



Intelligence Community Technical Specification

CVE Encoding Specification for Media Type

Version 2016-SEP

September 9, 2016

Distribution Notice:

This document has been approved for Public Release and is available for use without restriction.

Table of Contents

| | |
|--|----|
| Chapter 1 - Introduction | 1 |
| 1.1 - Purpose | 1 |
| 1.2 - Scope | 1 |
| 1.3 - Background | 1 |
| 1.4 - Enterprise Need | 2 |
| 1.5 - Audience and Applicability | 2 |
| 1.6 - Conventions | 3 |
| 1.6.1 - Language | 3 |
| 1.6.2 - Typography | 3 |
| 1.6.3 - Terminology | 3 |
| 1.6.4 - XML Namespaces | 3 |
| 1.7 - Dependencies | 3 |
| 1.8 - Conformance | 4 |
| 1.9 - Version Policies | 5 |
| 1.9.1 - XML Namespace Policy | 5 |
| 1.9.2 - Version Numbering | 5 |
| Chapter 2 - Development Guidance | 7 |
| 2.1 - Relationship to Abstract Data Definition and other encodings | 7 |
| 2.2 - List Sources | 7 |
| 2.3 - Additional Guidance | 7 |
| 2.3.1 - Usage of the MIME Schema | 7 |
| 2.3.2 - Usage of the MIME Schematron Library | 8 |
| 2.3.3 - Deprecated MIME types | 8 |
| Chapter 3 - Definitions, Interfaces, and Constraints | 9 |
| 3.1 - Constraint Rule Types | 9 |
| 3.2 - “Living” Constraint Rules | 9 |
| 3.3 - Classified or Controlled Constraint Rules | 9 |
| 3.4 - Constraint Terminology | 9 |
| 3.5 - Errors and Warnings | 10 |
| 3.6 - Rule Identifiers | 10 |
| 3.7 - Data Validation Constraint Rules | 10 |
| 3.7.1 - Purpose | 10 |
| 3.7.2 - Schematron | 11 |
| 3.7.3 - Non-null Constraints | 11 |
| 3.7.4 - Value Enumeration Constraints | 11 |
| 3.7.5 - Additional Constraints | 12 |
| 3.7.5.1 - CES Constraints | 12 |
| 3.7.6 - Constraint Rules | 12 |
| 3.8 - Data Rendering Constraint Rules | 12 |
| 3.8.1 - Purpose | 12 |
| 3.8.2 - Rendering Constraint Rules | 12 |
| Chapter 4 - Conformance Validation | 13 |
| 4.1 - Schema Validation | 13 |
| 4.2 - Business Rule Validation | 13 |
| Chapter 5 - Generated Guides | 14 |
| 5.1 - Schema Guide | 14 |

| | |
|--|----|
| 5.2 - Schematron Guide | 15 |
| Appendix A - Feature Summary | 16 |
| A.1 - MIME Feature Comparison | 16 |
| Appendix B - Change History | 17 |
| Appendix C - List of Abbreviations | 18 |
| Appendix D - Bibliography | 20 |
| Appendix E - Points of Contact | 23 |
| Appendix F - IC CIO Approval Memo | 24 |

List of Tables

| | |
|--|----|
| Table 1 - XML Namepaces | 3 |
| Table 2 - Dependencies | 4 |
| Table 3 - Numerical Rule Identifier Ranges | 10 |
| Table 4 - Constraint Rules | 12 |
| Table 5 - Feature Summary Legend | 16 |
| Table 6 - MIME Feature comparison | 16 |
| Table 7 - CES Version Identifier History | 17 |

Chapter 1 - Introduction

1.1 - Purpose

This CVE Encoding Specification (CES) defines a controlled vocabulary for media types used by the Intelligence Community (IC). This CES provides tokens for both IC-defined media types and general media types defined by the Internet Assigned Numbers Authority (IANA). Though the title refers to media types, this specification retains the abbreviation “MIME” as a generally-known term for media types even though the use is not limited to email and “MIME” is no longer used by IANA; the IANA specification is now known as “Media Types.” This specification applies generally to media types; it is NOT limited to use for mail extensions.

1.2 - Scope

This specification applies to the use of media types in information produced, stored, or shared within the IC. This CES may be useful outside the scope of intelligence, but potential adopters should independently assess the CES appropriateness for any particular purpose.

1.3 - Background

The Intelligence Community Chief Information Officer (IC CIO) is leading the IC’s enterprise transformation to an “interoperable federated architecture.” Intelligence Community Directive (ICD) 500, *Director of National Intelligence Chief Information Officer* [\[8\]](#) grants the IC CIO the authority and responsibility to:

- Develop an Intelligence Community Enterprise Architecture (IC EA).
- Lead the IC’s identification, selection, development, and management of IC enterprise standards.
- Incorporate technically sound, de-conflicted, interoperable enterprise standards into the IC EA.
- Certify that IC elements adhere to the architecture and standards.

