



The Global Language of Business

GS1 Verifiable Credentials – White Paper on Data Model and Validations

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1 Introduction

This document defines the data model and validations required to represent and validate licensing and declaration using the GS1 system.

“Licensing” is the process of authorizing a user company to identify products, locations, and other objects using GS1 identification keys. This is most commonly done by issuing a GS1 Company Prefix and allocating it to an organization, but some GS1 Member Organizations will also issue single keys (referred to as single-issue or one-off keys), typically to companies that need only a few of them.

“Declaration” is the process of declaring data associated with an object. This may be further broken down into three parts: identification, association, and authorization.

- “Identification” is the process of generating a GS1 identification key from a valid license, or an extended key (e.g., GTIN+serial) from an existing key.
- “Association” is the process of associating a key with data for the object that it represents (e.g., GTIN with trade item data, GLN with location data).
- “Authorization” is the process of granting an outside party the authority to associate data with a key.

An exhaustive description of the GS1 system is beyond the scope of this document; the reader is assumed to be familiar with it and is directed to the GS1 General Specifications¹ and other standards² for details.

1.1 Tiers of Keys

Within the GS1 identification system, keys are broken down into four tiers. Full details may be found in the GS1 System Architecture³, but some of the text is reproduced here.

- Tier 1: The structure, usage, and lifecycle rules of a GS1 tier 1 key are defined, administered, and managed entirely by GS1. A tier 1 key always incorporates a GS1 Prefix. A tier 1 key may incorporate a GS1 Company Prefix issued to a user company, who then issues the key, or it may be issued in its entirety as an individual key. Tier 1 keys are subject to allocation rules defined in GS1 standards, and their association with descriptive data elements is governed by validation rules also defined in GS1 standards.
- Tier 2: The structure of a GS1 tier 2 key is defined by GS1 as a GS1 tier 1 key, but its usage and lifecycle rules are defined, administered, and managed by an external organization. A tier 2 key exists within the range of a GS1 Prefix or a GS1 Company Prefix, incorporates additional characters administered by an external organization, and includes a check digit or a check character pair if required by its corresponding tier 1 key format. Tier 2 keys are unique with respect to tier 1 keys of the same type and can be used in most or all applications that support the corresponding tier 1 key type. Their allocation and lifecycle rules, however, are defined by an organization external to GS1. The degree to which the usage and lifecycle rules are compatible with those of the corresponding tier 1 keys is specific to each tier 2 key.
- Tier 3: The structure, usage, and its lifecycle rules of a GS1 tier 3 key are defined, administered, and managed entirely by an organization external to GS1. This organization enters into an agreement with GS1 that enables its keys to be supported in selected GS1 standards (e.g., within an EPC header).
- Tier 4: The structure and, usage, and lifecycle rules of a GS1 tier 4 key are defined, administered, and managed entirely by an organization or entity external to GS1. A tier 4 key has no explicit support within the GS1 system, but it may have some implicit support. For example, the EPCIS standard supports any URI as an object identifier and trading partners could, by mutual agreement, agree to use URIs for geographic locations as a ReadPointID for certain events.

For the purposes of this document, only tier 1 and tier 2 keys are considered.

The best-known examples of a tier 2 key are:

¹ <https://www.gs1.org/standards/barcodes-epcrfid-id-keys/gs1-general-specifications>

² <https://www.gs1.org/standards>

³ <https://www.gs1.org/standards/gs1-system-architecture-document/current-standard>

- The International Standard Book Number (ISBN), issued by the International ISBN Agency. GS1 Prefixes 978 and 979 are delegated to the Agency for ISBN management, and the ISBN can appear in some supply chain processes, functioning as a GTIN-13.
 - A subset of ISBNs starting with 9790 are reserved for the International Standard Music Number (ISMN).
- The International Standard Serial Number (ISSN), issued by the ISSN International Centre. GS1 Prefix 977 is delegated to the Centre for ISSN management, and the ISSN can appear in some supply chain processes, functioning as a GTIN-13.

1.2 Data Model

The credentials in this document are aligned as best as possible with the W3C Verifiable Credentials Data Model⁴, with the focus being on the claim portion as that is where the attributes required to assert a GS1 license and to declare data associated with an object may be found. Credential metadata and proof are provided in the examples where necessary, but they are incomplete, especially as they can vary considerably from one ecosystem to the next. The proof especially is shown only as an object with an ellipsis “{ . . . }”, because the cryptographic proof adds no value to the examples.

Within the claim portion, the data model is based on the GS1 Web Vocabulary⁵. Examples won't necessarily show complete data; for example, in party identification, there is little value in an example that includes party address and other ancillary attributes.

Development and refinement of JSON-LD and other schemas to support these Verifiable Credentials is outside the scope of this document.

1.3 Identifiers

The W3C Verifiable Credentials Data Model requires that any identifier (credential ID, issuer ID, subject ID, etc.) be a URI. In most cases, these are Decentralized Identifiers (DIDs), but all URI formats are supported. The specific requirements for an identifier (in the *id* property of an object) are that:

- The *id* property **must** express an identifier that others are expected to use when expressing statements about a specific thing identified by that identifier.
- The *id* property **must not** have more than one value.
- The value of the *id* property **must** be a URI.

Furthermore, it is **recommended** that the URI in the *id* property be one which, if dereferenced, results in a document containing machine-readable information about the identifier.

1.3.1 Decentralized Identifiers

DIDs meet all the requirements and the recommendation, but they come at a cost: they are typically associated with cryptographic material, such as public keys, and service endpoints, for establishing secure communication channels. While this is necessary for a DID that identifies an individual or an organization, it's not necessary for many use cases in GS1, such as serialized trade items, which could lead to an explosion of public/private key pairs and DID documents.

1.3.2 GS1 Digital Link URIs

In some circumstances, it may be better to use a GS1 Digital Link URI (DLURI) rather than a DID. For example, using DIDs as the credential subject ID to identify serialized trade items would require that a public/private key pair and DID document be generated for every trade item that is produced. The brand owner responsible would have to maintain and secure them, and most would never be used.

⁴ <https://www.w3.org/TR/vc-data-model/>

⁵ <https://www.gs1.org/voc/>

Using a DLURI as the credential subject ID instead allows for easy alignment with other parts of the GS1 system (e.g., by using a DLURI representing a GTIN and serial identifier to link to traceability data). In the rare case where a document containing machine-readable information about the subject is required, it may be discovered via an appropriate link type when dereferencing the DLURI, if such a document is made available by the DLURI issuer.

Similarly, a DLURI may be used as an identifier for the credential. For example, a DLURI incorporating a Global Document Type Identifier (GDTI) may be an appropriate way to identify a Verifiable Credential as a document in some supply chain processes. If a DLURI is used as a credential ID, it **may** have a default link, and, if it does, the default link **must** be a URI that returns a copy of the credential itself. This makes it easier for the URI to be referenced in other credentials without having to include a copy of the referenced credential in each presentation.

1.3.3 Other HTTPS URIs

Where the overhead of a DID isn't justified by and a DLURI format is not appropriate, other HTTPS URIs may be used. These will appear most commonly in the credential ID, and dereferencing an HTTPS URI used as a credential ID **may** return a copy of the credential itself. This makes it easier for the URI to be referenced in other credentials without having to include a copy of the referenced credential in each presentation.

1.4 Party Identification

A party that is an actor within any of these processes **must** have a DID appropriate to the ecosystem in which it is operating, and it **may** also have a DLURI representation of a party GLN.

For the sake of simplicity, where a DID refers to a party, the examples use a did:web URI, with the web address representing a domain under the control of the party. As with all URIs, the DIDs in this document are for illustration purposes only; in production, GS1 Global Office, GS1 Member Organizations, and user companies will be free to choose whatever DID methods best suit them. The only requirements are that the DID for GS1 Global Office be well known, as it is the anchor for all credentials, and that the DID documents for GS1 Global Office and the GS1 Member Organizations be publicly accessible.

1.4.1 Issuer – ID vs. Object

In the W3C Verifiable Credentials Data Model, the issuer may be a URI, or it may be an object with an *id* property that is a URI. The examples use URIs only, but it may be desirable for the issuer to be an object and include a "gs1:Organization" property, at least for credentials issued by GS1 Global Office and GS1 Member Organizations.

1.5 Guiding Principles

Development of the W3C Verifiable Credentials Data Model and validations follows five guiding principles.

1.5.1 Alignment

The principal of alignment requires that the framework align with existing practices within GS1. If any new practices are to be created, they can only be in support of Verifiable Credentials as a capability of GS1.

1.5.2 Completeness

The principle of completeness requires that the framework support all use cases within the GS1 identification system. A framework that works for most, but not all, users is not one that GS1 can take to market.

1.5.3 Extensibility

Completeness doesn't mean that GS1 must provide a solution for all use cases, only that it must enable them.

The principle of extensibility requires that the framework to be extensible so that users can build their own applications around the GS1 identification system and be assured that the Verifiable Credentials they issue can work within it, as long as they follow the rules for the GS1 identification system.

1.5.4 Security

In any distributed system where most parties have no direct relationship, there are opportunities for error and, in rare circumstances, for fraud.

The principle of security requires that the validation rules be sufficient to detect erroneous or fraudulent Verifiable Credentials.

1.5.5 Consistency

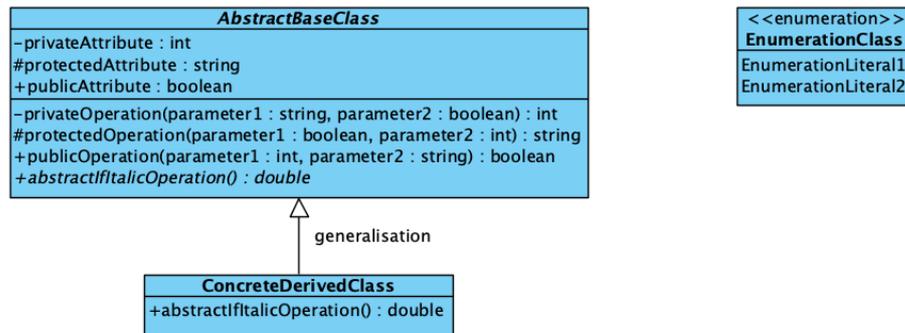
The architecture of the GS1 identification system can lead to the temptation to take shortcuts with some of the Verifiable Credentials within the hierarchy. While this may simplify the model for some use cases, it makes generation and especially validation of the Verifiable Credentials more complex, which can lead to inconsistent and erroneous implementations.

The principle of consistency requires that generation and validation of a Verifiable Credential be done in a consistent manner, regardless of the path taken to get to that Verifiable Credential.

1.6 Nomenclature

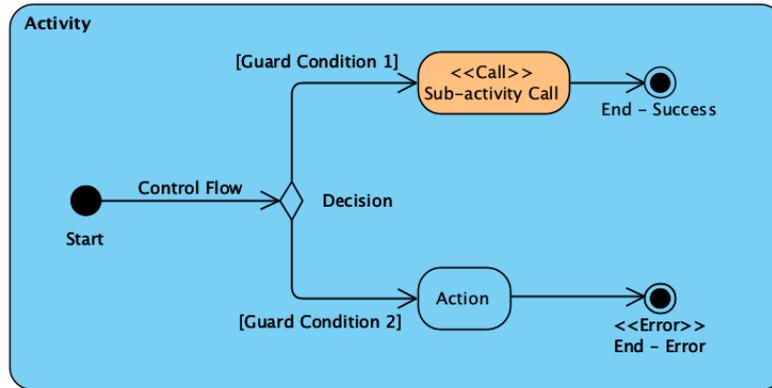
The diagrams in the following sections are standard UML class and activity diagrams.

1.6.1 Class Diagram



Classes that carry over from one class diagram to another (e.g., `ExtensibleCredential`) are shown in full only in their initial appearance.

1.6.2 Activity Diagram



2 Base

Support for Verifiable Credentials within GS1 require some common functionality that isn't tied to any specific feature. This section defines the classes that provide that functionality.

2.1 Classes

<<enumeration>> GS1IdentificationKeyTypeCode	
+valid(identificationKeyValue : xsd:string, includeSerialComponent : xsd:boolean) : xsd:boolean	
GTIN	
GLN	
SSCC	
GRAI	
GIAI	
GSRN	
GDTI	
GINC	
GSIN	
GCN	
CPID	
GMN	

ExtensibleCredential
+extendsCredential : xsd:anyURI

2.1.1 GS1IdentificationKeyTypeCode

This is an enumeration of all available GS1 identification key types.

