BS ISO 19160-1:2015

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Addressing

Part 1: Conceptual model

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Addressing —

Part 1: Conceptual model

Adressage —

Partie 1: Modèle conceptuel

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Foreword

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

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

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

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

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

The committee responsible for this document is ISO/TC 211, *Geographic information/Geomatics*.

ISO 19160 consists of the following parts, under the general title *Addressing*:

— *Part 1: Conceptual model*

The following parts are under preparation:

— *Part 4: International postal address components and template languages*

The following parts are planned:

— *Part 2: Good practices for address assignment schemes*

— *Part 3: Quality management for address data*

— *Part 5: Address rendering for purposes other than mail*

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Introduction

Addresses are one of the most common ways to unambiguously determine an object for the purposes of identification and location. Addresses vary from country to country. In many Euro-centric countries, reference to a road network in the address is common while addresses in countries, such as Japan and South Korea (though South Korea is moving away from this), comprise a hierarchy of administrative areas without reference to a thoroughfare. In the field of intelligent transport systems, an address can be considered as a simplified location system (as opposed to a coordinate reference system) where points of interest and postcodes are addressing information applicable in car navigation. Addresses are used for a wide variety of purposes: postal delivery, emergency response, customer relationship management, land administration, utility planning and maintenance, to name a few.

There are many stakeholders involved in addressing (activities involving addresses): for assigning addresses (local governments, postal operators, etc.), for using addresses in various ways (customer service providers and electronic business, local and national governments, utility service providers, election commissions, etc.), and for finding the address (citizens, delivery and emergency response service providers, etc.). Relevant stakeholders were identified during the preparatory work of the stage zero project on addressing and are now either involved or aware of the development of ISO 19160 addressing standards.

A variety of address standards and/or specifications are in use around the world. A number of these are described in the report of the preparatory work for this International Standard. These standards and specifications are well integrated into various operational processes and, in some cases, legally enforced. At the same time, some countries are rationalizing their addressing system or creating a new one. Addresses are also increasingly used to reference new geographic objects (e.g. road furniture) while they are also increasingly used in new technology such as in-vehicle navigation. The goal of this International Standard is to facilitate interoperability between existing and future address specifications.

ISO 19112 was included in the investigation of existing standards and specifications during the preparatory work for this International Standard. ISO 19112 deals with geographic identifiers, which indirectly describe position in the real world in the form of a label or code (as opposed to directly or explicitly in the form of coordinates). The review summary concluded that the requirements for addressing standards are sufficiently different to the scope of ISO 19112. If necessary, a profile of this part of ISO 19160 could be developed to map relevant parts of ISO 19112 to this International Standard.

The preparatory work for this International Standard recommended five projects with the following titles:

— *Addressing — Conceptual model*;

— *Addressing — Good practices for address assignment schemes*;

— *Addressing — Quality management for address data*;

— *Addressing — International postal address components and templates*;

— *Addressing — Address rendering for purposes other than mail*.

This part of ISO 19160 implements the first of these recommendations, the conceptual model. It aims to facilitate interoperability between address specifications, for example, in the cross-mapping of conceptual models between different address specifications.

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INTERNATIONAL STANDARD ISO 19160-1:2015(E)

Addressing —

Part 1: Conceptual model

1 Scope

This part of ISO 19160 defines a conceptual model for address information (address model), together with the terms and definitions that describe the concepts in the model. Lifecycle, metadata, and address aliases are included in the conceptual model. The model is presented in the Unified Modeling Language (UML).

The model provides a common representation of address information, independent of actual addressing implementations. It is not intended to replace conceptual models proposed in other specifications, but provides a means to cross-map between different conceptual models for address information and enables the conversion of address information between specifications.

The model provides a basis for developing address specifications by individual countries or communities.

2 Conformance

2.1 General

This part of ISO 19160 defines six classes of requirements and conformance. Annex A specifies how conformance with these classes shall be tested. Refer to Annex B for guidelines on developing a profile conforming to this International Standard.

2.2 Model — Core

Any address model for which core conformance is claimed shall pass all the requirements described in the abstract test suite in A.2.

2.3 Model — Lifecycle

An Address, AddressComponent or AddressableObject class in the address model for which lifecycle conformance is claimed shall pass the requirements described in the abstract test suite in A.3.