In the area of enterprise standardization, the IC CIO is called upon to establish common Information Technology (IT) standards, protocols, and interfaces, to establish uniform information security standards, and to ensure information technology infrastructure, enterprise architecture, systems, standards, protocols, and interfaces support the overall information sharing strategies and policies of the IC as established in relevant law, policy, and directives.

Enterprise standards facilitate the information exchanges, service protocols, network configurations, computing environments, and business processes necessary for a service-enabled federated enterprise. As the enterprise develops and deploys shared services employing approved standards, not only will information and services be interoperable, but significant efficiencies and savings will be achieved by promoting capability reuse. As detailed in Intelligence Community Standard (ICS) 500-21, *Tagging of Intelligence and Intelligence-Related Information* [\[11\]](#) the extensive and consistent use of Extensible Markup Language (XML) within data encoding specifications allows for improved data exchanges and processing of information, thereby facilitating achievement of the IC’s data discovery, data sharing, and interoperability goals.

An encoding specification defines a concrete implementation – a file format for example – for concepts in the *IC Abstract Data Definition* [\[2\]](#). Many IC encoding specifications are based on XML,

but other technologies are possible. For example, IC-ID^[6] defines a plain-text format for IC Identifiers as well as an associated XML structure.

1.4 - Enterprise Need

Many IC encoding specifications use CVEs to define allowable values for various elements and attributes. Over time, several encoding specifications became dependent on the same list of values, and dual (or more) maintenance was required to keep the lists aligned. Additionally, any changes to a specification's CVEs caused an entire new version of that specification to be created. In order to remove the need for dual maintenance and to remove the need to revision a specification when a CVE was updated, a new type of encoding specification, the CVE Encoding Specification, was created to decouple the vocabulary from the specifications. Each CES contains one or more CVEs and optionally a master schema that defines elements and attributes limited to the allowable values and/or any Schematron rules that enforce the vocabulary in specifications that define their own elements or attributes.

Enterprise needs and requirements for this specification can be found in the following Office of the Director of National Intelligence (ODNI) policies and implementation guidance:

- IC Information Technology Enterprise (IC ITE):
 - Intelligence Community Information Technology Enterprise (IC ITE) Increment 1 Implementation Plan^[5]
- 500 Series:
 - Intelligence Community Standard (ICS) 500-21, Tagging of Intelligence and Intelligence-Related Information^[11]
- 300 Series:
 - Intelligence Community Directive (ICD) 302, Document and Media Exploitation^[7]

1.5 - Audience and Applicability

CESs are primarily intended for those developing tools and services to create, modify, store, exchange, search, display, or further process the type of data being described.

The governance of this specification and the data it describes, including any requirement to use this specification or prohibition thereof, is explicitly outside the scope of this specification. IC Standard (ICS) 500-20, *Intelligence Community Enterprise Standards Compliance*, ^[10] defines the IC Enterprise Standards Baseline (IC ESB) and the applicability of such to an IC element. *Department of Defense Instruction (DODI) 8310.01, Information Technology Standards in the DoD*, ^[3] requires DoD elements to use the DoD IT Standards Registry (DISR).

Use of this specification must be consistent with applicable Federal statutes, Executive Orders, Presidential Directives, Attorney General approved guidelines, IC Policy, IC element policies, established concepts of operation, agreements, contractual obligations, etc. However, the determination of any such requirements or restrictions is the sole responsibility of each implementing entity. Implementers may wish to consult the Office of General Counsel for their cognizant agency to determine existing requirements and restrictions for the use of this DES and to determine if new agreements or policy changes are required related to the use of this DES.

1.6 - Conventions

Certain technical and presentation conventions were used in the creation of this document to ensure readability and understanding.

1.6.1 - Language

When appearing in all capital letters in this technical specification, the keywords “MUST,” “MUST NOT,” “REQUIRED,” “SHALL,” “SHALL NOT,” “SHOULD,” “SHOULD NOT,” “RECOMMENDED,” “MAY,” and “OPTIONAL” are to be interpreted as described in IETF RFC 2119, “Key words for use in RFCs to Indicate Requirement Levels.” [\[12\]](#) When these words appear in regular case, they are meant in their natural-language sense.

1.6.2 - Typography

Certain typography is used throughout the body of this document to convey certain meanings, in particular:

- *Italics* – A title of a referenced work or a specialized or emphasized term
- Underscore – An abstract data element
- **Bold** – An XML element or attribute

1.6.3 - Terminology

For an implementation to conform to this specification, it MUST adhere to all normative aspects of the specification. For the purposes of this document, normative and informative are defined as:

- *Normative*: considered to be prescriptive and necessary to conform to the standard.
- *Informative*: serving to instruct, enlighten or inform.

1.6.4 - XML Namespaces

Namespaces referenced in this document and the prefixes used to represent them are listed in the following table. The namespace prefix of any XML Qualified Name used in any example in this document should be interpreted using the information below.

