



# Open Retailing Design Rules for JSON

**December 8, 2020**

**Version 1.2**

## Document Summary

This document describes the Open Retailing (fuel retailing and convenience store) style guidelines for the use of JSON based APIs, including property and object naming conventions. These guidelines are based on best practice gleaned from IFSF, Conexxus, OMG (IXRetail), W3C, Amazon, Open API Standard and other industry bodies.

## Contributors

Axel Mammes, OrionTech  
Gonzalo Gomez, OrionTech  
Linda Toth, Conexus  
David Ezell, Conexus  
John Carrier, IFSF

This document was reviewed and approved by the Joint IFSF and Conexus Application Programming Interface Work Group and the Technical Advisory Committee within Conexus.

## Revision History

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# Table of Contents

1	Introduction.....	8
1.1	Audience .....	8
1.2	Background.....	8
1.3	What is REST? .....	8
1.4	Usage of JSON .....	9
2	Design Objectives .....	9
2.1	Overall JSON Design .....	9
2.2	Commercial Messages .....	9
3	Versioning.....	10
3.1	Backward Compatibility .....	10
3.2	Forward Compatibility .....	10
3.3	Version Numbering .....	10
3.3.1	Examples of Changes that can be incorporated in a Revision.....	11
3.3.2	Examples of Changes that can be incorporated in a Minor Version .....	12
3.3.3	Examples of Changes that Dictate a Major Version (new Release).....	12
3.3.4	Reflecting the Version Numbers for Data Types .....	12
4	The Common Library .....	13
4.1	Designing the Common Library.....	13
4.2	Guidelines for Structuring Libraries .....	14
4.3	Versioning of the Common Library.....	14
4.4	Code List Management.....	14
4.5	Hierarchy of Data Type Common Library Documents.....	15
4.6	File Naming Convention.....	15
5	Data Type Implementation Rules .....	15
5.1	Documentation .....	15
5.1.1	Annotation Requirements .....	15
5.1.2	Naming Conventions .....	16
5.2	Document Encoding .....	16
5.3	Property Names .....	16
5.3.1	Property and Type Names Use Lower Camel Case .....	16
5.3.2	Enumeration Rules.....	17

5.3.3	Acronyms .....	17
5.4	Reusing data types .....	17
5.5	Referencing Data Types from Other Data Type Documents .....	17
5.6	Property order .....	18
5.7	Data Types .....	18
5.7.1	Use of “Nulls” .....	18
5.7.2	Boolean values .....	19
5.7.3	Numeric values .....	20
5.7.4	String values .....	21
5.7.5	Arrays .....	22
5.7.6	Date time values .....	22
5.7.7	Hard and Soft Enumerations .....	23
5.7.7.1	Updating Hard Enumerations.....	25
5.7.7.2	Updating Soft Enumerations.....	26
5.7.7.3	Integers .....	26
6	Rules Summary.....	27
A.	References.....	29
B.	Glossary .....	30

# 1 Introduction

This document is a guideline for developing Open Retailing JSON Messages. This guideline helps to ensure that all data types and the resulting JSON conform to a standard layout and presentation. This guideline applies to all data types developed by IFSF, Conexus, their work groups and other partners who agree to adopt these Open Retailing API standards. This document is based upon the Conexus "Design Rules for XML" document to capitalize their knowledge and practical experience on writing style guidelines and to reflect the differences between how XML and JSON messages are used by the standards bodies.

Note: The original document (v1.0) was an IFSF standard which is now jointly owned and maintained by IFSF and Conexus. The word IFSF has therefore been substituted with "Open Retailing" which covers both Service (Gas) Stations and Convenience Stores.

## 1.1 Audience

The intended audiences of this document include, non-exhaustively:

- Architects and developers designing, developing, or documenting RESTful Web Services; and
- Standards architects and analysts developing specifications that make use of Open Retailing REST based APIs.

## 1.2 Background

Representational State Transfer (better known as REST) is a programming philosophy that was introduced by Roy T. Fielding in his doctoral dissertation at the University of California, Irvine, in 2000. Since then it has been gaining popularity and is being used in many different areas.

## 1.3 What is REST?

Representational State Transfer (REST) is an architectural principle rather than a standard or a protocol. The basic tenets of REST are: simplify your operations, name every resource using nouns, and utilize the HTTP commands GET, PUT, POST, and DELETE according to how their use is outlined in the original HTTP RFC (RFC 2616). REST is stateless; it does not specify the implementation details, and the interconnection of resources is done via URIs. REST can also utilize the HTTP HEAD command primarily for checking the existence of a resource or obtaining its metadata.