2.4 Model — Provenance

An Address or AddressComponent class in the address model for which provenance conformance is claimed shall pass the requirements described in the abstract test suite in A.4.

2.5 Model — Locale

Any Address, AddressComponent or AddressComponentValue class in the address model for which locale conformance is claimed shall pass the requirements described in the abstract test suite in A.5.

2.6 Model — Full conformance

Any address model for which full conformance is claimed shall pass all the requirements described in the abstract test suites specified for the Core, Lifecycle, Provenance and Locale conformance classes.

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2.7 Address profile documentation

Any documentation for which conformance is claimed shall pass the requirements described in the abstract test suite in A.6.

NOTE Refer to Annex C for examples of address models documented in conformance to the address profile documentation conformance class.

3 Normative references

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

ISO 8601, *Data elements and interchange formats — Information interchange — Representation of dates and times*

ISO 19103:2015, *Geographic information — Conceptual schema language*

ISO 19107:2003, *Geographic information — Spatial schema*

ISO 19115-1:2014, *Geographic information — Metadata — Part 1: Fundamentals*

ISO 19135-1: 2015, *Geographic information — Procedures for item registration — Part 1: Fundamentals*

ISO 19152:2012, *Geographic information — Land Administration Domain Model (LADM)*

4 Terms and definitions

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

4.1
address
structured information that allows the unambiguous determination of an object for purposes of identification and location

EXAMPLE 1 Address where the object is a business: *611 Fifth Avenue, New York NY 10022*.

EXAMPLE 2 Address where the object is a building: *Lombardy House, 809 Lombardy Street, The Hills, 0039, South Africa*.

EXAMPLE 3 Address where the object is a land parcel for a building: *San 4–5, Munjae-ro, Songpa-gu, Seoul, 13144, South Korea*.

EXAMPLE 4 Address where the object is a building group, such as a school or large apartment area: *228-dong 404-ho, 26 Kyunghee-daero, Dongdaemun-gu, Seoul 130–701, South Korea*.

Note 1 to entry: The object is identifiable in the real world, i.e. electronic and virtual addresses are excluded.

Note 2 to entry: "Identification" refers to the fact that the structured information in the address unambiguously determines the object, i.e. it helps the human to identify the object. In other words, "identification" here does not refer to unique identifiers in a database or dataset.

Note 3 to entry: There can be many addresses for an object, but at any moment (or lifecycle stage), an address unambiguously determines a single object (see Annex D for examples).

Note 4 to entry: Two addresses from two different *address classes* (4.4) (i.e. they have different sets of components) for the same addressable object are two different addresses (refer to Annex E for more examples).

Note 5 to entry: Two addresses for the same addressable object and from the same address class, but in two different languages are two different addresses (refer to Annex E for more examples).

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Note 6 to entry: In addition to the addressable object, there may be a multitude of people, organizations, addressees or other objects associated with an address. These are external to the address model (refer to Annex C and Annex F for examples).

4.2
addressable object
object that may be assigned an *address* (4.1)

4.3
address alias
one of a set of *addresses* (4.1) unambiguously determining the same *addressable object* (4.2)

4.4
address class
description of a set of *addresses* (4.1) that share the same *address components* (4.5), operations, methods, relationships, and semantics

EXAMPLE 1 "25 Blue Avenue Hatfield 0028" and "384 Green Street Motherville 2093" are from the same address class.

EXAMPLE 2 "PO Box 765 Goodwood 33948" and "PO Box 567 Grayville 98373" are from the same address class.

4.5
address component
constituent part of the *address* (4.1)

Note 1 to entry: An address component may reference another object such as a *spatial object* (4.17) (e.g. an administrative boundary or a land parcel) or a non-spatial object (e.g. an organization or a person).

Note 2 to entry: An address component may have one or more alternative values, e.g. alternatives in different languages or abbreviated alternatives.

4.6
addressing
activities involving *addresses* (4.1)

4.7
address position
position representing the *address* (4.1)

Note 1 to entry: An address may be represented by more than one position, e.g. different entrances to a building.

4.8
address reference system
defined set of *address components* (4.5) and the rules for their combination into *addresses* (4.1)

4.9
child address
address (4.1) defined relative to a *parent address* (4.13)

4.10
child addressable object
addressable object (4.2) that is addressed relative to another addressable object

EXAMPLE 1 An apartment within an apartment building.