Table 1 - XML Namespaces

| Prefix | URI |
|--------|----------------------------------|
| ism | urn:us:gov:ic:ism |
| mime | urn:us:gov:ic:mime |
| xsd | http://www.w3.org/2001/XMLSchema |

1.7 - Dependencies

This technical specification directly depends on the technical specifications, documentation, and implementations listed in [Table 2](#). The dependencies listed below are directly referenced in this specification (e.g. Schema, Schematron), and are normative or informative as indicated.

Table 2 - Dependencies

| Name | Dependency Description |
|--|---|
| Schematron ^[15] | <p>Schematron — ISO/IEC 19757-3:2006 — is a rule-based document schema definition language. In this specification Schematron is a formal language used to express normative business rules, so this reference is normative.</p> <p>The Schematron rules are normative in the sense that they convey criteria that a document MUST adhere to, exactly as English may be used to convey normative criteria. It is not necessary for implementers to use the specific Schematron encoding in this specification. Implementers MAY use any encodings, tools, or languages desired to implement validation schemes for conformance to this specification.</p> <p>Note: The Schematron rules in this specification use XSLT 2.0^[21] query binding.</p> |
| <p>XSLT 2.0^[21] implementation of Schematron^[15] by Rick Jelliffe (2010-04-14)</p> <p>Note: The only available identifying descriptors for this implementation are the implementer's name and date of release. This implementation may be found at the following URL: http://code.google.com/p/schematron/.</p> | <p>The International Organization for Standardization does not create nor endorse reference implementations of its standards. For the purposes of this specification the <i>behavior</i> of the implementation created by Mr. Jelliffe is normative.</p> <p>Implementers MAY use any encodings, tools, or languages desired to implement validation schemes for conformance to this specification. To conform to this specification, a validator MUST find a document valid <i>if and only if</i> the Schematron implementation by Mr. Jelliffe would find the document valid according to the Schematron rules in this specification.</p> |
| Value enumerations used for several XML structures are defined in the various Controlled Vocabulary Enumerations (CVEs) included in this CES. | Specification uses CVEs to encode controlled vocabularies. The use of the MIME CVEs is normative. |
| IANA Website ^[4] | Contains the IANA approved media types which are a significant subset of this CVE. |

1.8 - Conformance

The XML schemas (unless noted otherwise), CVE values from the XML CVE files, and any Schematron^[15] rules are normative for this specification. The rest of this document and the rest of this package, including the descriptive content referenced within the XML Schema Guide, the XSL

transformations, the SchematronGuide, and PDF CVE value files, are informative. Additionally, the use of keywords defined in IETF RFC 2119^[12] is considered normative within the scope of the sentence. All other parts of this document are informative.

The XML schemas provided may import other specifications. The versions of dependency specifications imported are not normative in that to import a different version of a component specification you could modify the import or substitute a different version of the component using the existing import path. This could be done by changing the schema file or by using XML Catalogs.^[19] For example, a schema could be changed to incorporate a different version of a dependency like ISM by changing the attribute declaration of **@ism:DESVersion='9'** to **@ism:DESVersion='10'** in the `xsd:schema` statement. The ability to specify which version of a dependent specification to import enables the configuration change control of parent specifications (such as PUBS and TDF) to be "decoupled" from the configuration change control of dependent specifications (such as ISM CVE updates). This "decoupling" method has not been in place for all versions of these parent specifications; therefore, please verify with the dependency table to ensure use of allowed dependency versions.

Additional guidance that is either classified or has handling controls can be found in separate annexes distributed to the appropriate networks and environments as necessary. Systems and services operating in those environments **MUST** consult the appropriate annexes.

1.9 - Version Policies

1.9.1 - XML Namespace Policy

The XML namespaces defined in this specification do not incorporate a version number and do not change with revisions of the specification. This choice aligns with perspective two from "The Disposition of Names in an XML Namespace."^[16] This decision allows for systems that process information encoded with these specifications to use the same XPath expressions across multiple revisions. It was agreed the burden of updating all XPath based systems for every revision to the specification was unacceptable. See section 4.2.2 "Versioning and XML namespace policy" of "Architecture of the World Wide Web, Volume One."^[17]

There is a version attribute (e.g. **@DESVersion**, **@CESVersion**, **@TESVersion**, **@version**) for each namespace defined in an IC CIO specification. Version attributes are used to capture the specification version number the specification author intends an instance to conform to. Namespaces do not change, so the version attribute is required to fully understand an instance document.

As changes to the specification are released, the version number captured in the "version" attribute increments. See [Section 1.9.2 - Version Numbering](#) for information on the numbering scheme.

This XML namespace policy only applies to the namespaces defined in this specification, any namespaces that are included by reference should define their own namespace policy.

