                            |                        |                                                                              |
| Type        | Field and Description                                      | Occ.                   |                                                                              |
| enum (type) | <b>type</b><br>11 = Length<br>(super-class field override) | 1                      | <i>cel-ipre:Length</i><br><i>mco-ipre:Length</i>                             |
| string      | <b>maxLength</b>                                           | 1                      | <i>cel-ipre:Length</i><br>maxLength (attribute)<br><i>mco-ipre:maxLength</i> |

| Methods        |                                                                                                                                                        |        |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Parameters     | Method and Description                                                                                                                                 | Return |
| void           | <b>getMaxLength()</b>                                                                                                                                  | string |
| string         | <b>Length()</b><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor.     | void   |
| string, string | <b>Length()</b><br>This method constructs a new object and gets as input all the required fields. This constructor invokes the superclass constructor. | void   |
| string         | <b>setMaxLength()</b>                                                                                                                                  | void   |

### 8.6.11 MaterialFormat

| Class           |                             | CEL                            | MCO                            |
|-----------------|-----------------------------|--------------------------------|--------------------------------|
| Name            | Type and Hierarchy          |                                |                                |
| Material-Format | Concrete, sub-class of Fact | <i>cel-ipre:MaterialFormat</i> | <i>mco-ipre:MaterialFormat</i> |
| Fields          |                             |                                |                                |
| Type            | Field and Description       | Occ.                           |                                |

| Class       |                                                                    |      | CEL                                                        | MCO                                                     |
|-------------|--------------------------------------------------------------------|------|------------------------------------------------------------|---------------------------------------------------------|
| Name        | Type and Hierarchy                                                 |      |                                                            |                                                         |
| enum (type) | <b>type</b><br>12 = MaterialFormat<br>(super-class field override) | 1    | <i>cel-ipre:</i><br>MaterialFormat                         | <i>mco-ipre:</i><br>MaterialFormat                      |
| string      | <b>matchesFormatComplianceProfile</b>                              | 0, 1 | <i>cel-ipre:</i><br>MatchesFor<br>matComplia<br>nceProfile | <i>mco-ipre:</i> matchesFor<br>matComplia<br>nceProfile |
| string      | <b>aspectRatio</b>                                                 | 0, 1 | <i>cel-ipre:</i><br>AspectRatio                            | <i>mco-ipre:</i><br>hasAspectRatio                      |
| string      | <b>audioFormat</b>                                                 | 0, 1 | <i>cel-ipre:</i><br>AudioFormat                            | <i>mco-ipre:</i><br>hasAudioFormat                      |
| string      | <b>format</b>                                                      | 0, 1 | <i>cel-ipre:</i> Format                                    | <i>mco-ipre:</i> hasFormat                              |
| ulong       | <b>maxBitrate</b>                                                  | 0, 1 | <i>cel-ipre:</i><br>MaxBitrate                             | <i>mco-ipre:</i><br>hasMaxBitrate                       |
| ulong       | <b>maxLines</b>                                                    | 0, 1 | <i>cel-ipre:</i> MaxLines                                  | <i>mco-ipre:</i><br>hasMaxLines                         |
| ulong       | <b>minBitrate</b>                                                  | 0, 1 | <i>cel-ipre:</i><br>MinBitrate                             | <i>mco-ipre:</i><br>hasMinBitrate                       |
| ulong       | <b>minLines</b>                                                    | 0, 1 | <i>cel-ipre:</i> MinLines                                  | <i>mco-ipre:</i> hasMinLines                            |
| string      | <b>videoFormat</b>                                                 | 0, 1 | <i>cel-ipre:</i><br>VideoFormat                            | <i>mco-ipre:</i><br>hasVideoFormat                      |