2.1.1.1 Enumerations

Enumeration	Description
GTIN	Global Trade Item Number.
GLN	Global Location Number.
SSCC	Serial Shipping Container Code.
GRAI	Global Returnable Asset Identifier.
GIAI	Global Individual Asset Identifier.
GSRN	Global Service Relation Number.
GDTI	Global Document Type Identifier.
GINC	Global Identification Number for Consignment.
GSIN	Global Shipment Identification Number.
GCN	Global Coupon Number.
CPID	Component/Part Identifier.
GMN	Global Model Number.

2.1.1.2 Operations

2.1.1.2.1 valid

```
public xsd:boolean valid(xsd:string identificationKeyValue, xsd:boolean includeSerialComponent)
```

This is a general method for validating a GS1 identification key. It validates the length, character set, check digit or check characters, and optionally the serial component.

No implementation flow is provided for this method as doing so adds no value at this time. The implementation is presumed to be based on the rules in the GS1 General Specifications.

2.1.1.2.1.1 Parameters

Parameter	Type	*	Description
identificationKeyValue	xsd:string	1	The value of the identification key to validate against the type.
includeSerialComponent	xsd:boolean	1	

2.1.2 ExtensibleCredential

This is the abstract superclass of any Verifiable Credential in the GS1 ecosystem that is extensible, i.e., that can be extended from another.

2.1.2.1 Properties

Property	Type	*	Static	Description
extendsCredential	xsd:anyURI	0..1	false	Reference to the credential that this one extends. Provides a complete chain to the GS1 Prefix or GS1-8 Prefix license credential issued by GS1 Global Office.

3 Core Licensing

Core licensing is only about the tier 1 keys. This section covers most use cases for tier 1 keys and will be the easiest to take to market. Some edge cases for tier 1 keys and support for tier 2 keys are covered in section 4, “Delegated Licensing”. A complete implementation for tier 1 keys therefore requires knowledge of both sections.

3.1 License Value and Alternative License Value

Every license credential includes a license value. The license credential type is usually sufficient to define, together with the license value, the “space” or “range” of the GS1 identification system granted to the licensee. The exception to this is any license credential that has to do with a GS1 identification key, which requires an identification key type as an additional qualifier.

For license credentials that have to do with prefixes, the license value is in normalized GS1 (i.e., non-U.P.C.) form. Where the license credential is within the U.P.C. range, the alternative license value holds the U.P.C. form.

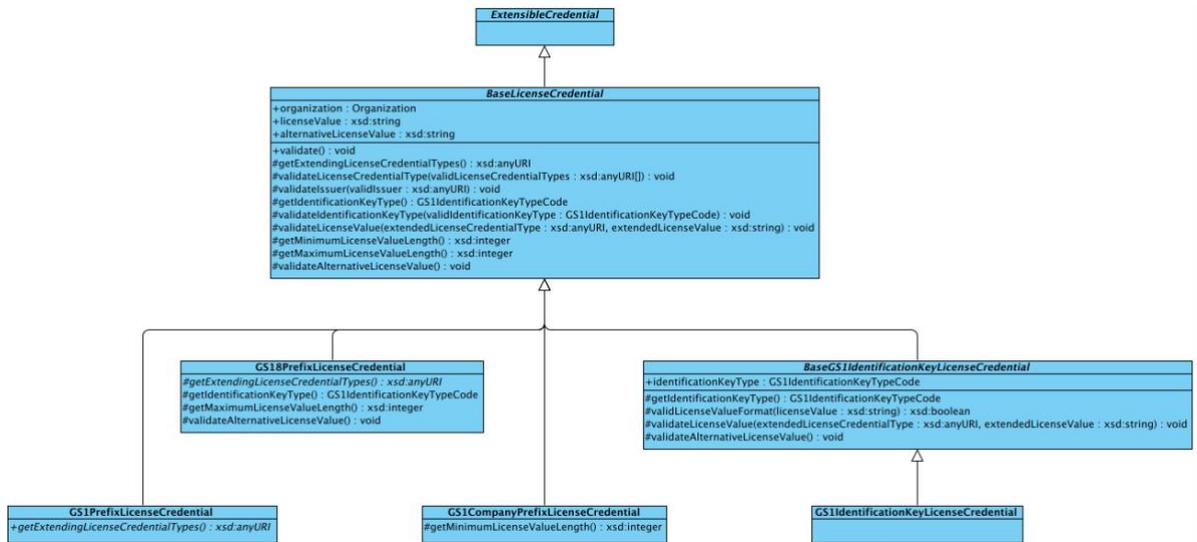
For license credentials that have to do with GS1 identification keys, the license value is the key, including the check digit or check characters if applicable, and excluding the serial component if applicable. When the license is specifically for a GTIN, the license value is the GTIN in its minimum format: GTIN-8, GTIN-12, GTIN-13 (which must not start with a zero), or GTIN-14 (which must start with indicator digit 9). Where the license credential is for a GTIN-8, GTIN-12, or GTIN-13, the alternative license value is the GTIN normalized to 13 digits (by padding with zeros on the left) and with the check digit removed (resulting in a 12-digit string); this value is used when verifying a GTIN with indicator digit 1-8 against a license.

3.2 GS1 Member Organization Extensions

The principle of extensibility applies to the core licensing Verifiable Credentials just as much as to all others. GS1 Member Organizations may provide additional attributes or have additional validation rules for their credentials. GS1 US, for example, issues GS1 Company Prefixes starting with 03 aligned with the FDA labeler code.⁶ A Verifiable Credential for such a GS1 Company Prefix license may include additional information specific to the pharmaceutical industry but will also align with the global data model. Pharmaceutical trading partners may need to read and validate the additional attributes and will do so according to guidance published by GS1 US, but others are free to ignore them.

⁶ <https://www.gs1us.org/content/dam/gs1us/documents/industries-insights/by-industry/healthcare/report/Frequently-Asked-Questions-by-the-Pharmaceutical-Industry-in-Preparing-for-the-US-DSCSA.pdf>

3.3 Classes



3.3.1 BaseLicenseCredential

This is the abstract superclass of any Verifiable Credential that is shared with parties interested in the license information associated with a GS1 identification key.

GS1 license credentials form a chain all the way up to GS1 Global Office, which acts as the root of the GS1 identification system by issuing GS1 Prefixes and GS1-8 Prefixes. Even GS1 Global Office itself, which acts as a GS1 Member Organization for countries that don't have one, must start with a GS1 Prefix license or a GS1-8 Prefix license issued to itself before issuing licenses to user companies.

3.3.1.1 Properties

Property	Type	*	Static	Description
Organization	Organization	1	false	Organization that is the credential subject. At minimum, the attributes partyGLN and organizationName must be populated.
licenseValue	xsd:string	1	false	Value of the license.
alternativeLicenseValue	xsd:string	0..1	false	Alternative value of the license. For most licenses, the alternative value of the license is the bridge between the U.P.C. system and the rest of the GS1 system: if the license value starts with zero, then the alternative license value is the same as the license value but without the starting zero.

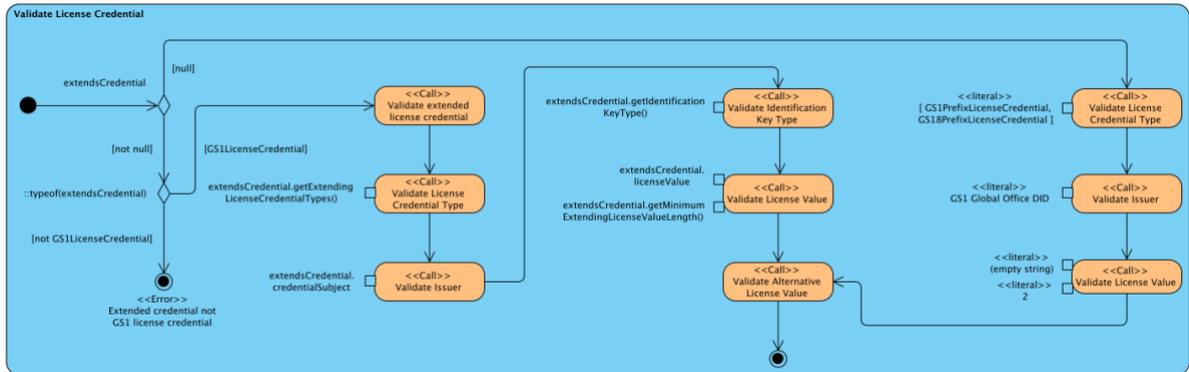
3.3.1.2 Operations

3.3.1.2.1 validate

```
public void validate()
```

Validate the license credential by validating the extended credential (if any) and then the attributes of this license credential.

3.3.1.2.1.1 Implementation



3.3.1.2.1.1.1 Flow

	Text	Description
	extendsCredential	Check for the existence of an extended credential.
	::typeof(extendsCredential)	Check the type of the extended credential.
	Validate extended license credential	Recursive call to this activity to validate the extended license credential. For a license credential to be valid, all prior license credentials must be valid as well.
	Validate License Credential Type	See implementation for "Validate License Credential Type".
	extendsCredential.getExtendingLicenseCredentialTypes()	Extended license credential determines the valid license credential types for the extending license credential.
	Validate Issuer	See implementation for "Validate Issuer".
	extendsCredential.credentialSubject	The credential subject of the extended license credential must be the issuer of the extending license credential.
	Validate Identification Key Type	See implementation for "Validate Identification Key Type".
	extendsCredential.getIdentificationKeyType()	If the extended license credential restricts the identification key type, the extending license credential must have a null or the same identification key type restriction.
	Validate License Value	See implementation for "Validate License Value".
	extendsCredential.licenseValue	The license value of the extended license credential must be the start of the license value of the extending license credential.
	extendsCredential.getMinimumExtendingLicenseValueLength()	The length license value of the extending license credential must be at least the length specified by the extended license credential.
	Validate Alternative License Value	See implementation for "Validate Alternative License Value".
	Validate License Credential Type	See implementation for "Validate License Credential Type".
	[GS1PrefixLicenseCredential, GS18PrefixLicenseCredential]	Only valid root license credential types are for GS1 Prefix and GS1-8 Prefix.
	Validate Issuer	See implementation for "Validate Issuer".
	GS1 Global Office DID	GS1 Global Office is the root issuer.
	Validate License Value	See implementation for "Validate License Value".
	(empty string)	Empty string is the root license value.
	2	The minimum length for a GS1 Prefix or GS1-8 Prefix is 2.

3.3.1.2.1.1.2 Errors

Error	Description
Extended credential not GS1 license credential	The extended credential must be a GS1 license credential.

3.3.1.2.2 getExtendingLicenseCredentialTypes

protected xsd:anyURI getExtendingLicenseCredentialTypes()

Returns the license credential types that can extend this license credential. The default implementation returns an empty array, indicating that this is a terminating license credential.

3.3.1.2.3 validateLicenseCredentialType

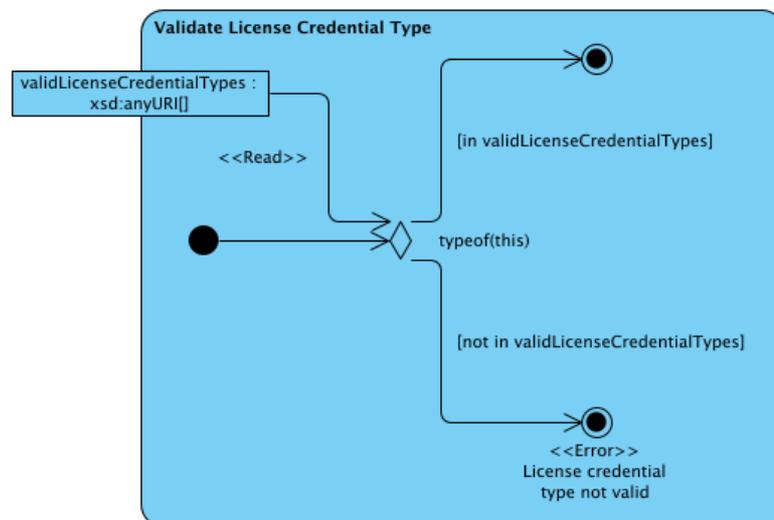
protected void validateLicenseCredentialType(xsd:anyURI[] validLicenseCredentialTypes)

Validate the license credential type against the list of license credential types supported by the extended license credential or the list of root license credential types if there is no extended license credential.

3.3.1.2.3.1 Parameters

Parameter	Type	*	Description
validLicenseCredentialTypes	xsd:anyURI[]	1..*	The license credential types against which to validate the type of this license credential.

3.3.1.2.3.2 Implementation



3.3.1.2.3.2.1 Flow

	Text	Description
	<code>typeof(this)</code>	Check the type of this license credential.

3.3.1.2.3.2.2 Errors

Error	Description
License credential type not valid	The type of this license credential is not in the list of valid license credential types.