EXAMPLE 2 In Japan, a *jukyo bango* (residence number) within a *gaiku* (block).

EXAMPLE 3 A building within a complex of buildings. In Korea, a *dong* (wing or section of a building) within a group of buildings.

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4.11
lineage
provenance (4.16), source(s) and production process(es) used in producing a resource

[SOURCE: ISO 19115-1:2014, 4.9]

4.12
locale
definition of the subset of a user's environment that depends on language and cultural conventions

Note 1 to entry: In computing, a locale is a set of parameters that defines the user's language, country and any special variant preferences that the user wants to see in their user interface. Usually, a locale identifier consists of at least a language identifier and a region identifier.

[SOURCE: ISO/IEC IEEE 9945:2009, 3.211, modified — The notes given in ISO/IEC IEEE 9945:2009 for this entry have been omitted. Note 1 to entry has been added.]

4.13
parent address
address (4.1) of a *parent addressable object* (4.14)

Note 1 to entry: Addresses of the *child addressable objects* (4.9) fully inherit the *address components* (4.5) of a parent address.

4.14
parent addressable object
addressable object (4.2) that fully encloses one or more other addressable objects

EXAMPLE 1 An apartment building with many apartments within.

EXAMPLE 2 In Japan, a *gaiku* (block) with many *jukyo bango* (residence number).

EXAMPLE 3 A complex of many buildings. In Korea, a group of buildings with many *dong* (wings or sections of a building).

4.15
profile
set of one or more base standards or subsets of base standards, and, where applicable, the identification of chosen clauses, classes, options and parameters of those base standards, that are necessary for accomplishing a particular function

[SOURCE: ISO 19106:2004, 4.5]

4.16
provenance
organization or individual that created, accumulated, maintained and used records

Note 1 to entry: Provenance information includes

— the source or origin of the record,

— all changes to the record, and

— all organizations or individuals who have had custody of the record since its creation.

[SOURCE: ISO 5127:2001, 4.1.1.10, modified – Note 1 to entry has been added.]

4.17
spatial object
object used for representing a spatial characteristic of a feature

[SOURCE: ISO 19107:2003, 4.69]

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5 Symbols and abbreviated terms

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

UML Unified Modeling Language

6 Address model

6.1 General

The address model described in this this part of ISO 19160 serves as a tool to develop specific addressing models, such as a model to describe postal addresses or a model for addresses used in a particular city or country. Figures 1 to 3 provide an overview of the address model with increasing levels of detail.

The core of the address model is built on the notion that an address is made up of a set of one or more address components (see Figure 1). An address is structured information that allows the unambiguous determination of an object for the purposes of identification and location. Address component values form the constituent parts of the structured information. In a simple example, a number of address lines make up an address. In a more complex example, an address comprises more than one kind of address component such as a number, a thoroughfare name, a place name, and a postcode. While the structured information in an address allows one to identify and locate an object, the address is not a unique identifier for the object.

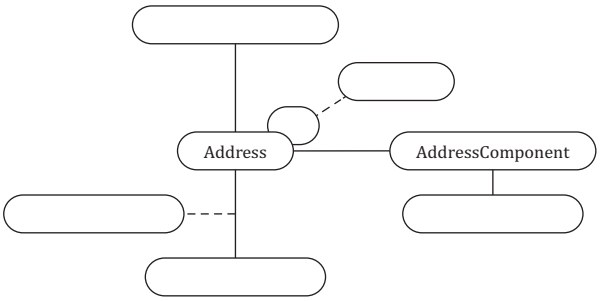

Figure 1 — Schematic overview of the address model showing only the core elements

The value of the address component is a label and sometimes also a reference to another object (ReferenceObject). For example, a place name may reference an object representing the boundary of the place, or an addressee may reference an object with information about the addressee, such as the client name and purchase history. The remaining elements in the address model allow an address to be associated with an object (AddressableObject) such as a building, a dwelling or a land parcel, and with metadata (AddressAlias, AddressedPeriod, AddressSpecifications). See Figure 2.

If more than one address unambiguously determines the same object, the addresses are referred to as address aliases. A typical example is a building on the corner of two streets with an entrance from each street and an address for each entrance. Other examples include colloquial variations of an address or addresses in multiple languages.