| Methods    |                                                                                                                                                            |        |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Parameters | Method and Description                                                                                                                                     | Return |
| void       | <b>getMatchesFormatComplianceProfile()</b>                                                                                                                 | string |
| void       | <b>getAspectRatio()</b>                                                                                                                                    | string |
| void       | <b>getAudioFormat()</b>                                                                                                                                    | string |
| void       | <b>getFormat()</b>                                                                                                                                         | string |
| void       | <b>getMaxBitrate()</b>                                                                                                                                     | ulong  |
| void       | <b>getMaxLines()</b>                                                                                                                                       | ulong  |
| void       | <b>getMinBitrate()</b>                                                                                                                                     | ulong  |
| void       | <b>getMinLines()</b>                                                                                                                                       | ulong  |
| void       | <b>getVideoFormat()</b>                                                                                                                                    | string |
| string     | <b>MaterialFormat()</b><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor. | void   |
| string     | <b>setMatchesFormatComplianceProfile()</b>                                                                                                                 | void   |
| string     | <b>setAspectRatio()</b>                                                                                                                                    | void   |
| string     | <b>setAudioFormat()</b>                                                                                                                                    | void   |
| string     | <b>setFormat()</b>                                                                                                                                         | void   |
| ulong      | <b>setMaxBitrate()</b>                                                                                                                                     | void   |
| ulong      | <b>setMaxLines()</b>                                                                                                                                       | void   |
| ulong      | <b>setMinBitrate()</b>                                                                                                                                     | void   |
| ulong      | <b>setMinLines()</b>                                                                                                                                       | void   |
| string     | <b>setVideoFormat()</b>                                                                                                                                    | void   |

## 8.6.12 Means

| Class              |                                                                                                                                                                                                                                                                                   | CEL                   | MCO                                                               |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-------------------------------------------------------------------|
| Name               | Type and Hierarchy                                                                                                                                                                                                                                                                |                       |                                                                   |
| Means              | Concrete, sub-class of Fact                                                                                                                                                                                                                                                       | <i>cel-ipre:Means</i> | <i>mco-ipre:Means</i>                                             |
| Fields             |                                                                                                                                                                                                                                                                                   |                       |                                                                   |
| Type               | Field and Description                                                                                                                                                                                                                                                             | Occ.                  |                                                                   |
| enum (type)        | <b>type</b><br>13 = Means<br>(super-class field override)                                                                                                                                                                                                                         | 1                     | <i>cel-ipre:Means</i><br><i>mco-ipre:Means</i>                    |
| enum (restriction) | <b>restriction</b><br>0 = Videogram<br>1 = TransmissionTechnology<br>2 = BroadcastTechnology<br>3 = Cable<br>4 = IPNetwork<br>5 = MobileBroadcastTechnology<br>6 = Satellite<br>7 = Terrestrial<br>8 = Internet<br>9 = MobileTechnology<br>10 = MobileTelecommunicationTechnology | 1                     | <i>cel-ipre:MeansType</i><br><i>mco-ipre:Means</i><br>sub-classes |

| Methods                   |                                                                                                                                                       |                    |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| Parameters                | Method and Description                                                                                                                                | Return             |
| void                      | <b>getRestriction()</b>                                                                                                                               | enum (restriction) |
| string                    | <b>Means()</b><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor.     | void               |
| string, enum(restriction) | <b>Means()</b><br>This method constructs a new object and gets as input all the required fields. This constructor invokes the superclass constructor. | void               |
| enum (restriction)        | <b>setRestriction()</b>                                                                                                                               | void               |

## 8.6.13 Runs

| Class       |                                                          | CEL                  | MCO                                          |
|-------------|----------------------------------------------------------|----------------------|----------------------------------------------|
| Name        | Type and Hierarchy                                       |                      |                                              |
| Runs        | Concrete, sub-class of Fact                              | <i>cel-ipre:Runs</i> | <i>mco-ipre:Runs</i>                         |
| Fields      |                                                          |                      |                                              |
| Type        | Field and Description                                    | Occ.                 |                                              |
| enum (type) | <b>type</b><br>14 = Runs<br>(super-class field override) | 1                    | <i>cel-ipre:Runs</i><br><i>mco-ipre:Runs</i> |

| Class  |                            |      | CEL                                                          | MCO                                            |
|--------|----------------------------|------|--------------------------------------------------------------|------------------------------------------------|
| Name   | Type and Hierarchy         |      |                                                              |                                                |
| ulong  | <b>numberOfRuns</b>        | 1    | <i>cel-ipre:Runs</i><br>numberOfRuns<br>(attribute)          | <i>mco-ipre:</i><br>hasNumberOfRuns            |
| string | <b>validity</b>            | 0, 1 | <i>cel-ipre:Runs</i><br>validity (attrib-<br>ute)            | <i>mco-ipre:hasValidity</i>                    |
| ulong  | <b>numberOfRepetitions</b> | 0, 1 | <i>cel-ipre:Runs</i><br>numberOfRepeti-<br>tions (attribute) | <i>mco-ipre:ha</i><br>sNumberOfR<br>epetitions |