## 1.4 Usage of JSON

JSON is the preferred message body format for REST APIs as adopted both by IFSF and Conexus.

JSON represents data objects between applications; importantly, it has a schema language (JSON Schema) that can be used to define standard formats. Some other “heavier-weight” XML tools (such as XPATH, Transformations, etc.) are either not available or are under development at the time of this document publication.

Within this document are described a set of rules (and guidelines) that are to be taken into consideration when defining the data sets serialized using JSON.

## 2 Design Objectives

Design objectives of the Open Retailing Data Type Library include:

- Maximizing component reuse;
- Providing consistent naming conventions for properties of a common nature (e.g., date and time, currency, country, units of measure, counts, volumes, amounts); and
- Allow for easily changing existing XML standard formats into JSON to preserve previous standardization work.

### 2.1 Overall JSON Design

The use of JSON Schemas as a design language takes advantage of tools such as JSON Schema generators, automatic JSON syntax validation, and conversion to multiple computer languages’ data structures using automated code generators, etc. Because JSON schema drafts continue to evolve, it may be helpful to use Altova XML Spy JSON schema features as a benchmark.

### 2.2 Commercial Messages

All commercial messages in JSON documents SHALL be removed. For example, remove any messages similar to:

```
"Edited by <owner> with <JSchema editor> V2.0".
```

### 3 Versioning

Common libraries, including business-specific libraries and IFSF/Conexxus common libraries, SHALL NOT be mandated to hold the same version number.

In the next section, we resolve the following issues with versioning of data types:

- What constitutes a major and a minor version?
- What do we mean by compatibility?
- Do we need to provide for backward/forward compatibility between versions?

Note: This document, and specifically section 3.3 Version Numbering, supersedes IFSF Administration Bulletin (AB#04) which is no longer compatible with current best practices.

#### 3.1 Backward Compatibility

Definition: A given data type is backwardly compatible with a prior data type if no document valid under the prior data type definition is invalid under the later data type definition.

<b>Rule 1. Backward Compatibility for Revisions</b>
---

Open Retailing data type definition SHALL support backward compatibility.

#### 3.2 Forward Compatibility

Definition: The ability to design a data type such that even the older data type definition can validate the instance documents created according to the newer version is called forward compatibility.

<b>Rule 2. Forward Compatibility for Revisions Only</b>
---

Open Retailing data type definitions SHALL support forward compatibility for specification revisions.

#### 3.3 Version Numbering

Open Retailing standards SHALL adhere to the standard semantic versioning practice. A version number is divided into three parts: Major number, minor number, and

revision (or patch). These numbers are separated by a dot (‘.’) character. The following rules apply:

- Major number – must increment on any breaking change, i.e., any change that would cause an existing client of the API to malfunction.
- Minor number – must be incremented if the interface is extended in such a way that existing clients continue to function normally, but new functionality becomes available through the interface.
- Revision (in semantic versioning call a patch) – must be incremented to indicate other kinds of changes, such as documentation or minor extensions or clarifications (bug fixes).

**Rule 3. Revisions are backwardly and forwardly compatible**

All revisions of a data type definition within a major and minor version **MUST** be backwardly and forwardly compatible with the all revisions within the same minor version.

**Rule 4. Minor versions are backwardly compatible**

All minor versions of a data type within a major version **MUST** be backwardly compatible with the preceding minor versions for same major version, and with the major version itself.

**Rule 5. All data types within a business process have same version**

To ease the ongoing maintenance of data type versioning, all data types within a Business Process (e.g. the REMC specification) **MUST** have the same version.

This means that if one data type within a suite of JSON Schema data types that come under a particular business process needs to be upgraded to the next version number, all the data type definitions within that business process **MUST** be upgraded to that version number.

### **3.3.1 Examples of Changes that can be incorporated in a Revision**

- Adding Comments and Errata
- Adding Extensions to Extensible objects.

- Adding or removing elements from a soft enum.