1.9.2 - Version Numbering

The version numbering for this specification is defined by a year-month structure (e.g., YYYY-
MMM). This provides a temporal representation of when the specification was released. When the

version number is used in the version attribute, the expression follows the Augmented Backus–Naur Form^[1] below:

Version Format when used in the version attribute:

- [1] Version : : = [Year](#) [Month](#) ["-" [CustomizationSuffix](#)]
- [2] Year : : = 4(DIGIT)
- [3] Month : : = 2(DIGIT)
- [4] Customization : : = 1*27(ALPHA / DIGIT / " _ ")
Suffix

Version in XML Lexicon

The following vocabulary helps explain the meaning of terms used in the version documentation, and it may further constrain the set of allowable values:

| | |
|---------------------|---|
| Version | The version number as it might be expressed in a DESVersion, CESVersion or other XML attribute for indicating the version being referenced. |
| Year | The four digit year from the version of the specification being referenced. |
| Month | The 2 digit month from the version of the specification being referenced. |
| CustomizationSuffix | An optional suffix used when customizing a version of a specification. This would be used to indicate that you have extended the specification in some fashion for a particular use case. |

Chapter 2 - Development Guidance

2.1 - Relationship to Abstract Data Definition and other encodings

The relationship of the XML structures defined in this encoding specification to the abstract terms defined in the ADD are described using a mapping table in the ADD. The mapping tables generally show the mapping to the encoding specification where a structure is defined, not where it is used. These mappings are provided for reference only. The complete set of encoding specification artifacts, both normative and informative, should be consulted in order to gain a complete understanding of this encoding specification.

The mappings in the ADD provide a starting point for the development of automated transformations between formats defined by the encoding specifications. However, it should be noted that when these transformations are used between formats with different levels of detail there might be some data loss.

2.2 - List Sources

The media types included in this specification were obtained from:

- IANA website (<http://www.iana.org/assignments/media-types/media-types.xhtml>)
- The current IC-specific media types are defined in the *Community Shared Resources Technical Specification Profiles* data encoding specification
- The legacy media types that existed in PUBS/IRM prior to the creation of MIME.CES are the final source of values.

Each of the above sources are provided as a separate CVE to facilitate review and understanding of the source for each value. The union of all 3 sources is the final CVE that is anticipated to be the one used by most consumers of this specification.

2.3 - Additional Guidance

This section provides additional guidance for encoding data in specific situations. In particular, situations for which there is not clearly a single method of encoding the data are documented here. The content of this section will evolve over time as additional situations are identified. Implementers of this CES are encouraged to contact the maintainers of this CES for further guidance when necessary.

There are two ways in which a consumer requiring a MIME can use the MIME.CES specification: through referencing objects defined in the schema or enforcing the format via running Schematron.

2.3.1 - Usage of the MIME Schema

The MIME.CES schema defines an element (**mime:MIMETYPE**) and an attribute (**@mime:mimetype**) that enforces the allowable values as defined in the specification's CVE (see [Section 3.7.4 - Value Enumeration Constraints](#) for more details). Consumers of the MIME.CES

specification should import the MIME schema and reference the element or attribute, depending on what is needed. Note: the names for the element and the attribute are similar because the content is the same, i.e., both limit the value to the MIME CVE, but the expectation on usage is that the consumer would use one or the other. The difference in capitalization is because they follow the IC naming standards, which requires the first letter of elements to be uppercase and the first letter of attributes to be lower case.

2.3.2 - Usage of the MIME Schematron Library

The MIME.CES Schematron library contains an abstract rule that enforces the allowable values as defined in the specification's CVE (see [Section 3.7.4 - Value Enumeration Constraints](#) for more details). Consumers of the MIME.CES specification should include the abstract rule and define an implementation for it. This allows for the consumer to define the context that triggers the rule and the value that should be matched against the MIME CVE.

Note that consumers of the MIME.CES Schematron library also need to import the MIME schema within their schema. The importing schema needs to reference the CES version for MIME in order to let systems reviewing the data know what Schematron library to import.

2.3.3 - Deprecated MIME types

The deprecated MIME types are marked with a **@deprecated** attribute. The date noted in the attribute is not the actual date of deprecation but the release date of the specification. The MIME schematron rules provides a warning message based on the existence of the **@deprecated** attribute and does not depend on the release date.

Chapter 3 - Definitions, Interfaces, and Constraints

3.1 - Constraint Rule Types

Data constraint rules fall into two categories - validation and rendering constraints. Data validation constraints explicitly define policy validation constraints, describing how data should be structured and encoded in order to comply with IC policy. Validation constraint rules are implemented as a combination of basic XML Schema constraints and supplemental constraints for more complex rules. Complex constraint rules contain technical rule descriptions, Schematron rule implementations, and *Human Readable* descriptions. The human readable text describes the intent and meaning behind the more technical rule description. The semantics of the constraint rules are normative, whereas the use of the Schematron implementation is informative. Implementers developing alternative validation code should follow the technical rule descriptions and Schematron logic. Should there be a perception of conflict, implementers should bring it to the attention of the appropriate configuration control body for resolution. Rendering constraint rules define constraints on the display and rendering of documents. While expressed in a similar manner to the data validation constraint rules, there is no expectation that evaluation of these rules can be automated; rather these rules should inform the evaluation of a system's capabilities and functionality.