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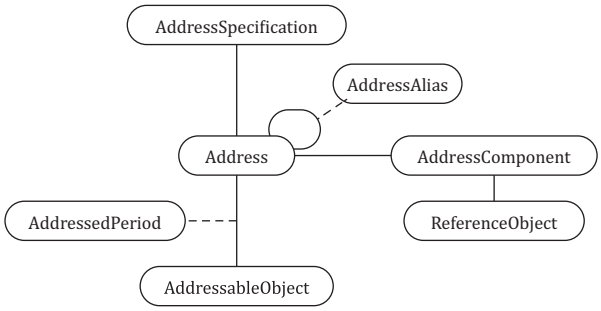

Figure 2 — Schematic overview of the address model showing all elements

Occasionally, an already established address is reassigned to a different object, e.g. in the case of sub-divisions or the construction of additional buildings on single premises. If necessary, AddressedPeriod allows for the representation of different periods during which an address was associated with a specific addressable object.

If applicable and available, metadata about the specification or document describing the address reference system (i.e. rules for combining address components into addresses) and/or addresses represented in the model is provided in the AddressSpecification class.

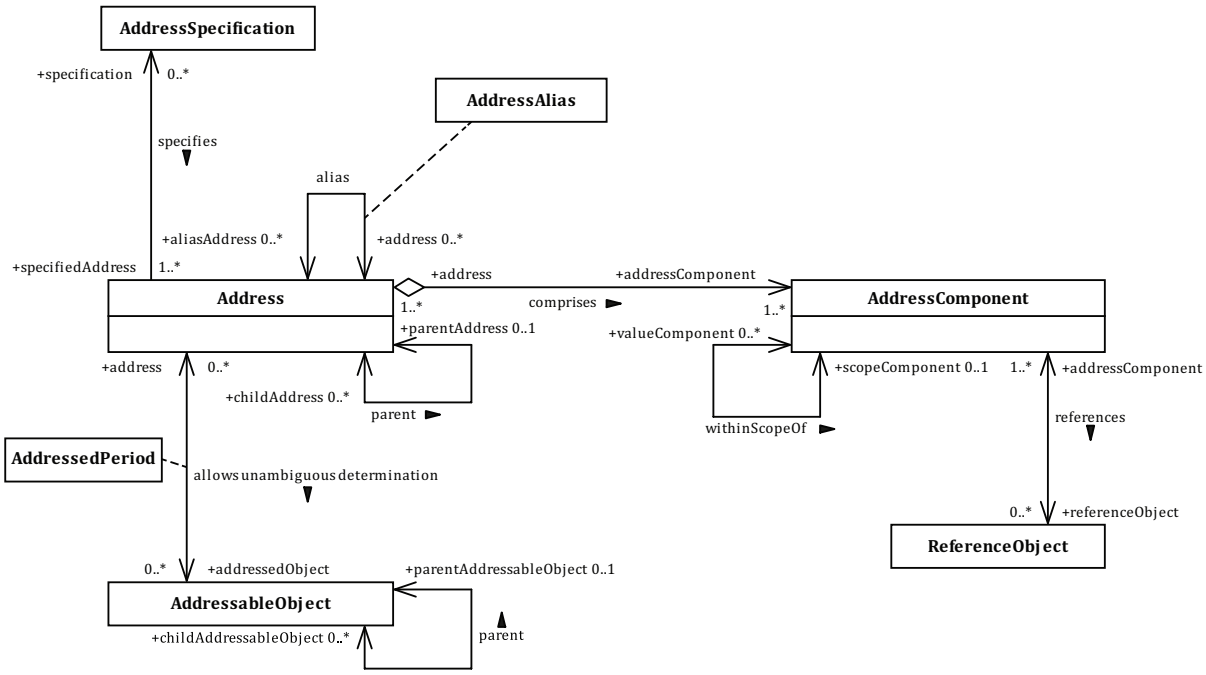

Figure 3 — Address model overview in UML

An address may have coordinates to specify its position. If an address is assigned to an object, the position of the address may be inferred from the addressed object. These are two very different ways of representing the position of an address, and it is, therefore, important that any address model conforming to this part of ISO 19160 clearly specifies how the position of an address is represented in the model.

Finally, an addressable object may have parent-child relationships with other addressable objects, e.g. a building is the parent addressable object of the apartments or offices within. An address may also have parent-child relationships with other addresses, e.g. the address of a building may be the parent address of the addresses for the apartments or offices within (see Figure 3).