3.3.1.2.4 validateIssuer

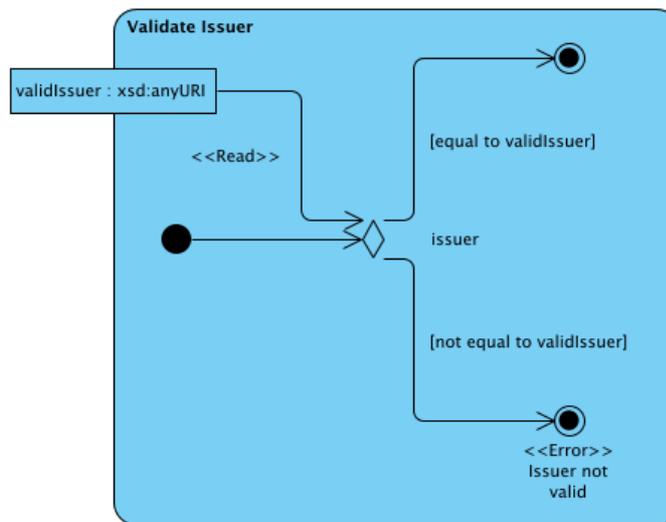
```
protected void validateIssuer(xsd:anyURI validIssuer)
```

Validate the issuer by comparing it to the credential subject of the extended credential or to the root DID if there is no extended credential.

3.3.1.2.4.1 Parameters

Parameter	Type	*	Description
validIssuer	xsd:anyURI	1	The issuer against which to validate the issuer of this license credential.

3.3.1.2.4.2 Implementation



3.3.1.2.4.2.1 Flow

	Text	Description
	issuer	Check the issuer of this license credential.

3.3.1.2.4.2.2 Errors

Error	Description
Issuer not valid	The issuer of this license credential does not match the expected value.

3.3.1.2.5 getIdentificationKeyType

```
protected GS1IdentificationKeyTypeCode getIdentificationKeyType()
```

Returns the singular identification key type supported by this license or null if all identification key types are supported. The default implementation returns null if the extended credential is null or the identification key type supported by the extended credential if the extended credential is not null.

3.3.1.2.6 validateIdentificationKeyType

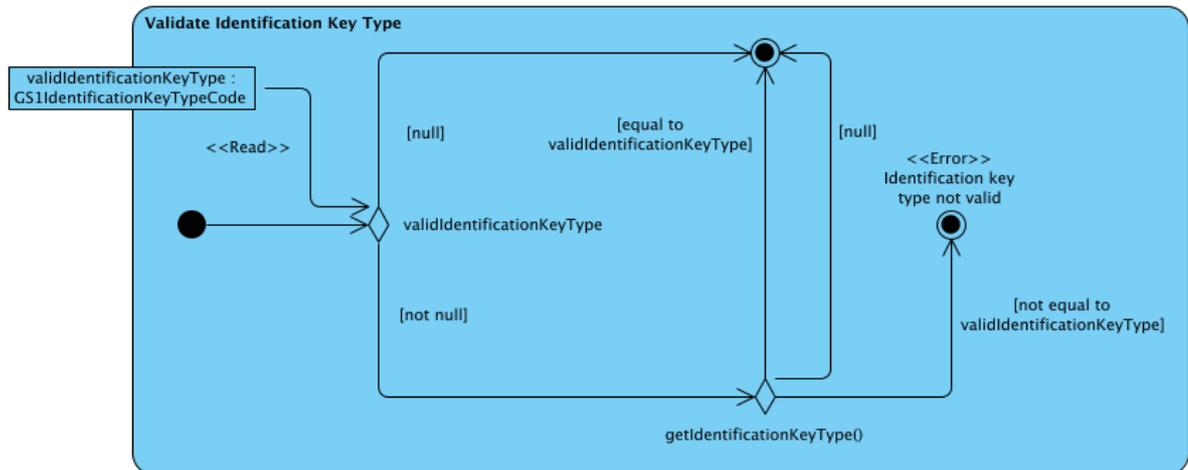
```
protected void validateIdentificationKeyType(GS1IdentificationKeyTypeCode validIdentificationKeyType)
```

Validate the identification key type against the identification key type of the extended license credential. If both the identification key type and the valid identification key type are not null, they must match.

3.3.1.2.6.1 Parameters

Parameter	Type	*	Description
validIdentificationKeyType	GS1IdentificationKeyTypeCode	0..1	The identification key type against which to validate the identification key type supported by this license credential.

3.3.1.2.6.2 Implementation



3.3.1.2.6.2.1 Flow

	Text	Description
→	validIdentificationKeyType	Check the valid identification key type.
→	getIdentificationKeyType()	Check the identification key type of this license credential.

3.3.1.2.6.2.2 Errors

Error	Description
Identification key type not valid	The identification key type of this license credential does not match the expected value.

3.3.1.2.7 validateLicenseValue

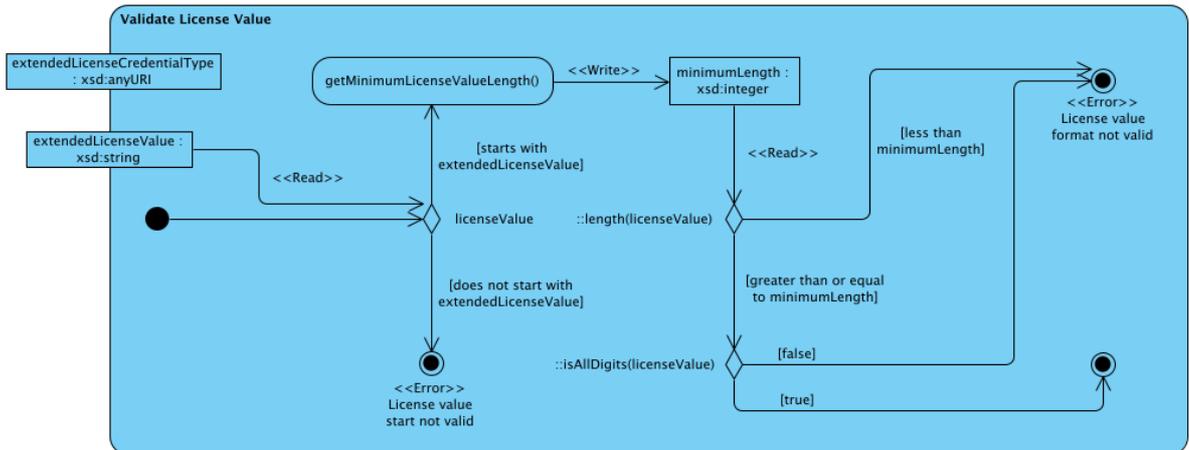
```
protected void validateLicenseValue(xsd:anyURI extendedLicenseCredentialType, xsd:string extendedLicenseValue)
```

Validate the license value given the extended license value.

3.3.1.2.7.1 Parameters

Parameter	Type	*	Description
extendedLicenseCredentialType	xsd:anyURI	0..1	The type of the extended license credential. This may affect the validation flow for some types of license credential.
extendedLicenseValue	xsd:string	1	The license value from the extended license credential against which to validate the license value of this license credential.

3.3.1.2.7.2 Implementation



3.3.1.2.7.2.1 Variables

Variable	Type	Description
minimumLength	xsd:integer	The minimum length of the license value of this license credential.

3.3.1.2.7.2.2 Flow

	Text	Description
	licenseValue	Check the license value of this license credential.
	getMinimumLicenseValueLength()	Get the minimum length of the license value of this license credential.
	::length(licenseValue)	Check the length of the license value of this license credential.
	::isAllDigits(licenseValue)	Check the format of the license value.

3.3.1.2.7.2.3 Errors

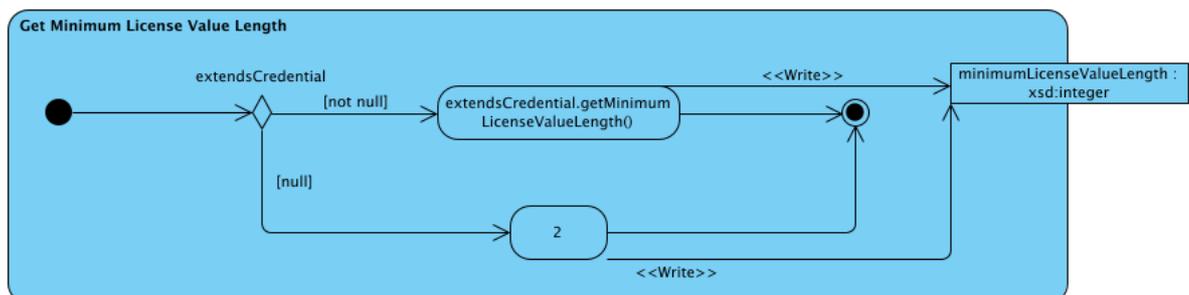
Error	Description
License value start not valid	The license value doesn't start with the expected value.
License value format not valid	The license value format is not valid.

3.3.1.2.8 getMinimumLicenseValueLength

```
protected xsd:integer getMinimumLicenseValueLength()
```

Returns the minimum license value length. The default implementation returns the length of the license value of the extended license credential if any, or 2 if none.

3.3.1.2.8.1 Implementation



3.3.1.2.8.1.1 Flow

	Text	Description
	extendsCredential	Check the extended license credential.
	extendsCredential.getMinimumLicenseValueLength()	Get the minimum license value length from the extended license credential.
	2	Minimum license value length for any license type that doesn't override this operation is 2.

3.3.1.2.9 getMaximumLicenseValueLength

```
protected xsd:integer getMaximumLicenseValueLength()
```

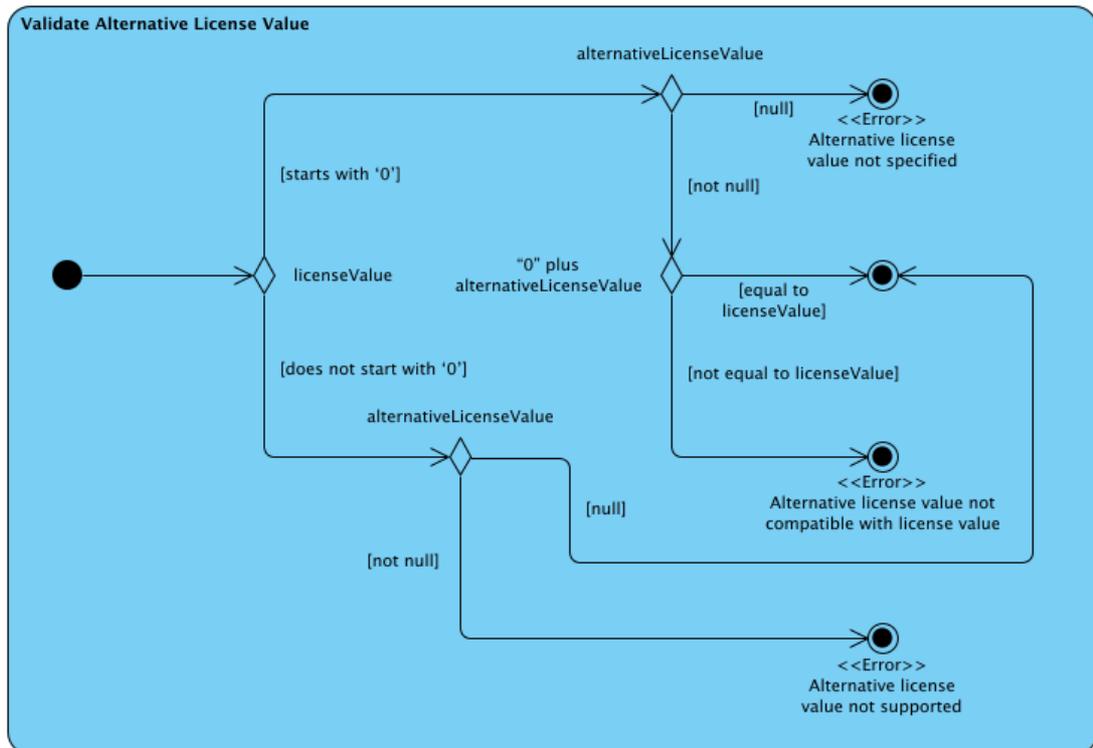
Returns the maximum license value length. The default implementation returns 12.

3.3.1.2.10 validateAlternativeLicenseValue

```
protected void validateAlternativeLicenseValue()
```

Validate the alternative value of the license. The default implementation treats the alternative value of the license as the bridge between the U.P.C. system and the rest of the GS1 system: if the license value starts with zero, then the alternative license value is the same as the license value but without the starting zero.

3.3.1.2.10.1 Implementation



3.3.1.2.10.1.1 Flow

	Text	Description
	licenseValue	Check the license value of this license credential.
	alternativeLicenseValue	Check the alternative license value of this license credential.
	"0" plus alternativeLicenseValue	Check required alternative license value.