3.2 - "Living" Constraint Rules

These constraint rules are a "living" rule set. The constraint rules provided are a starter set and do not attempt to address the full scope tradecraft and business rules addressed by multiple policy drivers. These rules will be expanded and modified as the model matures, and as applicable documentation and tradecraft policies change.

Since these constraint rules are only a subset of the entire rule base, an XML document that is compliant with these rules may still not be fully compliant with all of the business rules defined in the authoritative guidance. An XML document that is not compliant with these rules is not compliant with the authoritative guidance.

3.3 - Classified or Controlled Constraint Rules

Additional rules that are either classified or have handling controls can be found in separate annexes closely associated with the encoding specification artifacts wherever they are located.

3.4 - Constraint Terminology

For the purposes of this document, the following statements apply:

- The term "is specified" indicates that an attribute is applied to an element and the attribute has a non-null value.
- The term "must be specified" indicates that an attribute **MUST** be applied to an element and the attribute **MUST** have a non-null value.
- The term "is not specified" indicates that an attribute is not applied to an element, or an attribute is applied to an element and the attribute has a null value.

- The term “must not be specified” indicates that an attribute **MUST NOT** be applied to an element.

3.5 - Errors and Warnings

The severity of a constraint rule violation is categorized as either an “Error” or a “Warning.” An “Error” is more severe and is indicative of a clear violation of a constraint rule, which would be likely to have a significant impact on the quality of a document. A “Warning” is less severe although noteworthy, and may not necessarily have any impact on the quality of a document. The severity of a constraint rule violation is indicated in brackets preceding each constraint rule description.

Each system responsible for processing a document (e.g., create, modify, transform, or exchange) **MUST** make a mission-appropriate decision about using a document with errors or warnings based on mission needs.

3.6 - Rule Identifiers

Each constraint rule has an assigned rule identifier, indicated in brackets preceding the constraint rule description. MIME.CES data validation constraint rule identifiers are prefixed with “MIME-ID-” and followed by a 5 digit unique number, assigned from pre-defined ranges to group rules by classification. The numerical ranges are described in [Section 3.6 - Rule Identifiers \[10\]](#). As the constraint rules are managed over time, IDs from deleted rules will not be reused.

Table 3 - Numerical Rule Identifier Ranges

| Rule Identifier Range | | Description |
|-----------------------|-------|---|
| Start | End | |
| 00001 | 09999 | Reserved for Unclassified constraint rules |
| 10001 | 19999 | Reserved for Unclassified but For Official Use Only (FOUO) constraint rules |
| 20001 | 20999 | Reserved for constraint rules classified at the “Secret//REL USA, FVEY” level |
| 21001 | 21999 | Reserved for constraint rules classified at the “Secret//NF” level |
| 22001 | 29999 | Reserved for constraint rules classified at the “Secret//TBD” level |
| 30001 and above | | Reserved for constraint rules classified with other classifications |

3.7 - Data Validation Constraint Rules

3.7.1 - Purpose

The MIME.CES schema defines the data elements, attributes, cardinalities and parent-child relationships with which CES instances must comply. Validation of these syntax aspects is an important first step in the validation process. An additional level of validation is needed to ensure that the content complies with the constraints as specified in applicable IC policy guidance and codified in these constraint rules. Traditional schema languages are generally unable to effectively represent these additional constraints.

3.7.2 - Schematron

Schematron^[15] is the formal language used in this specification to encode normative data validation constraints. The Schematron rules are normative in the sense that they convey criteria a document **MUST** meet, exactly as English may be used to convey normative criteria.

It is not necessary for implementers to use the specific Schematron encoding in this specification, and implementers **MAY** use any encodings, tools, or languages desired to implement validation schemes for conformance to this specification. To conform to this specification, a validator **MUST** find a document valid *if and only if* the Schematron implementation by Mr. Jelliffe would find the document valid according to the Schematron rules in this specification.

For better understanding, the Schematron^[15] rules for this specification may be executed in *Oxygen*^[14] or with an XSLT 2.0-compliant processor using the XSLT 2.0^[21] transforms in the Schematron implementation from Rick Jelliffe (see [XSLT 2.0 implementation of Schematron by Rick Jelliffe](#) in the Dependency table).

The constraint rules for this specification are dependent on XPath 2.0^[20] and XSLT 2.0^[21] features. Regarding the use of XPath 2.0 and XSLT 2.0 with Schematron, the editor of the ISO Schematron standard stated the following:^[13]

By default, Schematron uses the XPath language as used in XSLT 1.0, and is typically implemented by converting the schema into an XSLT 1.0 script which is run against the document being validated. However, ISO Schematron also allows XSLT 2.0 to be used, and this is becoming an increasingly popular choice because of the extra expressive convenience of XPath 2.0: a different skeleton is available for this.