| Methods       |                                                                                                                                                      |        |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Parameters    | Method and Description                                                                                                                               | Return |
| void          | <b>getNumberOfRuns()</b>                                                                                                                             | ulong  |
| void          | <b>getValidity()</b>                                                                                                                                 | string |
| void          | <b>getNumberOfRepetitions()</b>                                                                                                                      | ulong  |
| string        | <b>Runs()</b><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor.     | void   |
| string, ulong | <b>Runs()</b><br>This method constructs a new object and gets as input all the required fields. This constructor invokes the superclass constructor. | void   |
| ulong         | <b>setNumberOfRuns()</b>                                                                                                                             | void   |
| string        | <b>setValidity()</b>                                                                                                                                 | void   |
| ulong         | <b>setNumberOfRepetitions()</b>                                                                                                                      | void   |

#### 8.6.14 ServiceAccessPolicy

| Class               |                                                                         |      | CEL                                     | MCO                                     |
|---------------------|-------------------------------------------------------------------------|------|-----------------------------------------|-----------------------------------------|
| Name                | Type and Hierarchy                                                      |      |                                         |                                         |
| ServiceAccessPolicy | Concrete, sub-class of Fact                                             |      | <i>cel-ipre:</i><br>ServiceAccessPolicy | <i>mco-ipre:</i><br>ServiceAccessPolicy |
| Fields              |                                                                         |      |                                         |                                         |
| Type                | Field and Description                                                   | Occ. |                                         |                                         |
| enum<br>(type)      | <b>type</b><br>15 = ServiceAccessPolicy<br>(super-class field override) | 1    | <i>cel-ipre:</i><br>ServiceAccessPolicy | <i>mco-ipre:</i><br>ServiceAccessPolicy |

| Class              |                                                                                                                                                                                  |   | CEL                                     | MCO                                                |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-----------------------------------------|----------------------------------------------------|
| Name               | Type and Hierarchy                                                                                                                                                               |   |                                         |                                                    |
| enum (restriction) | <b>restriction</b><br>0 = Open<br>1 = Restricted<br>2 = Hotel<br>3 = PublicPerformanceHalls<br>4 = Transportations<br>5 = Airplanes<br>6 = BusesMetro<br>7 = Ships<br>8 = Trains | 1 | <i>cel-ipre:ServiceAccessPolicyType</i> | <i>mco-ipre:ServiceAccessPolicy</i><br>sub-classes |

| Methods                   |                                                                                                                                                                     |                    |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| Parameters                | Method and Description                                                                                                                                              | Return             |
| void                      | <b>getRestriction()</b>                                                                                                                                             | enum (restriction) |
| string                    | <b>ServiceAccessPolicy()</b><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor.     | void               |
| string, enum(restriction) | <b>ServiceAccessPolicy()</b><br>This method constructs a new object and gets as input all the required fields. This constructor invokes the superclass constructor. | void               |
| enum (restriction)        | <b>setRestriction()</b>                                                                                                                                             | void               |

### 8.6.15 ServiceChannelContext

| Class                 |                                                                           |      | CEL                                                                             | MCO                                    |
|-----------------------|---------------------------------------------------------------------------|------|---------------------------------------------------------------------------------|----------------------------------------|
| Name                  | Type and Hierarchy                                                        |      |                                                                                 |                                        |
| ServiceChannelContext | Concrete, sub-class of Fact                                               |      |                                                                                 |                                        |
|                       |                                                                           |      | <i>cel-ipre:ServiceChannelContext</i>                                           | <i>mco-ipre:ServiceChannelContext</i>  |
| Fields                |                                                                           |      |                                                                                 |                                        |
| Type                  | Field and Description                                                     | Occ. |                                                                                 |                                        |
| enum (type)           | <b>type</b><br>16 = ServiceChannelContext<br>(super-class field override) | 1    | <i>cel-ipre:ServiceChannelContext</i>                                           | <i>mco-ipre:ServiceChannelContext</i>  |
| string[]              | <b>servicesAndChannels</b>                                                | 0, 1 | <i>cel-ipre:ServiceChannelContext</i><br><i>servicesAndChannels</i> (attribute) | <i>mco-ipre:hasServicesAndChannels</i> |