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6.2 Diagrams

Figure 4 provides an overview of the address model in UML.

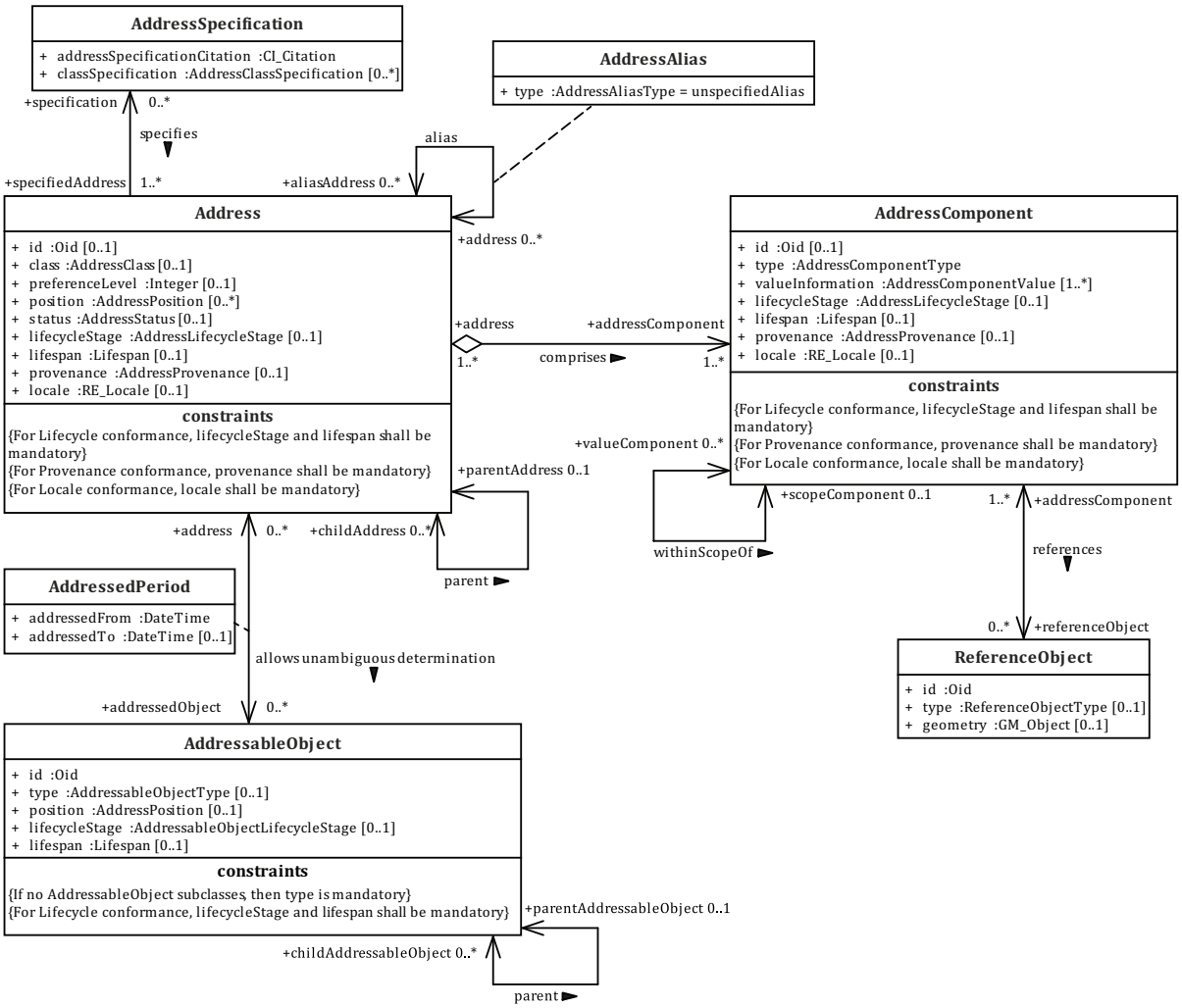

Figure 4 — Address model

Figure 5 shows the core types defined in the address model.