### 3.3.2 Examples of Changes that can be incorporated in a Minor Version

- Adding new optional properties.
- Changing properties from required to optional.
- Adding values to a hard enum.
- Removing the enum facet, converting an enum to a non-enum.
- Removing constraints from a data type.
  - Example 1: removing the `maxValue` facet of a numeric type.
  - Example 2: incrementing or removing the `maxItems` facet of an array

### 3.3.3 Examples of Changes that Dictate a Major Version (new Release)

- Changing a property from optional to required.
- Adding a required property.
- Eliminating an optional property.
- Eliminating a required property.
- Changing a property name.
- Converting a type from non-array to an array (change of cardinality)
- Converting an array type to a non-array (change of cardinality)
- Changing a soft enum to a hard enum.
- Removing values from a hard enum

### 3.3.4 Reflecting the Version Numbers for Data Types

<b>Rule 6. Versions will be represented using numeric digits</b>
--

- Major, minor and revision numbers will be represented using numeric characters only. The complete representation of the version will be of the format `Majorversion.Minorversion.Revision` (e.g., 1.5.1) where:
  - The first release of a major version will be numbered *M.0* (e.g., 2.0).
  - The first minor version of a given major version will be numbered *M.1*  
In addition, the first release of a minor version will be numbered *M.m*, instead of *M.m.0*. (e.g., 2.1)
  - The first revision of a minor version will be numbered *M.m.1*. (e.g., 2.1.1)

<b>Rule 7. Full version number reflected in library folders</b>
---

The complete version number is indicated in the file directory used to group project files by business requirement.

Library file path examples:

```
common-v1.3.4/unitsOfMeasure.json  
common-v1.3.4/countries.json  
wsm-v1.0.0/tankStockReport.json
```

The chosen approach to indicating the complete version number is to simply change the version number contained in the folder name referred by the uses clause at the beginning of the relevant JSON file. There are many advantages to this approach. It's easy to update since it a part of the header of the documents, and the developers will have control of the library version in use. If versions were reflected in the name of the data type, instance documents would not validate unless they were changed to designate the new target libraries wherever used.

## 4 The Common Library

The common library consists of JSON Schema libraries that might be used in two or more Business Documents. Placing shared components in a common library increases interoperability and simplifies data type maintenance. However, it can also result in some additional complexities, which are addressed here.

### 4.1 Designing the Common Library

Specifically, these areas need to be addressed:

1. Structuring the library documents: breaking down the data type definition documents into smaller units to avoid the inclusion of document structures not required for a given specification.
2. Versioning: creating one or more separate object sets data types, which will address the lack of a separate life cycle.
3. Configuration management: determining a mechanism for storing, managing and distributing the libraries.
4. Structuring the library documents involves deciding how large each library document should be, and which components should be included together in a single document.
5. The approach chosen for Open Retailing documents is to include type definitions for those types (property contents) that are shared across multiple Open

Retailing specifications in shared libraries, commonly called "dictionaries". Code list enumerations and other shared data may also be defined in separate shared documents.

**Rule 8. Properties and Objects shared by two or more specifications MUST be defined in a shared common data type library**

**Rule 9. Properties and Objects shared by two or more components within a specification MUST be defined in a shared data type library**

## 4.2 Guidelines for Structuring Libraries

Some components are more likely to change than others. Specifically, code list types tend to change frequently and depend on context. For this reason, code list types SHOULD be separated from complex types that validate the structure of the document.

## 4.3 Versioning of the Common Library

**Rule 10. Common Library Version Changes Require Version Changes to Business Documents**

The individual files that constitute the common library can have minor versions, with backward compatible changes. However, when the common library has a major version change, all business documents that use the library MUST be upgraded.

## 4.4 Code List Management

Third-party code lists used within the Open Retailing data types SHOULD be defined as soft enum types in individual library files and assigned to a data type other than the Open Retailing original type. Additional codes will be added in a revision by updating the enumerate list in the datatype.

**Rule 11. Third Party Code List Enumerations MUST be implemented as soft enums**

## 4.5 Hierarchy of Data Type Common Library Documents

All common data type libraries are stored under the `libraries/common-vM.m.r` folder.

All other libraries are stored under the corresponding `libraries/group-vM.m.r` folder, where *group* is the name of the functional purpose of the group of libraries, for example *wsm* for wet stock management. An often-used alternative name for a *group* is *collection*.

**Rule 12. Recommendation – Keep all schemas for a specification in the same folder (i.e., relative path).**

## 4.6 File Naming Convention

Open Retailing data type libraries are given a name reflecting the business nomenclature of the types contained in the library.