| Methods    |                                                                                                                                                                   |          |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| Parameters | Method and Description                                                                                                                                            | Return   |
| void       | <b>getServicesAndChannels()</b>                                                                                                                                   | string[] |
| string     | <b>ServiceChannelContext()</b><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor. | void     |
| string[]   | <b>setServicesAndChannels()</b>                                                                                                                                   | void     |
| string     | <b>addServicesAndChannels()</b>                                                                                                                                   | void     |

### 8.6.16 SpatialContext

| Class          |                                                                        |      | CEL                                | MCO                                |
|----------------|------------------------------------------------------------------------|------|------------------------------------|------------------------------------|
| Name           | Type and Hierarchy                                                     |      |                                    |                                    |
| SpatialContext | Concrete, sub-class of Fact                                            |      | <i>cel-ipre:</i><br>SpatialContext | <i>mco-ipre:</i><br>SpatialContext |
| Fields         |                                                                        |      |                                    |                                    |
| Type           | Field and Description                                                  | Occ. |                                    |                                    |
| enum<br>(type) | <b>type</b><br>17 = SpatialContext<br><br>(super-class field override) | 1    | <i>cel-ipre:</i><br>SpatialContext | <i>mco-ipre:</i><br>SpatialContext |
| string[]       | <b>countries</b>                                                       | 1, n | <i>cel-ipre:</i> Country           | <i>mco-ipre:</i> inCountry         |
| string[]       | <b>regions</b>                                                         | 0, n | <i>cel-ipre:</i> Region            | /                                  |

| Methods          |                                                                                                                                                                |          |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| Parameters       | Method and Description                                                                                                                                         | Return   |
| void             | <b>getCountries()</b>                                                                                                                                          | string[] |
| void             | <b>getRegions()</b>                                                                                                                                            | string[] |
| string           | <b>SpatialContext()</b><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor.     | void     |
| string, string[] | <b>SpatialContext()</b><br>This method constructs a new object and gets as input all the required fields. This constructor invokes the superclass constructor. | void     |
| string[]         | <b>setCountries()</b>                                                                                                                                          | void     |
| string           | <b>addCountries()</b>                                                                                                                                          | void     |
| string[]         | <b>setRegions()</b>                                                                                                                                            | void     |
| string           | <b>addRegions()</b>                                                                                                                                            | void     |

### 8.6.17 TemporalContext

| Class            |                             |  | CEL                                 | MCO                                 |
|------------------|-----------------------------|--|-------------------------------------|-------------------------------------|
| Name             | Type and Hierarchy          |  |                                     |                                     |
| Temporal-Context | Concrete, sub-class of Fact |  | <i>cel-ipre:</i><br>TemporalContext | <i>mco-ipre:</i><br>TemporalContext |
| Fields           |                             |  |                                     |                                     |
| Type             | Field and Description       |  | Occ.                                |                                     |

| Class       |                                                                     |      | CEL                                                           | MCO                                 |
|-------------|---------------------------------------------------------------------|------|---------------------------------------------------------------|-------------------------------------|
| Name        | Type and Hierarchy                                                  |      |                                                               |                                     |
| enum (type) | <b>type</b><br>18 = TemporalContext<br>(super-class field override) | 1    | <i>cel-ipre:</i><br>TemporalContext                           | <i>mco-ipre:</i><br>TemporalContext |
| string      | afterDate                                                           | 0, 1 | <i>cel-ipre:</i><br>TemporalContext<br>afterDate (attribute)  | <i>mco-ipre:</i> afterDate          |
| string      | beforeDate                                                          | 0, 1 | <i>cel-ipre:</i><br>TemporalContext<br>beforeDate (attribute) | <i>mco-ipre:</i> beforeDate         |

| Methods    |                                                                                                                                                             |        |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Parameters | Method and Description                                                                                                                                      | Return |
| void       | <b>getAfterDate()</b>                                                                                                                                       | string |
| void       | <b>getBeforeDate()</b>                                                                                                                                      | string |
| string     | <b>TemporalContext()</b><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor. | void   |
| string     | <b>setAfterDate()</b>                                                                                                                                       | void   |
| string     | <b>setBeforeDate()</b>                                                                                                                                      | void   |