	Text	Description
	alternativeLicenseValue	Check the alternative license value of this license credential.

3.3.1.2.10.1.2 Errors

Error	Description
Alternative license value not specified	The alternative license value has not been specified.
Alternative license value not compatible with license value	The alternative license value is not compatible with the license value.
Alternative license value not supported	An alternative license value is not supported.

3.3.2 GS1PrefixLicenseCredential

A GS1 Prefix is issued by GS1 Global Office and allocated a GS1 Member Organization or to itself for the purpose of issuing GS1 Company Prefix, GS1 identification key, delegated GS1 Prefix, or delegated GS1 identification key licenses.

3.3.2.1 Operations

3.3.2.1.1 getExtendingLicenseCredentialTypes

```
public abstract xsd:anyURI getExtendingLicenseCredentialTypes()
```

Returns [GS1CompanyPrefixLicenseCredential, GS1IdentificationKeyLicenseCredential, GS1DelegatedPrefixLicenseCredential, GS1DelegatedIdentificationKeyLicenseCredential] as the license credential types that can extend this license credential.

3.3.3 GS18PrefixLicenseCredential

A GS1-8 Prefix is issued by GS1 Global Office and allocated a GS1 Member Organization or to itself for the purpose of issuing GS1 identification key licenses for GTIN-8s.

3.3.3.1 Operations

3.3.3.1.1 getExtendingLicenseCredentialTypes

```
protected abstract xsd:anyURI getExtendingLicenseCredentialTypes()
```

Returns [GS1IdentificationKeyLicenseCredential, GS1DelegatedIdentificationKeyLicenseCredential] as the license credential types that can extend this license credential.

3.3.3.1.2 getIdentificationKeyType

```
protected GS1IdentificationKeyTypeCode getIdentificationKeyType()
```

Returns GTIN as the identification key type supported by this license.

3.3.3.1.3 getMaximumLicenseValueLength

```
protected xsd:integer getMaximumLicenseValueLength()
```

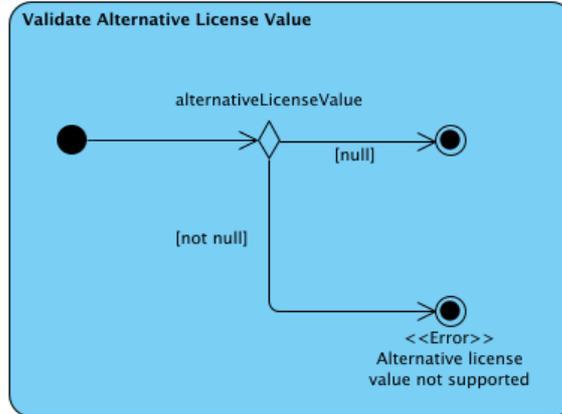
Returns 7 as the maximum license value length.

3.3.3.1.4 validateAlternativeLicenseValue

```
protected void validateAlternativeLicenseValue()
```

Validate the alternative value of the license. The GS1-8 Prefix doesn't support the alternative license value. Although in practice GS1 US doesn't issue GTIN-8s, it has still been licensed all GS1-8 Prefixes starting with zero and the default logic of checking for zero would be incorrect.

3.3.3.1.4.1 Implementation



3.3.3.1.4.1.1 Flow

	Text	Description
	alternativeLicenseValue	Check the alternative license value of this license credential.

3.3.3.1.4.1.2 Errors

Error	Description
Alternative license value not supported	An alternative license value is not supported.

3.3.4 GS1CompanyPrefixLicenseCredential

A GS1 Company Prefix License is issued by a GS1 Member Organization or GS1 Global Office and allocated to a user company or to itself for the purpose of generating tier 1 GS1 identification keys.

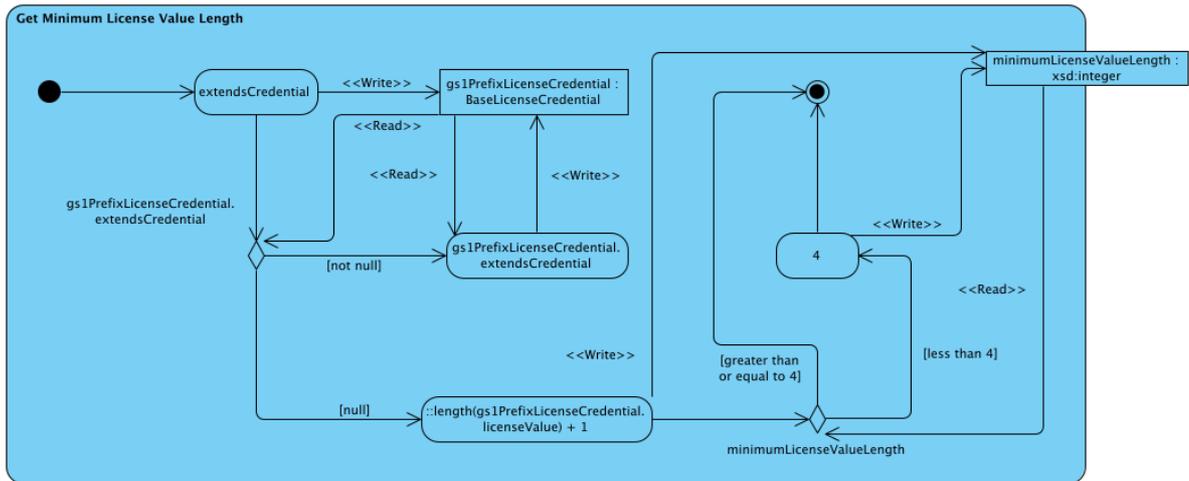
3.3.4.1 Operations

3.3.4.1.1 getMinimumLicenseValueLength

```
protected xsd:integer getMinimumLicenseValueLength()
```

Returns the maximum of 4 or the length of the underlying GS1 Prefix license value plus 1 as the minimum license value length.

3.3.4.1.1.1 Implementation



3.3.4.1.1.1.1 Variables

Variable	Type	Description
gs1PrefixLicenseCredential	BaseLicenseCredential	Holder to determine GS1 Prefix license credential. The GS1 Prefix is the root license credential for a GS1 Company Prefix license credential.

3.3.4.1.1.1.2 Flow

	Text	Description
[-]	extendsCredential	Get the first extended license credential in the chain.
[>]	gs1PrefixLicenseCredential.extendsCredential	Check the extended license credential of the holder for the GS1 Prefix license credential. If null, GS1 Prefix license credential has been found.
[-]	gs1PrefixLicenseCredential.extendsCredential	Get the next extended license credential in the chain.
[-]	::length(gs1PrefixLicenseCredential.licenseValue) + 1	The length of the GS1 Company Prefix license value must be at least one longer than the length of the GS1 Prefix license value.
[>]	minimumLicenseValueLength	Check the minimum license value length. Must be at least 4.
[-]	4	Minimum license value length for GS1 Company Prefix is 4.

3.3.5 BaseGS1IdentificationKeyLicenseCredential

This is the abstract superclass that provides base functionality for license credential types that support GS1 identification keys.

3.3.5.1 Properties

Property	Type	*	Static	Description
identificationKeyType	GS1IdentificationKeyTypeCode	1	false	Identification key type of the license. This plus the license value define the GS1 identification key.

3.3.5.2 Operations

3.3.5.2.1 getIdentificationKeyType

```
protected GS1IdentificationKeyTypeCode getIdentificationKeyType()
```

Returns the identification key type of the license.

3.3.5.2.2 validLicenseValueFormat

```
protected xsd:boolean validLicenseValueFormat(xsd:string licenseValue)
```

Determines if the license value matches the format (character set, minimum and maximum lengths, etc.) required by the identification key type.

For all identification key types except the GTIN, the license value is the identification key in its entirety, including check digit or check characters if applicable.

For the GTIN, the license value is the GTIN in its minimum format (8, 12, 13, or 14 digits), including check digit. If the GTIN is 13 digits, it must not start with a zero. If the GTIN is 14 digits, it must start with indicator digit 9.

3.3.5.2.2.1 Parameters

Parameter	Type	*	Description
licenseValue	xsd:string	1	License value to validate.

3.3.5.2.3 validateLicenseValue

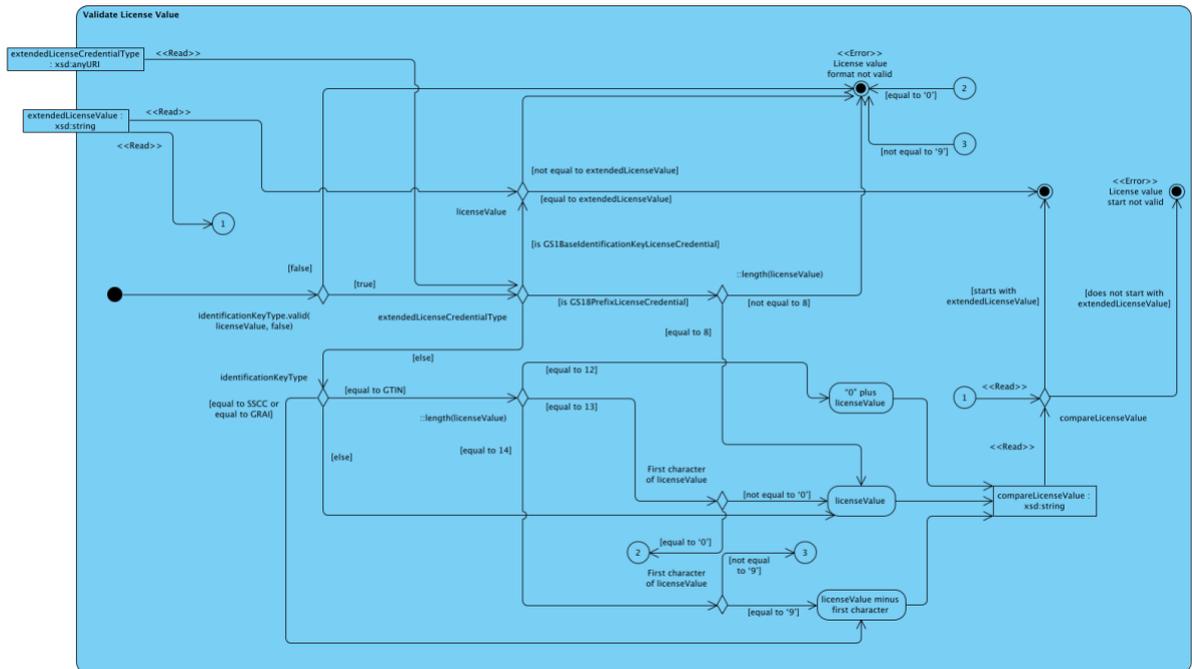
```
protected void validateLicenseValue(xsd:anyURI extendedLicenseCredentialType, xsd:string extendedLicenseValue)
```

Validate the license value given the extended license value.

3.3.5.2.3.1 Parameters

Parameter	Type	*	Description
extendedLicenseCredentialType	xsd:anyURI	1	The type of the extended license credential.
extendedLicenseValue	xsd:string	1	The license value from the extended license credential against which to validate the license value of this license credential.

3.3.5.2.3.2 Implementation



3.3.5.2.3.2.1 Variables

Variable	Type	Description
compareLicenseValue	xsd:string	The portion of the license value to compare against the license value of the extended license credential.

3.3.5.2.3.2.2 Flow

	Text	Description
→	identificationKeyType.valid(licenseValue, false)	Check that the license value is structurally valid for the given identification key type.
→	extendedLicenseCredentialType	Check the extended license credential type. If the type is GS1BaseIdentificationKeyLicenseCredential, the validation simply requires that the license value of this license credential equal the license value of the extended license credential. If the type is GS18PrefixLicenseCredential, the normal validation rules apply but the length of the license value must be exactly 8. The identification key type is known to be GTIN.
→	licenseValue	Check the license value against the license value of the extended license credential.
→	::length(licenseValue)	Check the length of the license value. Must be exactly 8.
→	identificationKeyType	Check the identification key type. If the type is GTIN, extended validation rules apply. If the type is SSCC or GRAI, the first character of the license value must be removed (extension digit for SSCC, zero padding for GRAI) before checking the license value against the license value of the extended license credential. Otherwise, the license value is checked as is.