**Rule 13. Data Type Document Named According to Functional Purpose**

For example, a Purchase Order data type library will be named `"B2BPurchaseOrder.json"`.

## 5 Data Type Implementation Rules

Open Retailing data types are created using a specific set of rules to ensure uniformity of definition and usage.

### 5.1 Documentation

#### 5.1.1 Annotation Requirements

- Every enumeration SHOULD have an annotation.
- Every simple or complex type defined in the Open Retailing data definition documents SHOULD have an annotation.
- Every property and type definition, including root type definitions, defined in the Open Retailing data definition documents SHOULD have an annotation.
- All data definition annotations MUST be in English language.

JSON Schema has limited annotations support. In the case of object description, JSON Schema supports the `description` property that can be used to document the usage of the object defined. The other two default metadata properties, `title` and `default`, can also be used as they are implemented by most JSON schema processors.

### *Example schema definition*

```
{
  "title": "User",
  "description": "Describe what a User is",
  "default": null,
  "properties": {
    "name": {
      "title": "This is the User Name",
      "type": "string",
      "maxLength": 100
    }
  },
  "additionalProperties": true,
  "type": "object",
  "required": [ "name" ],
  "$schema": "http://js-schema.org/draft-04/schema#"
}
```

## 5.1.2 Naming Conventions

Property, Object and Type names in API definitions MUST use U.S. English (e.g., "standardise" should read "standardize" and "behaviour" should read "behavior").

## 5.2 Document Encoding

All JSON interfaces SHOULD employ UTF-8 encoding. If UTF-8 encoding is not used, interoperability between trading partners may be compromised and must be independently evaluated by the trading partners involved.

## 5.3 Property Names

### 5.3.1 Property and Type Names Use Lower Camel Case

For property names, the lower Camel Case ("LCC") convention MUST be used. The first word in a property name will begin with a lower-case letter with subsequent words beginning with a capital letter without using hyphens or underscores between words.

In JSON files LCC convention SHOULD be applied to the Dictionary Entry Name and any white space should be removed.

Usage of the suffix “Type” in the type name SHOULD be used when the type has a name that is accessed via reference (“\$ref”).

Usage of suffix “Enum” in the type name to denote a **soft** enumerated data type is recommended when the enumeration has a name that is accessed via reference (“\$ref”). See Section 5.7.7 Hard and Soft Enumerations for further details.

### 5.3.2 Enumeration Rules

**Rule 14. For enumeration values the Lower Camel Case (‘LCC’) convention SHOULD be used. Exceptions may occur (for instance) when enumerations are imported from existing sources.**

**Rule 15. Enumerations imported from other dictionaries (i.e. states) MAY be used without modification.**

### 5.3.3 Acronyms

**Rule 16. Acronyms are defined in the Open Retailing data dictionary. Acronyms SHOULD be written using uppercase. Word abbreviations SHOULD be avoided.**

When this rule conflicts with another rule that specifically calls for LCC, that rule requiring LCC SHALL override.

## 5.4 Reusing data types

Reusing data types is done through the common library, as described previously, or through inheritance.

## 5.5 Referencing Data Types from Other Data Type Documents

**Rule 17. References to Common Library data Type documents MUST use a relative path to the corresponding library.**

Using relative paths allows the easy reuse of common libraries in other projects.

## 5.6 Property order

In JSON, by definition:

*An object is an **unordered** collection of zero or more name/value pairs, where a name is a string and a value is a string, number, Boolean, Date, null, object, or array.*

*An array is an **ordered** sequence of zero or more values.*

Therefore, property order is not guaranteed. JSON schema does not include provision for sequence enforcing. Arrays of objects will maintain order. Items that require ordering (such as authentication of a message) should either be represented in an array, or the required order must be defined in the documentation.

## 5.7 Data Types

As a rule of thumb types SHOULD be used to convey business information entities, i.e. terms that have a distinct meaning when used in a specific business context. Type names and descriptions SHOULD be chosen to accurately reflect the information provided. For example, a "total" may need to include the word "gross" or "net" in the name to accurately identify the total. Clarification on the meaning or the rationale behind the choice of name could be provided in the annotation.

### 5.7.1 Use of “Nulls”

API design includes appropriate response codes when objects are unavailable.