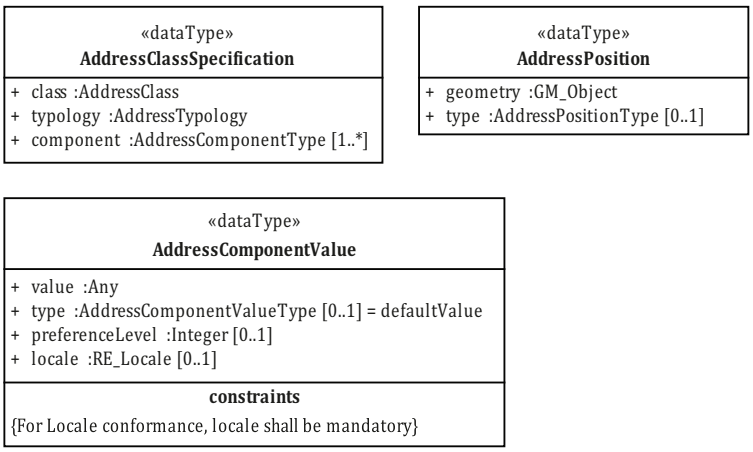

Figure 5 — Core types in the address model

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Figure 6 shows the core codelists defined in the address model.

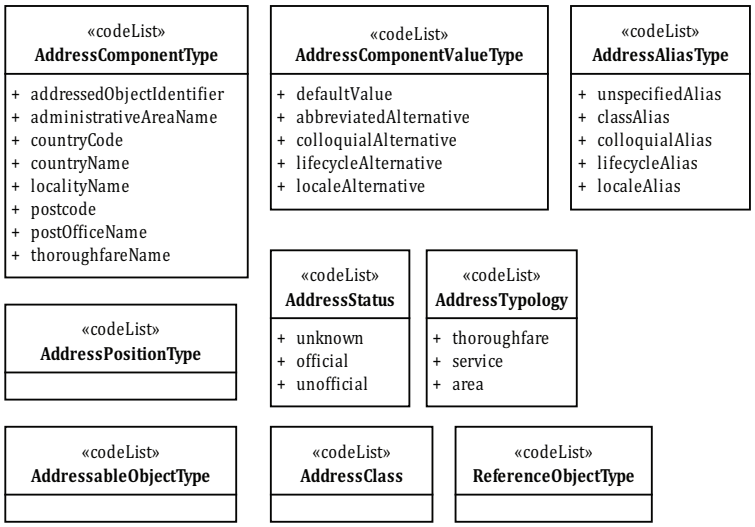

Figure 6 — Core codelists in the address model

NOTE There are too many possible values with little known overlap for the codelists AddressableObjectType, AddressClass, AddressPositionType and ReferenceObjectType. Therefore, these codelists are empty. Each address model has to specify codes, as required (see Annex C for possible codelist values in the sample profiles).

EXAMPLE 1 building, house, landParcel, landmark, apartment and complexOfBuildings are examples of codes for the AddressableObjectType codelist.

EXAMPLE 2 thoroughfareAddress, landmarkAddress and informalAddress are examples of codes for the AddressClass codelist.

EXAMPLE 3 centroid, streetFront and approximated are examples of codes for the AddressPositionType codelist.

EXAMPLE 4 street, administrativeArea, individual and organization are examples of codes for the ReferenceObjectType codelist.

Figure 7 shows the types and codelists in the address model related to lifecycle information.

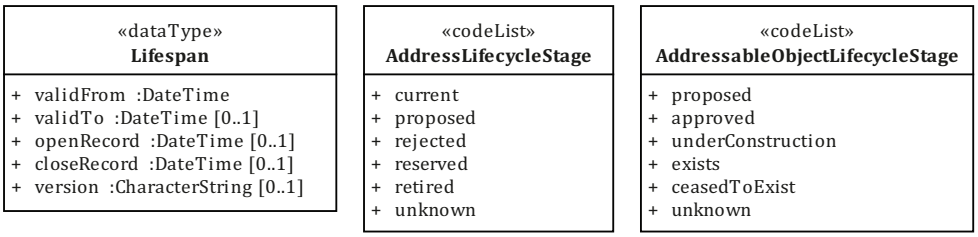

Figure 7 — Types and codelists in the address model for lifecycle information

Figure 8 shows the single type in the address model related to provenance information.