#### 8.6.18 UserTimeAccess

| Class              |                                                                    |      | CEL                                                 | MCO                                                    |
|--------------------|--------------------------------------------------------------------|------|-----------------------------------------------------|--------------------------------------------------------|
| Name               | Type and Hierarchy                                                 |      |                                                     |                                                        |
| UserTime-Access    | Concrete, sub-class of Fact                                        |      | <i>cel-ipre:</i><br>UserTimeAccess                  | <i>mco-ipre:</i><br>UserTimeAccess                     |
| Fields             |                                                                    |      |                                                     |                                                        |
| Type               | Field and Description                                              | Occ. |                                                     |                                                        |
| enum (type)        | <b>type</b><br>19 = UserTimeAccess<br>(super-class field override) | 1    | <i>cel-ipre:</i><br>UserTimeAccess                  | <i>mco-ipre:</i><br>UserTimeAccess                     |
| enum (restriction) | <b>restriction</b><br>0=Unlimited<br>1=Limited                     | 1    | <i>cel-ipre:</i> Limited <i>cel-ipre:</i> Unlimited | <i>mco-ipre:</i> Limited<br><i>mco-ipre:</i> Unlimited |
| string             | validity                                                           | 0, 1 | <i>cel-ipre:</i> Limited<br>validity (attribute)    | <i>mco-ipre:</i> hasValidity                           |

| Methods    |                         |                    |
|------------|-------------------------|--------------------|
| Parameters | Method and Description  | Return             |
| void       | <b>getRestriction()</b> | enum (restriction) |
| void       | <b>getValidity()</b>    | string             |



| Methods                   |                                                                                                                                                                |        |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Parameters                | Method and Description                                                                                                                                         | Return |
| string                    | <b>UserTimeAccess()</b><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor.     | void   |
| string, enum(restriction) | <b>UserTimeAccess()</b><br>This method constructs a new object and gets as input all the required fields. This constructor invokes the superclass constructor. | void   |
| enum (restriction)        | <b>setRestriction()</b>                                                                                                                                        | void   |
| string                    | <b>setValidity()</b>                                                                                                                                           | void   |

### 8.6.19 UserDefinedFact

| Class           |                                                                       | CEL                       | MCO                                           |
|-----------------|-----------------------------------------------------------------------|---------------------------|-----------------------------------------------|
| Name            | Type and Hierarchy                                                    |                           |                                               |
| UserDefinedFact | Concrete, sub-class of Fact                                           | cel-core: UserDefinedFact | /                                             |
| Fields          |                                                                       |                           |                                               |
| Type            | Field and Description                                                 | Occ.                      |                                               |
| enum (type)     | <b>type</b><br>20 = UserDefinedAction<br>(super-class field override) | 1                         | cel-core: UserDefinedFact                     |
| string          | <b>href</b>                                                           | 0, 1                      | cel-core: UserDefinedFact<br>href (attribute) |
| string          | <b>name</b>                                                           | 1                         | cel-core: Name                                |
| string          | <b>standardReference</b>                                              | 0, 1                      | cel-core: StandardReference                   |
| string          | <b>definition</b>                                                     | 0, 1                      | cel-core: Definition                          |

| Methods        |                                                                                                                                                                 |        |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Parameters     | Method and Description                                                                                                                                          | Return |
| void           | <b>getHref()</b>                                                                                                                                                | string |
| void           | <b>getName()</b>                                                                                                                                                | string |
| void           | <b>getStandardReference()</b>                                                                                                                                   | string |
| void           | <b>getDefinition()</b>                                                                                                                                          | string |
| string         | <b>UserDefinedFact()</b><br>This method constructs a new object and gets as input only the identifier. This constructor invokes the superclass constructor.     | void   |
| string, string | <b>UserDefinedFact()</b><br>This method constructs a new object and gets as input all the required fields. This constructor invokes the superclass constructor. | void   |
| string         | <b>setHref()</b>                                                                                                                                                | void   |
| string         | <b>setName()</b>                                                                                                                                                | void   |
| string         | <b>setStandardReference()</b>                                                                                                                                   | void   |

| Methods    |                        |        |
|------------|------------------------|--------|
| Parameters | Method and Description | Return |
| string     | <b>setDefinition()</b> | void   |