**Rule 18. Null values may be used if appropriate**

There are two cases in which nulls may be useful:

- When the sending system cannot provide a value for a required property, the use of null for that property may be appropriate, as determined by the schema designers; or
- When the sending system must indicate that the value of an optional property has changed from a non-null value to null, the use of null is appropriate.

In the following example, the type of an object has two required properties, `name` and `comment`, both defaulting to type string. In the provided example, `name` is assigned a string value, but `comment` is allowed to be null by using the multiple type (array) feature of JSON Schema.

#### *Example Schema Definition*

```
{
  "properties": {
    "name": {
      "type": "string",
      "maxLength": 20
    },
    "comment": {
      "type": ["string", "null"],
      "maxLength": 100
    }
  },
  "required": [ "name", "comment" ],
  "$schema": "http://Json-schema.org/draft-04/schema#"
}
```

*Example: Providing a value or a null value here is required*

```
{
  "name": "fred",
  "comment": null
}
```

Declaring the type of a property to be `null` represents the lack of a value in a type instance.

## 5.7.2 Boolean values

<b>Rule 19. Boolean values SHOULD be represented as enum data types.</b>
--

Boolean properties SHOULD use the data type `<enum>`.

Usage of enumeration codes instead of the native `Boolean` type is recommended, as the use of `Boolean` could impact backwards compatibility if it is necessary to change from a true boolean to an enumeration. For example, an authorization response might initially have responses of `yes` or `no`. But subsequently, it might be necessary to add `yesButCheckSignature` or `noButLocalOverridePossible`.

### *Example Schema Definition*

```
{
  "isMarried": {
    "enum": [ "yes", "no" ]
  }
}
```

## 5.7.3 Numeric values

**Rule 20. Numeric values SHOULD be defined as positive.**

The use of JSON property `minimum: 0` for data type `number` is encouraged but not required. The type name itself should imply the type of value contained so that a positive value makes sense. As an example, a bank amount type should be defined as either "Credit" or "Debit" so that the intended type is explicit.

### *Example Schema Definition*

```
{
  "credit": {
    "type": "number",
    "minimum": 0,
    "maximum": 1000
  }
}
```

**Rule 21. Open Retailing data types SHALL NOT use unbounded numeric data types without proper constraints**

Either the minimum and maximum values or the maximum number of digits for properties containing numeric data types should be specified. Shrinking the boundary conditions for properties may only be done in a major version. Enlarging the boundary conditions for properties may be done in minor or major versions.

### Example Schema Definition

```
{
  "weight": {
    "type": "number",
    "minimum": 4,
    "maximum": 100,
    "multipleOf": "4",
  }
}
```

## 5.7.4 String values

**Rule 22. Open Retailing data types MUST NOT use properties of type string without an accompanying constraint on the overall length of the string. Properties of type string SHOULD use a REGEX to constrain the contents of the string.**

Shrinking the boundary conditions for a property may only be done in a major version. Enlarging the boundary conditions for a property may be done in minor or major versions.

### Example Schema Definition

```
{
  "tankLabel": {
    "type": "string"
    "minLength": 1,
    "maxLength": 16,
    "pattern": "^[A-Z0-9a-z]$"
  }
}
```

**Note:** Data type `string` also supports a pattern constraint through a regular expression.

**Note:** for specifications migrating from XML to JSON representations, if property content is derived from a string and no maximum length is defined, the new JSON Schema should use `maxLength` of 1024.

## 5.7.5 Arrays

**Rule 23. Open Retailing data types MUST NOT use arrays without an accompanying constraint on the overall quantity of items.**

Shrinking the array boundary conditions may only be done in a major version. Enlarging the boundary conditions may be done in minor or major versions.

## 5.7.6 Date time values

**Rule 24. Open Retailing MUST use RFC3339 compliant date and time formats.**

**Rule 25. Time Offset must be included whenever possible.**

The inclusion of the time offset for Time and Date-Time values provide for easier integration when devices and servers operate in different time zones.