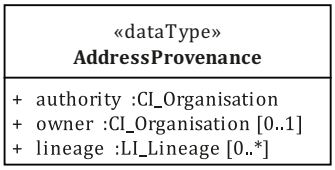

Figure 8 — Type in the address model for provenance information

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6.3 Classes

6.3.1 General

The definitions of classes and their attributes are provided in 6.3.2. The name, definition, obligation or condition, maximum occurrence, data type, and domain of each attribute are provided. Some attribute domains are specified with a reference to a UML element, such as a datatype or codelist, in another International Standard. These UML elements can be found in the ISO/TC 211 Harmonized Model at www.isotc211.org.

6.3.2 Address

The Address class represents structured information that allows unambiguous determination of an object for the purposes of identification and location. It consists of a non-empty set of AddressComponents.

EXAMPLE An address such as "99 Lombardy Street, The Hills, 0039" consists of address number (99), thoroughfare name (Lombardy Street), place name (The Hills) and postcode (0039) components.

The attributes of the Address class are defined in Table 1.

Table 1 — Address attributes

Name	Definition	Mandatory/ conditional/ optional	Max occur	Data type	Domain
id	Unique character string that identifies the address.	O	1	Class	<<datatype>> Oid, see ISO 19152
	NOTE id is a unique object identifier; not a primary key in a relational database.				
class	Code that specifies the address class to which the address belongs.	O	1	Class	<<codelist>> AddressClass
preferenceLevel	Indicates the ranking of the address in a set of address aliases. 1 indicates highest ranking.	O	1	Integer	<<interface>> Integer > 0
	EXAMPLE 1 A building on a street corner could be referenced by two addresses. One of them could have its preferenceLevel set to 1. EXAMPLE 2 In Switzerland, addresses containing German and French names, e.g. Biel (German) and Bienne (French), are different addresses with the same preference level.				
position	Geometry (coordinates) that represents the address location.	O	N	Class	<<dataType>> AddressPosition
	NOTE Good practice is to represent a generic position of the address (e.g. door, driveway, centroid) as opposed to a domain or purpose specific position, such as the emergency access or utility meter. Positions of the latter can be represented in a position attribute of an external class associated with the address or addressable object (see example in Figure C.22).				
status	Code that specifies the nature of the address assignment.	O	1	Class	<<codelist>> AddressStatus

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Table 1 *(continued)*

Name	Definition	Mandatory/ conditional/ optional	Max occur	Data type	Domain
lifecycleStage	Code that specifies the phase an address has reached in its lifecycle.	O	1	Class	<<codelist>> AddressLifecycle-Stage
	NOTE See Annex D for lifecycle examples of an address.				
lifespan	Information about the period over which an address exists.	O	1	Class	<<dataType>> Lifespan
	NOTE See Annex D for lifespan examples of an address.				
provenance	Information about the source or origin of the address such as the authority who assigned the address, the owner of the address data instance, and lineage of the address.	O	1	Class	<<dataType>> AddressProvenance
locale	A set or parameters that specify the cultural and linguistic environment.	O	1	Class	<<interface>> RE_Locale, see ISO 19135-1
addressedObject	An object that is unambiguously determined by the address.	O	N	Class	AddressableObject
	NOTE There is a single addressedObject at any given point in time.				
addressComponent	A component that is a constituent part of the address.	M	N	Class	AddressComponent
parentAddress	The address of an object that fully encloses the addressedObject.	O	1	Class	Address
childAddress	The address of an object that is fully enclosed by the addressedObject.	O	N	Class	Address
aliasAddress	An address that unambiguously determines the same addressable object as the address.	O	N	Class	Address
specification	A specification of the address and its constituent parts.	o	N	Class	AddressSpecifica-tion

6.3.3 AddressComponent

An AddressComponent is a constituent part of an address. A non-empty set of AddressComponents makes up an address.

EXAMPLE "The Hills" is a constituent part of the address "99 Lombardy Street, The Hills, 0039"

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The attributes of the AddressComponent class are defined in Table 2.