## 9 API for MPEG-21 CEL/MCO parser

This clause specifies the API for the MPEG-21 CEL/MCO parser. This API shall be used in conjunction with MPEG-21 XML and RDF media contracts (ISO/IEC 21000-19, ISO/IEC 21000-20, and ISO/IEC 21000-21).

| Methods    |                                                                                                                            |          |
|------------|----------------------------------------------------------------------------------------------------------------------------|----------|
| Parameters | Method and Description                                                                                                     | Return   |
| string     | <b>getContractFromCEL()</b><br>Returns a set of media contractual objects as defined in 7.1.1 from an MPEG-21 CEL contract | Contract |
| string     | <b>getContractFromMCO()</b><br>Returns a set of media contractual objects as defined in 7.1.1 from an MPEG-21 MCO contract | Contract |
| string     | <b>validateCELContract()</b><br>Returns a conformance report of the MPEG-21 CEL contract given as input.                   | string   |
| string     | <b>validateMCOContract()</b><br>Returns a conformance report of the MPEG-21 MCO contract given as input.                   | string   |

## 10 API for MPEG-21 CEL/MCO generator

This clause specifies the API for the MPEG-21 CEL/MCO generator. This API shall be used in conjunction with MPEG-21 XML and RDF media contracts (ISO/IEC 21000-19, ISO/IEC 21000-20, and ISO/IEC 21000-21 ).

| Methods    |                                                                                                                            |        |
|------------|----------------------------------------------------------------------------------------------------------------------------|--------|
| Parameters | Method and Description                                                                                                     | Return |
| Contract   | <b>getCELFromContract()</b><br>Returns an MPEG-21 CEL contract from a set of media contractual objects as defined in 7.1.1 | string |
| Contract   | <b>getMCOFromContract()</b><br>Returns an MPEG-21 MCO contract from a set of media contractual objects as defined in 7.1.1 | string |

## 11 Reference software and conformance

The reference software is organized with the following structure:

### — MPEG-21 template contracts

- XML
- RDF

- *JSON-LD*
- **MPEG-21 Contract Expression Language (CEL)**
  - *MPEG-21 CEL parser*
  - *MPEG-21 CEL generator*
  - *MPEG-21 CEL contracts to smart contracts for media (forward conversion)*
    - Solidity/Ethereum<sup>1)</sup>
    - Michelson/Tezos<sup>1)</sup>
  - *Smart contracts for media to MPEG-21 CEL contracts (backward conversion)*
    - Solidity/Ethereum
    - Michelson/Tezos
- **MPEG-21 Media Contracts Ontology (MCO)**
  - *MPEG-21 MCO parser*
  - *MPEG-21 MCO generator*
  - *MPEG-21 MCO contracts to smart contracts for media (forward conversion)*
    - Solidity/Ethereum
    - TEAL/Algorand<sup>1)</sup>
  - *Smart contracts for media to MPEG-21 MCO contracts (backward conversion)*
    - Solidity/Ethereum
    - TEAL/Algorand
- **OpenAPI and demo**
  - *OpenAPI*
  - *MPEG-21 MCO OpenAPI server*
  - *MPEG-21 CEL server*
  - *Demo*

The reference software workflow is shown in [Figure 4](#), including its modules for the bidirectional conversion from MPEG-21 CEL/MCO contracts to smart contracts for media. The complete description of the modules is given in the following subclauses, while the associated ISO/IEC 21000-23 Smart contracts for media reference software can be downloaded at <https://standards.iso.org/iso-iec/21000/-23/ed-1/en/>.

1) Solidity/Ethereum, Michelson/Tezos and TEAL/Algorand are examples of suitable products available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of these products.



### 11.1 MPEG-21 template contracts

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