	Text	Description
	::length(licenseValue)	Check the length of the license value. If the length is 12, the GTIN is based on a U.P.C. Company Prefix and the license value requires a zero to be padded on the left before checking against the license value of the extended license credential. If the length is 13, the GTIN is not based on a U.P.C. Company Prefix and must not start with a zero. If the length is 14, the GTIN must start with indicator digit 9 (indicating a variable measure trade item scanned in general distribution), which must be removed before checking the license value against the license value of the extended license credential.
	First character of licenseValue	Check the first character of the license value. Must not be '0'.
	First character of licenseValue	Check the first character of the license value. Must be '9'.
	"0" plus licenseValue	The license value requires a zero prepended to it before being compared to the license value of the extended license credential.
	licenseValue	The license value is compared as is to the license value of the extended license credential.
	licenseValue minus first character	The license value has an extra character at the start (indicator digit for GTIN, extension digit for SSCC, zero for GRAI) that must be removed before being compared to the license value of the extended license credential.
	compareLicenseValue	Check the portion of the license value to compare against the license value of the extended license credential.

3.3.5.2.3.2.3 **Errors**

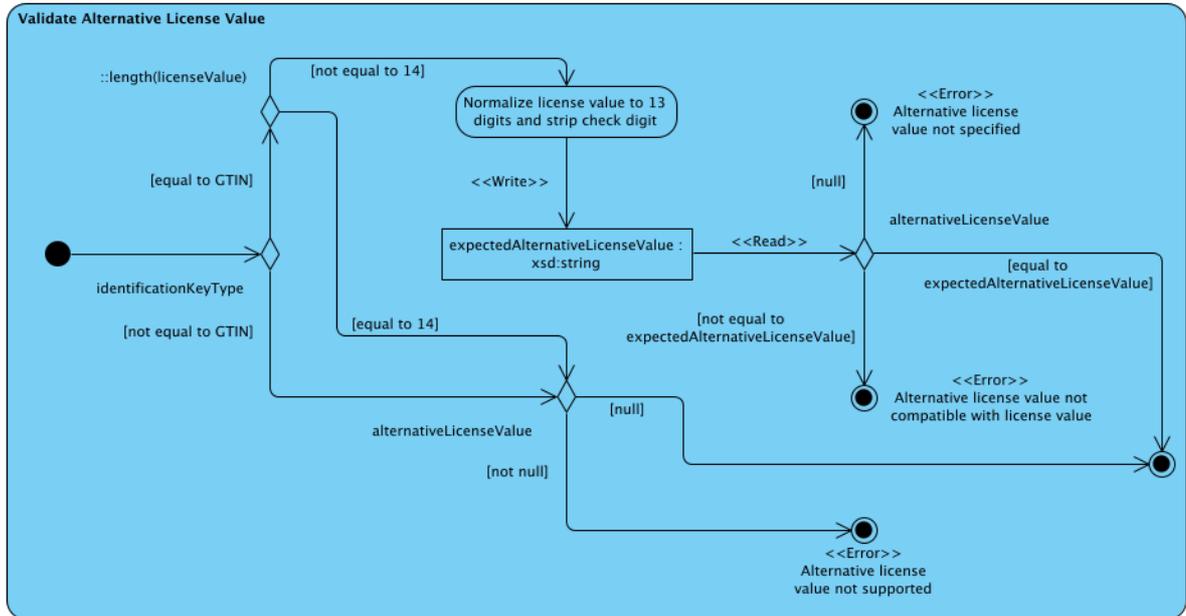
Error	Description
License value format not valid	The license value format is not valid.
License value start not valid	The license value doesn't start with the expected value.

3.3.5.2.4 **validateAlternativeLicenseValue**

```
protected void validateAlternativeLicenseValue()
```

Validate the alternative value of the license. The default implementation treats the alternative value of the license as the bridge between the U.P.C. system and the rest of the GS1 system: if the license value starts with zero, then the alternative license value is the same as the license value but without the starting zero.

3.3.5.2.4.1 Implementation



3.3.5.2.4.1.1 Variables

Variable	Type	Description
expectedAlternativeLicenseValue	xsd:string	The expected alternative license value, being a 12-digit string to be used to check against GTINs with indicator digits 1-8.

3.3.5.2.4.1.2 Flow

	Text	Description
→	identificationKeyType	Check the identification key type of this license credential.
→	::length(licenseValue)	Check the length of the license value of this license credential.
▢	Normalize license value to 13 digits and strip check digit	The alternative license value is used to check against GTINs with indicator digits 1-8. To do this efficiently, the alternative license value is the license value padded on the left with enough zeros to bring it up to 13 digits and then the check digit on the right is removed, yielding a 12-digit string.
→	alternativeLicenseValue	Check the alternative license value of this license credential.
→	alternativeLicenseValue	Check the alternative license value of this license credential.

3.3.5.2.4.1.3 Errors

Error	Description
Alternative license value not specified	The alternative license value has not been specified.
Alternative license value not compatible with license value	The alternative license value is not compatible with the license value.
Alternative license value not supported	An alternative license value is not supported.

3.3.6 GS1IdentificationKeyLicenseCredential

A GS1 identification key license is issued by a GS1 Member Organization or GS1 Global Office and entitles the user company to allocate that key to an object.

Within GS1 Member Organizations, there are generally two types of programmes for issuing GS1 identification key licenses.

The first programme is to support the marking of very small trade items. If the GS1 Member Organization determines that the trade item is too small for a GTIN-13, it will issue a GS1 identification key license for a GTIN-8.

The second programme is to support small- to medium-sized enterprises (SMEs) that sell only a handful of products and often don't have the resources or the need to manage a GS1 Company Prefix. The GS1 Member Organization usually sets aside a GS1 Company Prefix for the purpose of generating single-issue GS1 identification key licenses.

Some GS1 identification keys are acquired as a result of a partial acquisition. While the process hasn't been fully defined in the standards, in general, when one company acquires part of another (e.g., a product line or division rather than the whole company), it also acquires the keys used to identify the products, locations, assets, etc. associated with the part of the company that it acquired. In some cases, regulatory requirements may mandate that the acquiring company assume the liabilities for past and present products, and in such a case, it may be necessary for the GS1 licensing infrastructure to reflect that.

Outside of GS1, some GS1 identification key licenses are acquired through indirect licensing programmes. Such licenses must extend a delegated GS1 Prefix license issued to the third party.

4 Declaration

Declaration is about data. Fundamentally, it requires three components: a key to identify the object about which the declaration is being made, the data with which the key is associated, and enough information about the party making the declaration to know whether to trust it.

A GS1 identification key is said to be allocated to an object when it is associated with data about that object. For a GTIN, the data describes the product or other trade item, with a brand and description. For a GLN, the data describes a location, with a name and address. For an SSCC, the data describes the source, destination, and contents. Similar mappings exist for all identification keys, and not just for those within the GS1 system.

In most cases, the party that issues the key is expected to be the one to associate data with it, but this isn't always the case. Some product data, when provided by the brand owner, isn't necessarily trusted by the users of that data. For retailers, one of the critical data sets is that of the product dimensions and weight for planogram purposes, and a significant percentage of brand owners, even large multinationals, cannot provide consistent and reliable planogram data. For consumers, product certifications (organic, allergen-free, fair trade, kosher, etc.) are more trusted, or only trusted, when they can be verified by outside agencies.

To support the ability for outside agencies to associate data with a key in a way that can be fully trusted, the party that issues the key must grant the authority to do so to that outside agency.

There are, however, some circumstances where even authorization isn't trusted. For example, product reviews are expected to be independent, and the validity of the product review will depend on the identification of the product being reviewed and some authority to review the product (e.g., proof of purchase for a consumer-based review or the reputation of the reviewing party for a business-based review). There is no authorization provided by the licensee for the review and the trust in the data comes through a different path.

- For the sake of simplicity, all the data elements in this section are assumed to be unilingual. In a production implementation, localizable attributes (e.g., product description) would support multiple languages. Similarly, some structured attributes are simplified, and some repeatable attributes are shown as singletons.

4.1 Issuer

It will take some time for Verifiable Credentials to achieve critical mass. To support the transition to a world in which all parties can make the appropriate declarations or authorizations themselves, there is an automatic authorization to the licensor as the issuer of a credential. This allows GS1 Member Organizations to issue credentials on behalf of their user companies, such as for product data declarations or third-party authorizations.

4.2 Credential Subject ID

When declaring data, the credential subject ID should be a GS1 Digital Link URI (DLURI). While preference should be given to the canonical URI (based on id.gs1.org), this is not required.

Using the DLURI means that the data declaration can support any level of granularity required (e.g., GTIN, GTIN+CPV, GTIN+batch/lot, GTIN+serial, GLN, GLN+extension, etc.). Furthermore, using a DLURI eliminates the need to generate and secure a public/private key pair for every object, which can be difficult to manage as the number of objects requiring Verifiable Credentials grows (e.g., GTIN+serial for manufacturing, GLN+extension for warehouse location identification, SSCC for logistics).

In some use cases where a DID or other URI is required as the credential subject ID (e.g., party identification between trading partners), the DLURI shall be included as well using a "sameAs" attribute in the credential subject. If the credential subject ID is already a DLURI, the "sameAs" attribute shall not be specified.

The presence of a DLURI makes for easy association between Verifiable Credentials of different types. For example, a retail operation may want to assign GLNs to all its stores and to make basic declarations about them, such as the store name and address as well as its opening hours. As each store can act as a Verifiable Credential issuer or subject in some circumstances, the party data

Verifiable Credential, containing the store name and address, would have the store's DID as the credential subject ID and a "sameAs" attribute with the DLURI. However, the store's opening hours have nothing to do with its participation in Verifiable Credential processes, so the DLURI can be specified as the credential subject ID for the opening hours Verifiable Credential.

4.3 Key Credential

When discussing licensing, the terms "identification key" and "GS1 identification key" are used, but when discussing declarations, the term "key" is used. "Identification key" and "GS1 identification key" refer to any of the foundational keys within the GS1 General Specifications: GTIN, GLN, SSCC, etc., and include serialized versions of keys that natively support serialization (GRAI, GDTI, and GCN). "Key" refers to the GS1 identification keys alone as well as any combination of GS1 identification keys and other attributes that can identify something for which data can be declared.

Some examples:

- GTIN to identify a trade item;
- GTIN+batch/lot to identify common manufacturing characteristics across multiple trade item instances;
- GTIN+serial to identify a specific instance of a trade item;
- GLN to identify a warehouse;
- GLN+extension to identify a sub-location within a warehouse;
- GDTI in serialized form to identify a specific document; and
- GSRN+SRIN to identify a sequence within an episode of care.

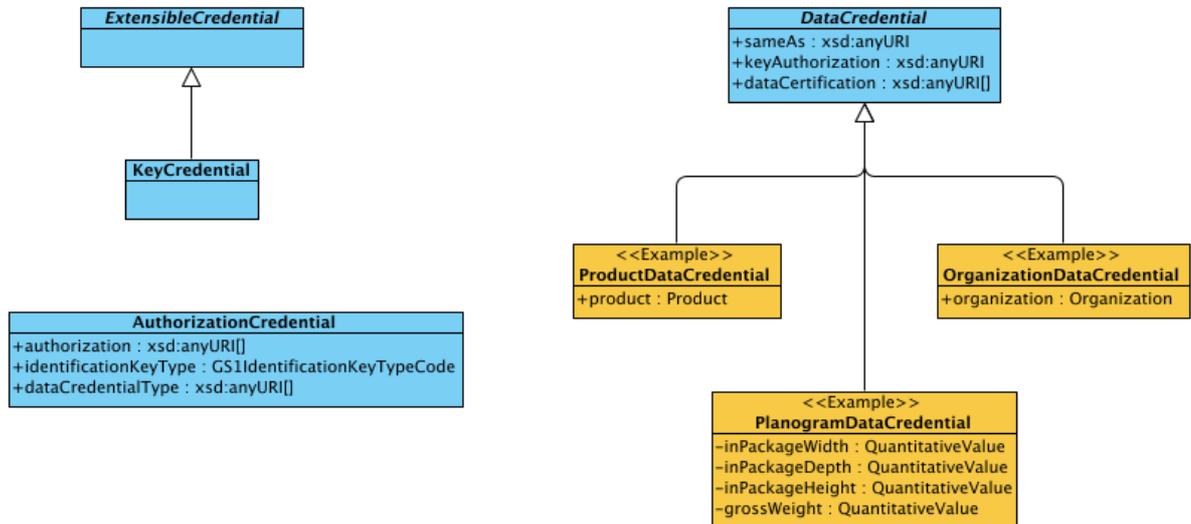
The lifecycle of a key is different from the lifecycle of the license on which it is based and on the data associated with it. A trade item may be withdrawn from the market, but the data associated with it would be valid for a long time to come, especially if in the resale market if it's a non-perishable item. The underlying license, whether for a GS1 Company Prefix or for a GS1 identification key (even if identical to the key), could also remain valid for some time. Revoking the Verifiable Credential for the key can make a statement about the validity of the key without affecting the validity of the data declared for it (but it will prevent new declarations from being made).