*Example Schema Definition (date and time with time zone)*

```
{
  "startPeriodDateTime": {
    "type": "string",
    "format": "date-time"
  }
}
```

*Values:*

```
1996-12-19T16:39:57-08:00
1996-12-19T16:39:57
1996-12-19
```

### *Example Schema Definition (date and time without time zone)*

```
{
  "dateAndTime": {
    "type": "string",
    "pattern": "^(\\d{4})-(\\d{2})-(\\d{2})T(\\d{2}):(\\d{2}):(\\d{2})$"
  }
}
```

*Value:*

*1996-12-19T16:39:57*

### *Example Schema Definition (date only)*

```
{
  "dateOnly": {
    "type": "string",
    "pattern": "^(\\d{4})-(\\d{2})-(\\d{2})$"
  }
}
```

*Value:*

*1996-12-19*

### *Example time only:*

```
{
  "timeOnly": {
    "type": "string",
    "pattern": "^(\\d{2}):(\\d{2}):(\\d{2})$"
  }
}
```

*Value:*

*16:39:57*

Note: The above regular expressions regulate the format of the text within the field, but it is not sufficient to ensure a proper date is included. Additional logic must be included when implementing APIs to ensure valid date values.

## **5.7.7 Hard and Soft Enumerations**

Here follows a short explanation of the definition and meaning of hard and soft enumerations. A soft enumeration is when the processing of that new element is no different to any other element. Clear example of this are color and currency. Processing

doesn't change whether it is red or yellow, GBP or USD. A hard enumeration is when the value of the element causes a change in *application* processing. An example of this is payment method, which might take enumerated values of CREDIT and DEBIT. Clearly CREDIT and DEBIT have different processing needs. If an additional new element is added, new code is necessary to process it.

**Rule 26. When all elements of an enumeration have the same treatment, soft enums MUST be used.**

- A **hard enum** only accepts values that are in the enum list, because special treatment is required for one or more values.
- A **soft enum** is a type that allows values that are not listed in the enum.

*Example Schema Definition (currency soft enum)*

```
{
  "currencyCodeSoftEnum": {
    "type": "string",
    "anyOf": [
      { "type": "string" },
      { "type": "currencyCodeEnum" }
    ],
    "currencyCodeEnum": {
      "type": "string",
      "enum": ["USD", "BGP", "EUR"]
    }
  }
}
```

*Example Schema Definition (card type hard enum)*

```
{
  "cardTypeHardEnum": {
    "enum": [ "CREDIT", "DEBIT" ]
  }
}
```

### Example Schema Definitions (using enum properties)

```
{
  "payment": {
    "properties": {
      "cardType": {
        "type": "cardTypeHardEnum"
      },
      "currencyCode": {
        "type": "currencyCodeSoftEnum"
      },
      "amount": {
        "type": "number",
        "minimum": 0,
        "maximum": 1000000000
      }
    }
  }
}

{
  "cardType": "credit",
  "currencyCode": "USD",
  "amount": "1"
}
```

Note: this rule does not imply that properties defined for these enum types must contain the words `hard` or `soft`.

#### 5.7.7.1 Updating Hard Enumerations

**Rule 27. Hard enumerations values MAY be added in a minor version**

Since the addition of a new enumerated value to an existing enumeration is backward compatible with documents valid under the previous version of the code list, the addition of new code list values MAY be included in a minor version of a given IFSF schema.

**Rule 28. Hard enumerations values MAY only be removed in a major version**

The removal of an enumerated value from an enumeration breaks backward compatibility and MUST therefore occur in major versions only.

**Rule 29. Hard enumerations values MAY be deprecated in a version revision**

"Deprecated" means will be removed at future major release. Until a future release the enum element MUST not be used in new implementations and during maintenance of existing applications checked that it is no longer used.

### 5.7.7.2 Updating Soft Enumerations

**Rule 30. Soft enumerations values MAY be added or removed in a version revision**

Using soft enums allows the enumeration values to be updated in a revision without compromising compatibility. E.g. When a country has been recognized/unrecognized by United Nations, its country code can be supported/removed with a revision.

### 5.7.7.3 Integers

**Rule 31. Integer values, including those used for counting, MUST have a "minimum" and "maximum" property defined.**

Unbounded integer values are not allowed by these guidelines.