Note

For convenience, the specification package provides the XSLT 2.0^[21] implementation of Schematron^[15] along with a compiled version of the rules.

3.7.3 - Non-null Constraints

XML syntax allows all elements with content declared to be of data type “string” to have zero or more characters of content, meaning elements can be empty or null. According to this specification, all required elements (and certain conditional elements) **MUST** have content, other than white space.¹ Elements, which are allowed to only have text content, **MUST** have text content specified.

3.7.4 - Value Enumeration Constraints

The purpose of the MIME.CES specification is to define the CVE for allowable media types.

Some CVEs are not available on all networks. A subset CVE will be provided for use on networks not approved for the entire list. If the processing will occur on a network where the entire CVE is

¹“White space” is defined in XML 1.0^[18] as “(white space) consists of one or more space (#x20) characters, carriage returns, line feeds, or tabs.”

not available, the subset CVE may be substituted in the constraint rules since the excluded values would be excluded from use on the lower network.

As noted in the specific rules, a failure of validation against a CVE will generate an Error.

3.7.5 - Additional Constraints

3.7.5.1 - CES Constraints

The CES version is specified through attributes on the root element. The schema constrains the values of these attributes. The **CESVersion** attribute enables systems processing an instance document to be certain which set of constraint rules, schema, CVEs and business rules are intended by the author to be used.

3.7.6 - Constraint Rules

The detailed constraint rules for the MIME.CES schema can be found in a separate document inside the SchematronGuide directory, in the MIME_Rules.pdf file. This document is generated from the individual Schematron files to provide a single searchable document for all of the constraint rules encoded in Schematron. Obsolete rule numbers are listed in the SchematronGuide.

3.8 - Data Rendering Constraint Rules

3.8.1 - Purpose

Rendering rules define constraints on the rendering and display of MIME.CES documents. The intent is to inform the development of systems capable of rendering or displaying MIME.CES data for use by individuals not familiar with the details of the MIME.CES markup. While expressed in a similar manner to the data validation constraint rules above, there is no expectation that evaluation of these rules can be automated; rather these rules should inform the evaluation of a system's capabilities and functionality.

3.8.2 - Rendering Constraint Rules

The following table contains the information for the MIME.CES data rendering constraint rules.

Table 4 - Constraint Rules

| Rule Number | Severity | Description | Human Readable Description |
|--|----------|-------------|----------------------------|
| There are no Data Rendering Constraint rules at this time. | | | |

Chapter 4 - Conformance Validation

An instance document conforms with this specification if it conforms to all normative guidance of this specification and this specification's dependencies and it passes all of the following validation steps. This specification does not dictate how this validation strategy is implemented.

4.1 - Schema Validation

An instance document **MUST** comply with the schemas for this specification and this specification's dependencies, and schema validation **SHOULD** occur prior to other validation steps. If schema validation fails, results from later steps may be indeterminate.

4.2 - Business Rule Validation

An instance document **MUST** comply with the business rules expressed in this specification and those expressed in this specification's dependencies. The business rules in this specification are expressed in Schematron, but it is not necessary for implementers to use the specific Schematron encoding in this specification. Implementers **MAY** use any encodings, tools, or languages desired to implement validation schemes for conformance to this specification. To conform to this specification, a validator **MUST** find a document valid *if and only if* the Schematron implementation by Mr. Jelliffe would find the document valid according to the Schematron rules in this specification.

Chapter 5 - Generated Guides

5.1 - Schema Guide

The detailed description and reference documentation for the MIME.CES schema can be found as a collection of HTML files inside the SchemaGuide directory. These files comprise a guide that serves as an interactive presentation of the MIME.CES schema as well as an implementation-specific data element dictionary.

The guide was generated with a commercially available product named *oXygen@^[14]*, produced by SyncRO Soft.

The guide provides an interactive index to:

- Global Elements and Attributes
- Local Elements and Attributes
- Simple and Complex Types
- Groups and Attribute Groups
- Referenced Schemas

Where applicable, the guide provides:

- Diagram
- Namespace
- Type
- Children (Child Elements)
- Used by
- Properties
- Patterns
- Enumerations
- Attributes
- Annotations
- Source Code

The guide is published in a folder consisting of the master HTML file *SchemaGuide.html* with supporting graphics.

5.2 - Schematron Guide

The detailed description and reference documentation for the MIME.CES Schematron rules can be found in a separate document named *MIME_Rules.pdf*, which is located inside the SchematronGuide directory. This document is generated from the individual Schematron files to provide a single searchable document for all of the constraint rules encoded in Schematron.

Appendix A Feature Summary

The following table summarizes major features by version for this specification.

Table 5 - Feature Summary Legend

| Key | Description |
|---|---|
| F | Full (able to comply and verified by spec to some degree) |
| P | Partial (Able to comply but not verifiable) |
| N | Non-compliance (Can't comply) |
| N/A | Not Applicable. Feature is no longer required. |
| Cell Colors represent the same information as the Key value | |

A.1. MIME Feature Comparison

Table 6 - MIME Feature comparison

| MIME Feature Comparison | | |
|-------------------------|--|----------|
| Required date | Feature | 2016-SEP |
| | Defines the allowable values for media types | F |

Appendix B Change History

The following table summarizes the version identifier history for this CES.