Furthermore, with the multitude of data sets that can be associated with a key, it's difficult to identify one that can apply across multiple key types, or even one that can apply across all instances of a single key type. For example, it can be argued that a trade item shall have a brand and description, so a basic trade item data declaration containing those attributes should be enough to make a statement about the GTIN without having to create a separate Verifiable Credential, but other questions arise:

- Which description do you use? The supply chain description, the regulatory description, or the consumer description?
- How do you handle changes to the basic trade item data that don't change the GTIN?
- What happens to other data declarations that refer to the basic trade item data declaration when the basic trade item data declaration is revoked and replaced with an updated description?
- How do you discover the current version of the basic trade item data declaration?

The best way to deal with these questions is to keep the key in its own Verifiable Credential.

4.4 Classes



4.4.1 KeyCredential

This is the Verifiable Credential that indicates that something has been identified. It contains no data about what has been identified as that is done via the association process. This credential is used only to indicate that the key that it contains exists and is valid. When the key is retired (e.g., a product is withdrawn from the market or an asset is destroyed), the credential is revoked.

The credential subject ID must be a GS1 Digital Link URI. While preference should be given to the canonical URI (based on id.gs1.org), this is not required. Using the GS1 Digital Link URI means that the credential can support any level of granularity required (e.g., GTIN, GTIN+CPV, GTIN+lot, GTIN+serial, GLN, GLN+extension, etc.).

4.4.2 AuthorizationCredential

This is the Verifiable Credential that authorizes another party to issue data credentials on behalf of the issuer of this credential.

4.4.2.1 Properties

Property	Type	*	Static	Description
authorization	xsd:anyURI[]	1..*	false	<p>References to the license or key credentials that have been authorized to the credential subject. Within the GS1 system, provides a complete chain to the GS1 Prefix license credential issued by GS1 Global Office.</p> <p>If a URI is to a license credential, all keys within the license are authorized to the credential subject.</p> <p>If a key entry is incomplete (e.g., the authorization is for serial-level data but only the GTIN key credential is provided), all additional attributes below the path in the key are authorized to the credential subject.</p> <p>The authorization URIs do not need to be resolvable, and the fact that this credential is presented does not require that the authorized credentials be presented as well. It is up to the holder to decide whether to present the authorized credentials alongside this one.</p>
identificationKeyType	GS1IdentificationKey yTypeCode	0..1	false	<p>The identification key type to which the authorization applies. This attribute is generally not necessary. If all of the authorizations are for individual key credentials, or if the data type can apply to only one type of thing, the identification key type can be implied.</p>
dataCredentialType	xsd:anyURI[]	0..*	false	<p>A URI representing the data credential types that have been delegated. If the list is empty, the credential subject has the authority to declare any data of any type for the delegated URIs.</p>

4.4.3 DataCredential

A data credential is data about something identified with a key credential. While anyone can make any declaration about an object, for that data to be trusted, it has to be authorized in some fashion. This can vary depending on the type of data and the business process in which it is used. For example, a brand owner can be trusted to declare the brand name, description, size and unit of measure, and much more about their own product. The brand owner may not be trusted, however, to declare certain product certifications (e.g., conformance to religious practices such as Halal) or to provide high-quality data for critical supply chain processes (e.g., dimensions and weights for planogram purposes). In such cases, the brand owner would have to authorize other parties that are trusted to provide that data.

On the other hand, an anonymous consumer can provide a review of the product without any authorizations provided by the brand owner but can increase trust in the review by referencing a proof of purchase credential for the product.

Ultimately, the rules governing which declarations may be made, by whom, and with what combination of key authorization and data certification credentials depend on the data being provided.

The key authorization and data certification credential URIs do not need to be resolvable, and the fact that this credential is presented does not require that the other credentials be presented as well. It is up to the holder to decide whether to present the other credentials alongside this one, and up to the verifier to decide whether or not to accept them (or accept their absence).

4.4.3.1 Properties

Property	Type	*	Static	Description
sameAs	xsd:anyURI	0..1	false	If the credential subject ID is not a GS1 Digital Link URI, this specifies the GS1 Digital Link URI.
keyAuthorization	xsd:anyURI	0..1	false	Reference to a credential that authorizes the issuer to declare data for the credential subject (the key). Normally, this is the key credential itself, in which case the issuer of this and the key credential must be the same. For data that is declared by other parties on behalf of the issuer of the key credential, an authorization credential may be provided instead. In some circumstances, where the issuer of the data declaration is entirely independent, the key authorization may be entirely outside of the GS1 system (e.g., a proof-of-purchase Verifiable Credential for a product review).
dataCertification	xsd:anyURI[]	0..*	false	<p>List of references to credentials that certify that the issuer is competent to declare data of the given type. This would be used, for example, to declare that a solution provider is certified in accordance with the GS1 Package Measurement Rules Standard would assure the verifier of the credential that the planogram data contained in the credential is accurate. The combination of a data authorization credential from the brand owner for planogram data along with the GS1 Package Measurement Rules Standard data certification credential would confirm to the verifier that the solution provider is both authorized and competent to provide the data.</p> <p>Multiple data certification credentials may be provided, which may address situations where multiple certifying parties exist and different users require different certifications.</p> <p>It's not always necessary to have a data certification credential to match a key delegation credential, as data certification may be implied by the issuer of the credential (e.g., a Halal or other religious practice certification authority) that is trusted by the community that is interested in the data.</p>

4.4.4 ProductDataCredential

The product data credential is the Verifiable Credential that is shared with parties interested in the basic information associated with a product identified by a GTIN.

4.4.4.1 Properties

Property	Type	*	Static	Description
product	Product	1	false	Product that is identified by the GTIN.

4.4.5 OrganizationDataCredential

The organization data credential is the Verifiable Credential that is shared with parties interested in the basic information associated with an organization identified by a GLN.

4.4.5.1 Properties

Property	Type	*	Static	Description
organization	Organization	1	false	Organization that is identified by the GLN.

4.4.6 PlanogramDataCredential

The planogram data credential is the Verifiable Credential that is shared with parties interested in the planogram dimensions and weight of a product identified by a GTIN. Measurements are expected to be taken according to the GS1 Package and Product Measurement Standard.

4.4.6.1 Properties

Property	Type	*	Static	Description
inPackageWidth	QuantitativeValue	1	false	The width of the product in the package.
inPackageDepth	QuantitativeValue	1	false	The depth of the product in the package.
inPackageHeight	QuantitativeValue	1	false	The height of the product in the package.
grossWeight	QuantitativeValue	1	false	The gross weight of the product including all packaging materials.

5 Examples

Examples showing relationships between Verifiable Credentials are color-coded according to the issuer as follows:



5.1 GS1 Prefix License Credential

5.1.1 GS1 Prefix 754 Licensed to GS1 Canada



```

{
  "@context": [
    "https://www.w3.org/2018/credentials/v1",
    "https://ref.gs1.org/gs1/vc/license-context/"
  ],
  "id": "https://id.gs1.org/vc/license/gs1_prefix/754",
  "type": [
    "VerifiableCredential",
    "GS1PrefixLicenseCredential"
  ],
  "issuer": "did:web:id.gs1.org",
  "issuanceDate": "2005-01-01T00:00:00Z",
  "credentialSubject": {
    "id": "did:web:www.gs1ca.org",
    "organization": {
      "gs1:partyGLN": "7541230000000",
      "gs1:organizationName": "GS1 Canada",
      ...
    },
    "licenseValue": "754"
  },
  "credentialStatus": {
    "id": "https://id.gs1.org/vc/license/status/gs1_prefix/754",
    "type": "CredentialStatusList2021"
  },
  "proof": { ... }
}

```

Attribute	Notes
id	A resolvable URI where this credential is stored. Note that the URI contains the GS1 Prefix.
issuer	Resolvable DID for GS1 Global Office.

Attribute	Notes
credentialSubject	
id	The DID for the GS1 Member Organization, or GS1 Global Office itself, to whom the GS1 Prefix has been licensed.
licenseValue	The GS1 Prefix.

5.1.2 U.P.C. Prefix 6 Licensed to GS1 US

U.P.C. Prefix license 6

```
{
  "@context": [
    "https://www.w3.org/2018/credentials/v1",
    "https://ref.gs1.org/gs1/vc/license-context/"
  ],
  "id": "https://id.gs1.org/vc/license/gs1_prefix/06",
  "type": [
    "VerifiableCredential",
    "GS1PrefixLicenseCredential"
  ],
  "issuer": "did:web:id.gs1.org",
  "issuanceDate": "2005-01-01T00:00:00Z",
  "credentialSubject": {
    "id": "did:web:www.gs1us.org",
    "organization": {
      "gs1:partyGLN": "0614141000005",
      "gs1:organizationName": "GS1 US",
      ...
    },
    "licenseValue": "06",
    "alternativeLicenseValue": "6"
  },
  "credentialStatus": {
    "id": "https://id.gs1.org/vc/license/status/gs1_prefix/06",
    "type": "CredentialStatusList2021"
  },
  "proof": { ... }
}
```

Attribute	Notes
id	A resolvable URI where this credential is stored. Note that the URI contains the GS1 Prefix.
issuer	Resolvable DID for GS1 Global Office.
credentialSubject	

Attribute	Notes
id	The DID for the GS1 Member Organization, or GS1 Global Office itself, to whom the GS1 Prefix has been licensed.
licenseValue	The GS1 Prefix.
alternativeLicenseValue	The GS1 Prefix as U.P.C. Prefix.

5.1.3 GS1 Prefix 978 Licensed to GS1 Global Office (Self)

GS1 Prefix license 978

```

{
  "@context": [
    "https://www.w3.org/2018/credentials/v1",
    "https://ref.gs1.org/gs1/vc/license-context/"
  ],
  "id": "https://id.gs1.org/vc/license/gs1_prefix/978",
  "type": [
    "VerifiableCredential",
    "GS1PrefixLicenseCredential"
  ],
  "issuer": "did:web:id.gs1.org",
  "issuanceDate": "2005-01-01T00:00:00Z",
  "credentialSubject": {
    "id": "did:web:id.gs1.org",
    "organization": {
      "gs1:partyGLN": "9506000038186",
      "gs1:organizationName": "GS1 AISBL",
      ...
    },
    "licenseValue": "978"
  },
  "credentialStatus": {
    "id": "https://id.gs1.org/vc/license/status/gs1_prefix/978",
    "type": "CredentialStatusList2021"
  },
  "proof": { ... }
}

```

Attribute	Notes
id	A resolvable URI where this credential is stored. Note that the URI contains the GS1 Prefix.
issuer	Resolvable DID for GS1 Global Office.
credentialSubject	
id	The DID for the GS1 Member Organization, or GS1 Global Office itself, to whom the GS1 Prefix has been licensed.

Attribute	Notes
licenseValue	The GS1 Prefix.

5.2 GS1-8 Prefix License Credential

5.2.1 GS1-8 Prefix 754 Licensed to GS1 Canada

GS1-8 Prefix license 754

```

{
  "@context": [
    "https://www.w3.org/2018/credentials/v1",
    "https://ref.gs1.org/gs1/vc/license-context/"
  ],
  "id": "https://id.gs1.org/vc/license/gs1_8_prefix/754",
  "type": [
    "VerifiableCredential",
    "GS18PrefixLicenseCredential"
  ],
  "issuer": "did:web:id.gs1.org",
  "issuanceDate": "2005-01-01T00:00:00Z",
  "credentialSubject": {
    "id": "did:web:www.gs1ca.org",
    "organization": {
      "gs1:partyGLN": "7541230000000",
      "gs1:organizationName": "GS1 Canada",
      ...
    },
    "licenseValue": "754"
  },
  "credentialStatus": {
    "id": "https://id.gs1.org/vc/license/status/gs1_8_prefix/754",
    "type": "CredentialStatusList2021"
  },
  "proof": { ... }
}

```

Attribute	Notes
id	A resolvable URI where this credential is stored. Note that the URI contains the GS1-8 Prefix.
issuer	Resolvable DID for GS1 Global Office.
credentialSubject	
id	The DID for the GS1 Member Organization, or GS1 Global Office itself, to whom the GS1-8 Prefix has been licensed.
licenseValue	The GS1-8 Prefix.