## 6 Rules Summary

- Rule 1. Backward Compatibility for Revisions
- Rule 2. Forward Compatibility for Revisions Only
- Rule 3. Revisions are backwardly and forwardly compatible
- Rule 4. Minor versions are backwardly compatible
- Rule 5. All data types within a business process have same version
- Rule 6. Versions will be represented using numeric digits
- Rule 7. Full version number reflected in library folders
- Rule 8. Properties and Objects shared by two or more specifications MUST be defined in a shared common data type library
- Rule 9. Properties and Objects shared by two or more components within a specification MUST be defined in a shared data type library
- Rule 10. Common Library Version Changes Require Version Changes to Business Documents
- Rule 11. Third Party Code List Enumerations MUST be implemented as soft enums
- Rule 12. Recommendation – Keep all schemas for a specification in the same folder (i.e., relative path).
- Rule 13. Data Type Document Named According to Functional Purpose
- Rule 14. For enumeration values the Lower Camel Case ('LCC') convention SHOULD be used. Exceptions may occur (for instance) when enumerations are imported from existing sources.
- Rule 15. Enumerations imported from other dictionaries (i.e. states) MAY be used without modification.
- Rule 16. Acronyms are defined in the Open Retailing data dictionary. Acronyms SHOULD be written using uppercase. Word abbreviations SHOULD be avoided.
- Rule 17. References to Common Library data Type documents MUST use a relative path to the corresponding library.
- Rule 18. Null values may be used if appropriate
- Rule 19. Boolean values SHOULD be represented as enum data types.
- Rule 20. Numeric values SHOULD be defined as positive.
- Rule 21. Open Retailing data types SHALL NOT use unbounded numeric data types without proper constraints
- Rule 22. Open Retailing data types MUST NOT use properties of type string without an accompanying constraint on the overall length of the string. Properties of type string SHOULD use a REGEX to constrain the contents of the string.
- Rule 23. Open Retailing data types MUST NOT use arrays without an accompanying constraint on the overall quantity of items.
- Rule 24. Open Retailing MUST use RFC3339 compliant date and time formats.
- Rule 25. Time Offset must be included whenever possible.
- Rule 26. When all elements of an enumeration have the same treatment, soft enums MUST be used.
- Rule 27. Hard enumerations values MAY be added in a minor version
- Rule 28. Hard enumerations values MAY only be removed in a major version
- Rule 29. Hard enumerations values MAY be deprecated in a version revision
- Rule 30. Soft enumerations values MAY be added or removed in a version revision
- Rule 31. Integer values, including those used for counting, MUST have a “minimum” and “maximum” property defined.



# A. References

## A.1 Normative References

**Conexus Design Rules for XML:** <https://www.conexus.org>

**IETF RFC 2616 Hypertext Transfer Protocol, HTTP/1.1:**  
<https://www.ietf.org/rfc/rfc2616.txt>

**IETF RFC 3339 Date and Time on the Internet:**  
<https://tools.ietf.org/html/rfc3339>

**IFSF Administration Bulletin Nbr 4:** Specification Version Identification (JSON rules superseded by this document), available at <http://www.ifsf.org>

**Semantic Versioning 2.0.0:** <https://semver.org>

**OASIS JSON Format Version 4.0 - Error Response:** [http://docs.oasis-open.org/odata/odata-json-format/v4.0/errata02/os/odata-json-format-v4.0-errata02-os-complete.html#\\_Toc403940655](http://docs.oasis-open.org/odata/odata-json-format/v4.0/errata02/os/odata-json-format-v4.0-errata02-os-complete.html#_Toc403940655)

## A.2 Non-Normative References

- JSON Resources
  - <http://www.json.org/>
  - <http://www.json-schema.org/>
  - <http://www.jsonapi.org/>
- Google JSON Style Guide  
<https://google.github.io/styleguide/jsoncstyleguide.xml>
- Design Beautiful REST + JSON APIs
  - <https://www.youtube.com/watch?v=hdSrT4yJS1g>
  - <http://www.slideshare.net/stormpath/rest-jsonapis>
- JSend project that lays down rules on how JSON responses from web servers should be formatted  
<https://labs.omniti.com/labs/jsend>

## B. Glossary

Term	Definition
API	<b>Application Programming Interface.</b> An API is a set of routines, protocols, and tools for building software applications
EB	IFSF Engineering Bulletin
Open Retailing	Open Retailing means both Service (Gas) Station and Convenience Store.
IFSF	International Forecourt Standards Forum
JSON	<b>JavaScript Object Notation;</b> is an open standard format that uses human-readable text to transmit data objects consisting of properties (name-value pairs), objects (sets of properties, other objects, and arrays), and arrays (ordered collections of data, or objects. JSON is in a format which is both human-readable and machine-readable.
REST	<b>REpresentational State Transfer)</b> is an architectural style, and an approach to communications that is often used in the development of Web Services.
XML	Extensible Markup Language is a markup language that defines a set of rules for encoding documents in a format which is both human-readable and machine-readable