Table 7 - CES Version Identifier History

| Version | Date | Purpose |
|----------|------------------|---------------------------------|
| 2016-SEP | 9 September 2016 | Initial Release per CR-2015-048 |

Appendix C List of Abbreviations

This appendix lists all the acronyms and abbreviations referenced in this encoding specification.

| | |
|--------|--|
| ADD | Abstract Data Definition |
| CES | Controlled Vocabulary Enumeration Encoding Specification |
| CVE | Controlled Vocabulary Enumeration |
| DNI | Director of National Intelligence |
| FOUO | For Official Use Only |
| HTML | HyperText Markup Language |
| IANA | Internet Assigned Numbers Authority |
| IC | Intelligence Community |
| IC CIO | Intelligence Community Chief Information Officer |
| IC EA | Intelligence Community Enterprise Architecture |
| IC ESB | Intelligence Community Enterprise Standards Baseline |
| IC ITE | Intelligence Community Information Technology Enterprise |
| ICD | Intelligence Community Directive |
| ICS | Intelligence Community Standard |
| IEC | International Electrotechnical Commission |
| IETF | Internet Engineering Task Force |
| ISM | Information Security Markings |
| ISO | International Organization for Standardization |
| IT | Information Technology |
| OCIO | Office of the Intelligence Community Chief Information Officer |
| ODNI | Office of the Director of National Intelligence |
| PUBS | Intelligence Publications |
| RFC | Request for Comments |
| TDF | Trusted Data Format |
| URL | Uniform Resource Locator |

| | |
|-------|--------------------------------|
| XML | Extensible Markup Language |
| XPath | XML Path Language |
| XSL | Extensible Stylesheet Language |
| XSLT | XSL Transformations |

Appendix D Bibliography

Bibliography

[1] ABNF

Internet Engineering Task Force. *Augmented BNF for Syntax Specifications: ABNF*. Available online at: <http://tools.ietf.org/html/std68>
Also known as: <http://www.ietf.org/rfc/rfc5234.txt>

[2] ADD

Office of the Director of National Intelligence. *Intelligence Community Abstract Data Definition (IC-ADD.XML)*. Available online Intelink-TS at: <http://go.ic.gov/soSC6M8>
Available online Intelink-U at: <https://w3id.org/ic/standards/ADD>
Available online at: <https://w3id.org/ic/standards/public>

[3] DoD Instruction 8310.01

DoD CIO. *Information Technology Standards in the DoD*. 8310.01. 2 February 2015. Available online at: <http://www.dtic.mil/whs/directives/corres/pdf/831001p.pdf>

[4] IANA

Internet Assigned Numbers Authority. *Intelligence Community Information Technology Enterprise (IC ITE) Increment 1 Implementation Plan*. July 2012. Media Types (MIME) available online at: <http://www.iana.org/assignments/media-types/media-types.xhtml>
IANA HomePage available online at: <http://www.iana.org>

[5] IC ITE INC1 IMPL

Office of the Director of National Intelligence. *Intelligence Community Information Technology Enterprise (IC ITE) Increment 1 Implementation Plan*. July 2012. Available online Intelink-TS at: <http://go.ic.gov/4X6TOc1>

[6] IC-ID.XML

Office of the Director of National Intelligence. *Text and XML Data Encoding Specification for Intelligence Community Identifier (IC-ID.XML)*. Available online Intelink-TS at: <http://go.ic.gov/mQ4IUDk>
Available online Intelink-U at: <https://w3id.org/ic/standards/IC-ID>
Available online at: <https://w3id.org/ic/standards/public>

[7] ICD 302

Office of the Director of National Intelligence. *Document and Media Exploitation*. Intelligence Community Directive 302. 6 July 2007. Available online at: http://www.dni.gov/files/documents/ICD/ICD_302.pdf

[8] ICD 500

Office of the Director of National Intelligence. *Director of National Intelligence Chief Information Officer*. Intelligence Community Directive 500. 7 August 2008. Available online Intelink-TS at: <http://go.ic.gov/5Ot5sbK>
Available online at: http://www.dni.gov/files/documents/ICD/ICD_500.pdf