5.3 GS1 Company Prefix License Credential

5.3.1 GS1 Company Prefix 7541234 Licensed to Example Company



```

{
  "@context": [
    "https://www.w3.org/2018/credentials/v1",
    "https://ref.gs1.org/gs1/vc/license-context/"
  ],
  "id": "did:example:b6d13abe-464d-4bb9-a568-b6d81efd57e3",
  "type": [
    "VerifiableCredential",
    "GS1CompanyPrefixLicenseCredential"
  ],
  "issuer": "did:web:www.gs1ca.org",
  "issuanceDate": "2020-11-19T14:56:37Z",
  "credentialSubject": {
    "id": "did:web:www.example.ca",
    "organization": {
      "gs1:partyGLN": "7541234000006",
      "gs1:organizationName": "Example Company",
      ...
    }
  },
  "extendsCredential": "https://id.gs1.org/vc/license/gs1_prefix/754",
  "licenseValue": "7541234"
},
"credentialStatus": {
  "id": "https://www.gs1ca.org/credentials/gcp/status/7541234",
  "type": "CredentialStatusList2021"
},
"proof": { ... }
}

```

Attribute	Notes
id	A DID for this credential. The ID isn't resolvable because the credential is sensitive information and only the user company can decide when it's presented.
issuer	Resolvable DID for GS1 Canada.
expirationDate	The date the license expires. Optional, as the GS1 Member Organization may not want to reveal this information or may simply rely on the credential status check.
credentialSubject	
id	The DID for the user company to whom the GS1 Company Prefix has been licensed.
extendsCredential	URI of the GS1 Prefix license that this GS1 Company Prefix license extends.

Attribute	Notes
licenseValue	The GS1 Company Prefix.

5.3.2 U.P.C. Company Prefix 614141 Licensed to Example Company



```

{
  "@context": [
    "https://www.w3.org/2018/credentials/v1",
    "https://ref.gs1.org/gs1/vc/license-context/"
  ],
  "id": "did:example:5df96271-b6ee-4fa0-8a99-32624906afd2",
  "type": [
    "VerifiableCredential",
    "GS1CompanyPrefixLicenseCredential"
  ],
  "issuer": "did:web:www.gs1us.org",
  "issuanceDate": "2020-11-19T14:56:37Z",
  "credentialSubject": {
    "id": "did:web:www.example.com",
    "organization": {
      "gs1:partyGLN": "0614141000005",
      "gs1:organizationName": "Example Company",
      ...
    }
  },
  "extendsCredential": "https://id.gs1.org/vc/license/gs1_prefix/06",
  "licenseValue": "0614141",
  "alternativeLicenseValue": "614141"
},
  "credentialStatus": {
    "id": "https://www.gs1us.org/vcs/stat/prefix/0614141",
    "type": "CredentialStatusList2021"
  },
  "proof": { ... }
}
  
```

Attribute	Notes
id	A DID for this credential. The ID isn't resolvable because the credential is sensitive information and only the user company can decide when it's presented.
issuer	Resolvable DID for GS1 US.
expirationDate	The date the license expires. Optional, as the GS1 Member Organization may not want to reveal this information or may simply rely on the credential status check.
credentialSubject	

Attribute	Notes
id	The DID for the user company to whom the GS1 Company Prefix has been licensed.
extendsCredential	URI of the GS1 Prefix license that this GS1 Company Prefix license extends.
licenseValue	The GS1 Company Prefix. This is the value used to generate all GS1 identification keys except GTINs.
Value alternativeLicense	The GS1 Company Prefix as U.P.C. Company Prefix. This is the value used to generate GTINs. The alternative license value applies only to GS1 Company Prefixes starting with zero as, with the leading zero removed, they are the only ones that are may be used to generate 12-digit GTINs for the US and Canadian markets.

5.4 GS1 Identification Key License Credential

5.4.1 GTIN-13 754123555550 Licensed to Example Company



```

{
  "@context": [
    "https://www.w3.org/2018/credentials/v1",
    "https://ref.gs1.org/gs1/vc/license-context/"
  ],
  "id": "did:example:3b306a01-eada-420e-bf5d-caa603042a61",
  "type": [
    "VerifiableCredential",
    "GS1IdentificationKeyLicenseCredential"
  ],
  "issuer": "did:web:www.gs1ca.org",
  "issuanceDate": "2020-11-19T14:56:37Z",
  "credentialSubject": {
    "id": "did:web:www.example.ca",
    "organization": {
      "gs1:partyGLN": "7541234000006",
      "gs1:organizationName": "Example Company",
      ...
    },
    "extendsCredential": "https://id.gs1.org/vc/license/gs1_prefix/754",
    "licenseValue": "754123555550",
    "alternativeLicenseValue": "75412355555",
    "identificationKeyType": "GTIN"
  },
  "credentialStatus": {
    "id": "https://www.gs1ca.org/credentials/gtin/status/754321055551",
    "type": "CredentialStatusList2021"
  },
}

```

```
"proof": { ... }
}
```

Attribute	Notes
id	A DID for this credential. The ID isn't resolvable because the credential is sensitive information and only the user company can decide when it's presented.
issuer	Resolvable DID for GS1 Canada.
expirationDate	The date the license expires. Optional, as the GS1 Member Organization may not want to reveal this information or may simply rely on the credential status check.
credentialSubject	
id	The DID for the user company to whom the GTIN has been licensed.
extendsCredential	URI of the GS1 Prefix license that this GTIN license extends.
licenseValue	The GTIN-13.
alternativeLicense	The GTIN-13 with the check digit removed.
Value	
identificationKeyType	GTIN.

5.4.2 GTIN-12 61414155550 Licensed to Example Company



```
{
  "@context": [
    "https://www.w3.org/2018/credentials/v1",
    "https://ref.gs1.org/gs1/vc/license-context/"
  ],
  "id": "did:example:6845f958-7a4a-41a3-832b-ed2c2a332c89",
  "type": [
    "VerifiableCredential",
    "GS1IdentificationKeyLicenseCredential"
  ],
  "issuer": "did:web:www.gs1us.org",
  "issuanceDate": "2020-11-19T14:56:37Z",
  "expirationDate": "2021-11-19T14:56:37Z",
  "credentialSubject": {
    "id": "did:web:www.example.com",
    "organization": {
      "gs1:partyGLN": "0614141000005",
      "gs1:organizationName": "Example Company",
      ...
    }
  },
  "extendsCredential": "https://www.gs1us.org/vcs/prefix/0614141",
  "licenseValue": "61414155550",
}
```

```

    "alternativeLicenseValue": "061414155555",
    "identificationKeyType": "GTIN"
  },
  "credentialStatus": {
    "id": "https://www.gs1us.org/vcs/stat/gtin/0614141555550",
    "type": "CredentialStatusList2021"
  },
  "proof": { ... }
}

```

Attribute	Notes
id	A DID for this credential. The ID isn't resolvable because the credential is sensitive information and only the user company can decide when it's presented.
issuer	Resolvable DID for GS1 US.
expirationDate	The date the license expires. Optional, as the GS1 Member Organization may not want to reveal this information or may simply rely on the credential status check.
credentialSubject	
id	The DID for the user company to whom the GTIN has been licensed.
extendsCredential	URI of the GS1 Company Prefix license that this GTIN license extends.
licenseValue	The GTIN-12.
alternativeLicense Value	The GTIN-12 in normalized GTIN-13 form with the check digit removed.
identificationKeyType	GTIN.

5.4.3 GTIN-8 75412340 Licensed to Example Company



```

{
  "@context": [
    "https://www.w3.org/2018/credentials/v1",
    "https://ref.gs1.org/gs1/vc/license-context/"
  ],
  "id": "did:example:0159a4a2-38a6-4ff7-8f54-e8af8897c40c",
  "type": [
    "VerifiableCredential",
    "GS1IdentificationKeyLicenseCredential"
  ],
  "issuer": "did:web:www.gs1ca.org",
  "issuanceDate": "2020-11-19T14:56:37Z",
  "expirationDate": "2021-11-19T14:56:37Z",
  "credentialSubject": {
    "id": "did:web:www.example.ca",

```

```

"organization": {
  "gs1:partyGLN": "7541234000006",
  "gs1:organizationName": "Example Company",
  ...
},
"extendsCredential": "https://id.gs1.org/vc/license/gs1_8_prefix/754",
"licenseValue": "75412340",
"alternativeLicenseValue": "0000007541234",
"identificationKeyType": "GTIN"
},
"credentialStatus": {
  "id": "https://www.gs1ca.org/credentials/gtin8/status/75412340",
  "type": "CredentialStatusList2021"
},
"proof": { ... }
}
  
```

Attribute	Notes
id	A DID for this credential. The ID isn't resolvable because the credential is sensitive information and only the user company can decide when it's presented.
issuer	Resolvable DID for GS1 Canada.
expirationDate	The date the license expires. Optional, as the GS1 Member Organization may not want to reveal this information or may simply rely on the credential status check.
credentialSubject	
id	The DID for the user company to whom the GTIN has been licensed.
extendsCredential	URI of the GS1-8 Prefix license that this GTIN license extends.
licenseValue	The GTIN-8.
alternativeLicenseValue	The GTIN-8 in normalized GTIN-13 form with the check digit removed.
identificationKeyType	GTIN.

5.4.4 GLN 952123455551 Licensed to Example Company



```

{
"@context": [
  "https://www.w3.org/2018/credentials/v1",
  "https://ref.gs1.org/gs1/vc/license-context/"
],
"id": "did:example:28397f4f-3336-49e3-a035-1b42874ace8b",
"type": [
  "VerifiableCredential",
  "License"
]
}
  
```

```

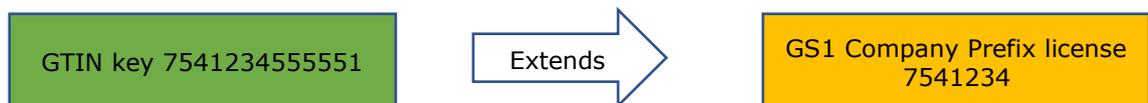
"GS1IdentificationKeyLicenseCredential"
},
"issuer": "did:web:www.gs1ey.org",
"issuanceDate": "2020-11-19T14:56:37Z",
"credentialSubject": {
  "id": "did:web:www.example.ca",
  "organization": {
    "gs1:partyGLN": "7541234000006",
    "gs1:organizationName": "Example Company",
    ...
  },
  "extendsCredential": "https://www.gs1ut.org/vcs/delegated/9521234",
  "licenseValue": "9521234555551",
  "identificationKeyType": "GLN"
},
"credentialStatus": {
  "id": "https://www.gs1ey.org/credential/stat/gln/9521234555551",
  "type": "CredentialStatusList2021"
},
"proof": { ... }
}

```

Attribute	Notes
id	A DID for this credential. The ID isn't resolvable because the credential is sensitive information and only the user company can decide when it's presented.
issuer	Resolvable DID for GS1 Elysium.
expirationDate	The date the license expires. Optional, as the GS1 Member Organization may not want to reveal this information or may simply rely on the credential status check.
credentialSubject	
id	The DID for the user company to whom the GLN has been licensed.
Extends	URI of the delegated GS1 Prefix license that this GLN license extends.
licenseValue	The GLN.
identificationKeyType	GLN.

5.5 Key Credential

5.5.1 GTIN 7541234555551, Issued by Licensee (Brand Owner)



```

{
"@context": [
  "https://www.w3.org/2018/credentials/v1",

```

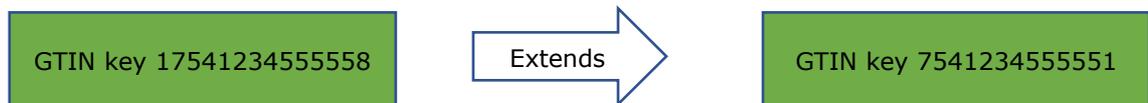
```

    "https://ref.gs1.org/gs1/vc/declaration-context/"
  ],
  "id": "did:example:60cda318-a0a7-4e39-b600-ea38bf68a31f",
  "type": [
    "VerifiableCredential",
    "KeyCredential"
  ],
  "issuer": "did:web:www.example.ca",
  "issuanceDate": "2020-12-02T09:48:11Z",
  "credentialSubject": {
    "id": "https://id.gs1.org/01/07541234555551",
    "extendsCredential": "did:example:b6d13abe-464d-4bb9-a568-b6d81efd57e3"
  },
  "credentialStatus": {
    "id": "https://www.example.com/mycreds/status/60cda318-a0a7-4e39-b600-ea38bf68a31f",
    "type": "CredentialStatusList2021"
  },
  "proof": { ... }
}

```

Attribute	Notes
id	A DID for this credential. The ID isn't resolvable because the credential is sensitive information and only the user company can decide when it's presented.
issuer	The DID for the user company. It is not necessary that the DID be resolvable as the user company may wish to keep it private.
credentialSubject	
id	The GS1 Digital Link URI for the GTIN.
extendsCredential	URI of the GS1 Company Prefix license that this GTIN extends.

5.5.2 GTIN 1754123455558, Issued by Licensee (Brand Owner)



```

{
  "@context": [
    "https://www.w3.org/2018/credentials/v1",
    "https://ref.gs1.org/gs1/vc/declaration-context/"
  ],
  "id": "did:example:5bff56d2-4ec4-4d9d-ba8b-52031fa82fc7",
  "type": [
    "VerifiableCredential",
    "KeyCredential"
  ],
  "issuer": "did:web:www.example.ca",
  "issuanceDate": "2020-12-02T09:48:11Z",

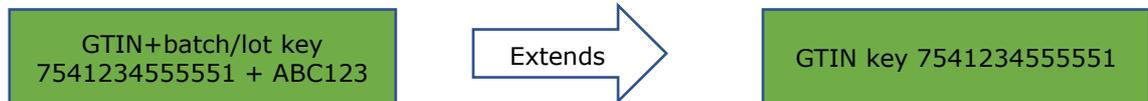
```

```

"credentialSubject": {
  "id": "https://id.gs1.org/01/17541234555558",
  "extendsCredential": "did:example:60cda318-a0a7-4e39-b600-ea38bf68a31f"
},
"credentialStatus": {
  "id": "https://www.example.com/mycreds/status/5bff56d2-4ec4-4d9d-ba8b-52031fa82fc7",
  "type": "CredentialStatusList2021"
},
"proof": {}
}
  
```

Attribute	Notes
id	A DID for this credential. The ID isn't resolvable because the credential is sensitive information and only the user company can decide when it's presented.
issuer	The DID for the user company. It is not necessary that the DID be resolvable as the user company may wish to keep it private.
credentialSubject	
id	The GS1 Digital Link URI for the GTIN.
extendsCredential	URI of the GTIN credential that this credential extends (due to presence of indicator digit).

5.5.3 GTIN 754123455551, Batch/Lot ABC123, Issued by Licensee (Brand Owner)



```

{
"@context": [
  "https://www.w3.org/2018/credentials/v1",
  "https://ref.gs1.org/gs1/vc/declaration-context/"
],
"id": "did:example:f29f3264-0c2b-4fb5-9b48-fb831d5d06ea",
"type": [
  "VerifiableCredential",
  "KeyCredential"
],
"issuer": "did:web:www.example.ca",
"issuanceDate": "2020-12-02T09:48:11Z",
"credentialSubject": {
  "id": "https://id.gs1.org/01/07541234555551/10/ABC123",
  "extendsCredential": "did:example:60cda318-a0a7-4e39-b600-ea38bf68a31f"
},
"credentialStatus": {
  "id": "https://www.example.com/mycreds/status/f29f3264-0c2b-4fb5-9b48-fb831d5d06ea",
  "type": "CredentialStatusList2021"
}
}
  
```

```

},
"proof": { ... }
}

```

Attribute	Notes
id	A DID for this credential. The ID isn't resolvable because the credential is sensitive information and only the user company can decide when it's presented.
issuer	The DID for the user company. It is not necessary that the DID be resolvable as the user company may wish to keep it private.
credentialSubject	
id	The GS1 Digital Link URI for the GTIN plus batch/lot.
extendsCredential	URI of the GTIN credential that this credential extends (due to presence of lot).

5.5.4 GLN 754123400006, Issued by Licensee (Party)



```

{
"@context": [
  "https://www.w3.org/2018/credentials/v1",
  "https://ref.gs1.org/gs1/vc/declaration-context/"
],
"id": "did:example:60cda318-a0a7-4e39-b600-ea38bf68a31f",
"type": [
  "VerifiableCredential",
  "KeyCredential"
],
"issuer": "did:web:www.example.ca",
"issuanceDate": "2020-11-19T14:56:37Z",
"credentialSubject": {
  "id": "https://id.gs1.org/417/7541234000006",
  "extendsCredential": "did:example:b6d13abe-464d-4bb9-a568-b6d81efd57e3"
},
"credentialStatus": {
  "id": "https://www.example.com/mycreds/status/60cda318-a0a7-4e39-b600-ea38bf68a31f",
  "type": "CredentialStatusList2021"
},
"proof": { ... }
}

```

Attribute	Notes
id	A DID for this credential. The ID isn't resolvable because the credential is sensitive information and only the user company can decide when it's presented.
issuer	The DID for the GS1 Member Organization. GS1 Member Organizations are permitted to issue credentials on behalf of their licensees.

Attribute	Notes
credentialSubject	
id	The GS1 Digital Link URI for the GLN.
extendsCredential	URI of the GS1 Company Prefix license that this GTIN extends.

5.6 Data Credential

5.6.1 Product Data for GTIN 754123455551, Issued by Brand Owner



```

{
  "@context": [
    "https://www.w3.org/2018/credentials/v1",
    "https://ref.gs1.org/gs1/vc/declaration-context/",
    "https://ref.gs1.org/gs1/vc/product-context/"
  ],
  "id": "did:example:4e24b35d-de87-49d4-a26b-70490c62ec25",
  "type": [
    "VerifiableCredential",
    "ProductDataCredential"
  ],
  "issuer": "did:web:www.example.ca",
  "issuanceDate": "2020-12-03T03:14:59Z",
  "credentialSubject": {
    "id": "https://id.gs1.org/01/07541234555551",
    "keyAuthorization": "did:example:60cda318-a0a7-4e39-b600-ea38bf68a31f",
    "product": {
      "gs1:brand": {
        "gs1:brandName": "The Best Example"
      },
      "gs1:productDescription": "Never Give Up NRG Drink",
      "gs1:image": {
        "gs1:referencedFileURL": "https://www.example.com/img/7541234555551.png"
      },
      "gs1:gpcCategoryCode": "10000266",
      "gs1:netContent": {
        "gs1:value": "300",
        "gs1:unitCode": "MLT"
      },
      "gs1:targetMarket": {
        "gs1:targetMarketCountries": [
          {
            "gs1:countryCode": "CA"
          }
        ]
      }
    }
  }
}

```

```

    },
    {
      "gs1:countryCode": "US"
    }
  ]
}
},
"credentialStatus": {
  "id": "https://www.example.com/mycreds/status/4e24b35d-de87-49d4-a26b-70490c62ec25",
  "type": "CredentialStatusList2021"
},
"proof": { ... }
}

```

Attribute	Notes
id	The DID for this credential. The ID isn't resolvable because the credential is sensitive information and only the user company can decide when it's presented.
issuer	URI of the licensee.
credentialSubject	
id	GS1 Digital Link URI for the trade item.
keyAuthorization	Reference to the GTIN key credential to which this data applies.
product	Product data.

5.6.2 Organization Data for GLN 7541234000006, Issued by Licensee (Party)



```

{
  "@context": [
    "https://www.w3.org/2018/credentials/v1",
    "https://ref.gs1.org/gs1/vc/declaration-context/",
    "https://ref.gs1.org/gs1/vc/party-context/"
  ],
  "id": "did:example:f16e1ed6-33ec-4e9a-a34d-afcb5ac9af65",
  "type": [
    "VerifiableCredential",
    "OrganizationDataCredential"
  ],
  "issuer": "did:web:www.example.ca",
  "issuanceDate": "2020-11-19T14:56:37Z",
  "credentialSubject": {
    "id": "did:web:www.example.ca",
    "sameAs": "https://id.gs1.org/417/7541234000006",
  }
}

```

```

"keyAuthorization": "did:example:60cda318-a0a7-4e39-b600-ea38bf68a31f",
"organization": {
  "gs1:partyGLN": "7541234000006",
  "gs1:organizationName": "Example Company",
  ...
}
},
"credentialStatus": {
  "id": "https://www.gs1ca.org/credentials/party/status/7541234000006",
  "type": "CredentialStatusList2021"
},
"proof": { ... }
}

```

Attribute	Notes
id	The DID for this credential. The ID isn't resolvable because the credential is sensitive information and only the user company can decide when it's presented.
issuer	URI of the licensor (GS1 Member Organization).
credentialSubject	
id	DID for the party.
sameAs	GS1 Digital Link URI for the party. Required because the ID is not a GS1 Digital Link URI.
keyAuthorization	Reference to the GLN key credential to which this data applies.

5.7 Authorization Credential

5.7.1 Authorization Credential for Planogram, Issued by Brand Owner



```

{
"@context": [
  "https://www.w3.org/2018/credentials/v1",
  "https://ref.gs1.org/gs1/vc/declaration-context/",
  "https://ref.gs1.org/gs1/vc/planogram-context/"
],
"id": "did:example:a60d21a8-485b-4f28-8510-c9b64325bab5",
"type": [
  "VerifiableCredential",
  "DelegationCredential"
],
"issuer": "did:web:www.example.ca",
"issuanceDate": "2020-12-03T03:14:59Z",
"credentialSubject": {
  "id": "did:web:www.egsolutionprovider.ca",

```

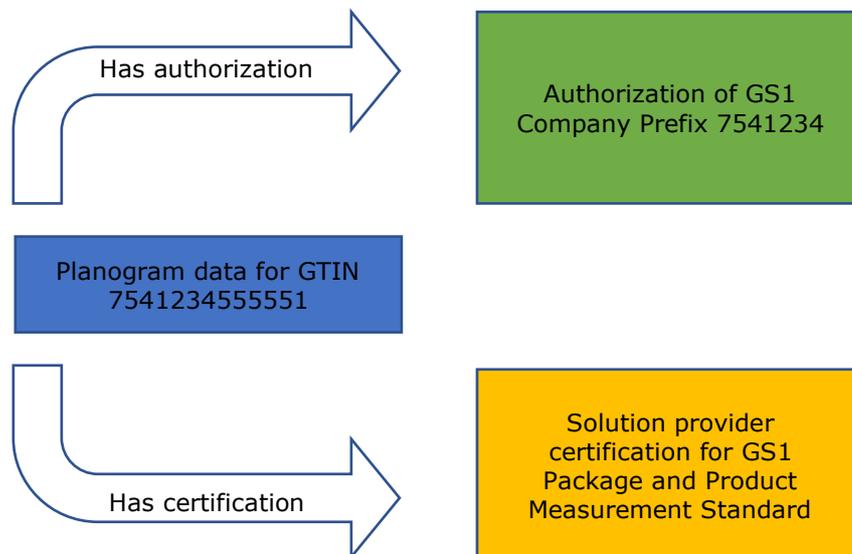
```

"delegation": [
  "did:example:b6d13abe-464d-4bb9-a568-b6d81efd57e3"
],
"dataCredentialType": [
  "PlanogramDataCredential"
]
},
"credentialStatus": {
  "id": "https://www.example.ca/mycreds/status/a60d21a8-485b-4f28-8510-c9b64325bab5",
  "type": "CredentialStatusList2021"
},
"proof": { ... }
}

```

Attribute	Notes
id	The DID for this credential. The ID isn't resolvable because the credential is sensitive information and only the user company can decide when it's presented.
issuer	URI of the licensee.
credentialSubject	
id	URI of the party to which the authority to declare data is delegated.
delegation	Reference to the GS1 Company Prefix license credential that is being delegated. The credential subject is authorized to make planogram declarations for all trade items (the only key type to which planogram data applies), so the identification key type is not necessary.
dataCredentialType	Data credential type for the planogram data set.

5.7.2 Planogram Data for GTIN 754123455551, Issued by Solution Provider



```

{
"@context": [
  "https://www.w3.org/2018/credentials/v1",
  "https://ref.gs1.org/gs1/vc/declaration-context/"
]
}

```

```

    "https://ref.gs1.org/gs1/vc/planogram-context/"
  ],
  "id": "did:example:7b993cf5-379e-470e-9575-6f9fe75ab03b",
  "type": [
    "VerifiableCredential",
    "PlanogramDataCredential"
  ],
  "issuer": "did:web:www.egsolutionprovider.ca",
  "issuanceDate": "2020-12-03T03:14:59Z",
  "credentialSubject": {
    "id": "https://id.gs1.org/01/07541234555551",
    "keyAuthorization": "did:example:a60d21a8-485b-4f28-8510-c9b64325bab5",
    "dataCertification": [
      "https://www.gs1ca.org/credentials/certification/534a928a-704c-41b6-9e47-ae0a756fb79"
    ],
    "inPackageWidth": {
      "gs1:value": "24",
      "gs1:unitCode": "CMT"
    },
    ...
  }
},
"credentialStatus": {
  "id": "https://www.egsolutionprovider.ca/status/7b993cf5-379e-470e-9575-6f9fe75ab03b",
  "type": "CredentialStatusList2021"
},
"proof": { ... }
}

```

Attribute	Notes
id	The DID for this credential. The ID isn't resolvable because the credential is sensitive information and only the user company can decide when it's presented.
issuer	URI of the solution provider.
credentialSubject	
id	GS1 Digital Link URI for the trade item.
keyAuthorization	Reference to the key authorization required to make this declaration. This is the delegation of the GS1 Company Prefix by the brand owner for planogram data.
dataCertification	Reference to the certification issued by GS1 Canada that the solution provider is competent to provide standardized planogram data.