- [9] ICPG 710.1
Director of National Intelligence. *Application of Dissemination Controls: Originator Control*. Intelligence Community Policy Guidance 710.1. 25 July 2012.
Available online Intelink-TS at: <http://go.ic.gov/0d147Ee>
Available online at: <http://www.dni.gov/files/documents/ICPG/ICPG710.1.pdf>
- [10] ICS 500-20
Director of National Intelligence Chief Information Officer. *Intelligence Community Enterprise Standards Compliance*. Intelligence Community Standard 500-20. 16 December 2010.
Available online Intelink-TS at: <http://go.ic.gov/sLKNq3N>
Available online Intelink-U at: <https://w3id.org/ic/standards/policy/ICS500-20>
- [11] ICS 500-21
Director of National Intelligence Chief Information Officer. *Tagging of Intelligence and Intelligence-Related Information*. Intelligence Community Standard 500-21. 28 January 2011.
Available online Intelink-TS at: <http://go.ic.gov/cWYv9nw>
Available online Intelink-U at: <https://w3id.org/ic/standards/policy/ICS500-21>
- [12] IETF-RFC 2119
Internet Engineering Task Force. *Key words for use in RFCs to Indicate Requirement Levels*. March 1997.
Available online at: <http://tools.ietf.org/html/rfc2119>
- [13] Jelliffe
Richard Alan Jelliffe. *FAQ. Frequently Asked Questions: Is Schematron tied to XSLT 1.0?*.
Available online at: <http://www.schematron.com>
- [14] Oxygen
SyncRO Soft. *<oXygen/> XML Editor*.
Available online at: <http://www.oxygenxml.com/>
- [15] Schematron
International Organization for Standardization (ISO). *Information technology -- Document Schema Definition Language (DSDL) -- Part 3: Rule-based validation -- Schematron*. ISO/IEC 19757-3:2006.
ISO Spec Available online at: <http://standards.iso.org/ittf/PubliclyAvailableStandards/index.html>
StyleSheets for compiling Available online at: <http://code.google.com/p/schematron/>
- [16] TAG-9-Jan-2006
W3C Technical Architecture Group (TAG). *The Disposition of Names in an XML Namespace*. 9 January 2006.
Available online at: <http://www.w3.org/2001/tag/doc/namespaceState.html>
- [17] WEBARCH-15-Dec-2004
W3C. *Architecture of the World Wide Web, Volume One*. 15 December 2004.
Available online at: <http://www.w3.org/TR/webarch>
- [18] XML 1.0

World Wide Web Consortium (W3C). *Extensible Markup Language (XML) 1.0, Second Edition*. W3C, 6 October 2000.

Available online at: <http://www.w3.org/TR/2000/REC-xml-20001006>

[19] XML Catalogs

The Organization for the Advancement of Structured Information Standards [OASIS]. *XML Catalogs*. Committee Specification 06 Aug 2001.

Available online at: <https://www.oasis-open.org/committees/entity/spec-2001-08-06.html>

[20] XPath2

World Wide Web Consortium (W3C). *XML Path Language (XPath) 2.0 (Second Edition)*. W3C Recommendation 14 December 2010 (Link errors corrected 3 January 2011).

Available online at: <http://www.w3.org/TR/xpath20/>

[21] XSLT2

World Wide Web Consortium (W3C). *XSL Transformations (XSLT) Version 2.0*. W3C Recommendation 23 January 2007.

Available online at: <http://www.w3.org/TR/xslt20/>

Appendix E Points of Contact

The Intelligence Community Chief Information Officer (IC CIO) facilitates one or more collaboration and coordination forums charged with the adoption, modification, development, and governance of IC technical specifications of common concern. This technical specification was produced by the IC CIO and coordinated with these forums, approved by the IC CIO or a designated representative, and made available at the following DNI-sponsored web sites.

Public Website: <https://w3id.org/ic/standards/public>

Intelshare: <https://w3id.org/ic/standards/data-specs>

Direct all inquiries about this IC technical specification, IC technical specification collaboration and coordination forums, or IC element representatives involved in those forums, to the IC CIO.

E-mail: ic-standards-support@iarpa.gov.

Appendix F IC CIO Approval Memo

An Office of the Intelligence Community Chief Information Officer (OCIO) Approval Memo should accompany this enterprise technical data specification bearing the signature of the Intelligence Community Chief Information Officer (IC CIO) or an IC CIO-designated official(s). If an OCIO Approval Memo is not accompanying this specification's version release package, then refer back to the authoritative web location(s) for this specification to see if a more complete package or a specification update is available.

Specification artifacts display a date representing the last time a version's artifacts as a whole were modified. This date most often represents the conclusion of the IC Element collaboration and coordination process. Once the IC Element coordination process is complete, the specification goes through an internal OCIO staffing and coordination process leading to signature of the OCIO Approval Memo. The signature date of the OCIO Approval Memo will be later than the last modified date shown on the specification artifacts by an indeterminable time period.

Upon signature of the OCIO Approval Memo, IC Elements may begin to use this specification version in order to address mission and business objectives. However, it is critical for IC Elements, prior to disseminating information encoded with this new specification version, to ensure that key enterprise services and consumers are prepared to accept this information. IC Elements should work with enterprise service providers and consumers to orchestrate an orderly implementation transition to this specification version in concert with mandatory and retirement usage decisions captured in the IC Enterprise Standards Baseline as defined in Intelligence Community Standard (ICS) 500-20.^[10]