Table 2 — AddressComponent attributes

Name	Definition	Mandatory/ conditional/ optional	Max occur	Data type	Domain
id	Unique character string that identifies the address component.	O	1	Class	<<datatype>> Oid, see ISO 19152
	NOTE id is a unique object identifier; not a primary key in a relational database.				
type	Code that specifies the kind of address component.	M	1	Class	<<codelist>> AddressComponentType
	EXAMPLES Thoroughfare name, locality name, country name.				
valueInformation	Value of and information about one or more address component values.	M	N	Class	<<dataType>> AddressComponentValue
lifecycleStage	Code that specifies the phase an address component has reached in its lifecycle.	O	1	Class	<<codelist>> AddressLifecycleStage
	NOTE See Annex D for lifecycle examples of an address component.				
lifespan	Information about the period over which an address component exists.	O	1	Class	<<dataType>> Lifespan
	NOTE See Annex D for lifespan examples of an address component.				
provenance	Information about the source or origin of the address component such as the authority who assigned the address component value, the owner of the address component data instance, and the lineage of the address component.	O	1	Class	<<dataType>> AddressProvenance
locale	A set of parameters that specify the cultural and linguistic environment.	O	1	Class	<<interface>> RE_Locale, see ISO 19135-1
address	An address of which the address component is a constituent part.	M	N	Class	Address
referenceObject	The feature or non-spatial object to which the address component value refers.	O	N	Class	ReferenceObject
	EXAMPLE 1 A person or organization may be the referenceObject for an addressee. EXAMPLE 2 The place name boundary may be the referenceObject for a place name. EXAMPLE 3 A number of street centreline segments may be the referenceObjects for a thoroughfare name.				

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Table 2 *(continued)*

Name	Definition	Mandatory/ conditional/ optional	Max occur	Data type	Domain
scopeComponent	Identifies the superordinate address component.	O	1	Class	AddressComponent
	NOTE "within scope of" refers to the relationship between a superordinate address component and a subordinate address component in an address reference system. EXAMPLE 1 Thoroughfare names could be within scope of a place name. If thoroughfare names are unique within a place name, the place name is the scopeComponent of the thoroughfare name. EXAMPLE 2 Building names could be within scope of a thoroughfare name. If building names along a thoroughfare are unique, the thoroughfare name is the scopeComponent of the building name. EXAMPLE 3 Box numbers could be within scope of a post office. If each box number at a post office is unique, the post office is the scopeComponent of the box number.				
valueComponent	Identifies the subordinate address component	O	N	Class	AddressComponent
	NOTE "within scope of" refers to the relationship between a superordinate address component and a subordinate address component in an address reference system. EXAMPLE 1 Thoroughfare names could be within scope of a place name. If thoroughfare names are unique within a place name, the thoroughfare name is a valueComponent of the place name. EXAMPLE 2 Building names could be within scope of a thoroughfare name. If building names are unique along a thoroughfare name, the building name is a valueComponent of the thoroughfare name. EXAMPLE 3 Box numbers could be within scope of a post office. If each box number at a post office is unique, the box number is a valueComponent of the post office.				

6.3.4 AddressableObject

The Address allows unambiguous determination of an AddressableObject, i.e. an object that may be identified or located by an Address.

EXAMPLE 1 The following address allows the unambiguous determination of a person's residence: *99 Lombardy Street, The Hills, 0039, South Africa.*

EXAMPLE 2 The following address allows the unambiguous determination of a building: *Lombardy House, 809 Lombardy Street, The Hills, 0039, South Africa.*

EXAMPLE 3 The following address allows the unambiguous determination of a door (apartment) in a building: *Room 4–6, Lombardy House, 809 Lombardy Street, The Hills, 0039, South Africa.*

The attributes of the AddressableObject class are defined in Table 3.

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Table 3 — AddressableObject attributes

Name	Definition	Mandatory/ conditional/ optional	Max occur	Data type	Domain
id	Unique character string that identifies the addressable object.	M	1	Class	<<datatype>> Oid, see ISO 19152
	NOTE id is a unique object identifier; not a primary key in a relational database.				
type	Code that specifies the kind of object to which an address may be assigned.	C: Only if there are no subclasses of AddressableObject	1	Class	<<codelist>> AddressableObjectType
	EXAMPLES A person's residence, a building, a door (apartment) in a building.				
position	Geometry (coordinates) representing the addressable object.	O	1	Class	<<dataType>> AddressPosition
	NOTE Good practice is to represent a generic position of the addressable object (e.g. door, driveway, centroid), as opposed to a domain or purpose specific position such as the position of an emergency access or utility meter. Positions of the latter can be represented in a position attribute of an external class associated with the address or addressable object (see Example in C.4).				
lifecycleStage	Code that specifies the phase an addressable object has reached in its lifecycle.	O	1	Class	<<codelist>> AddressableObjectLifecycleStage
	NOTE See Annex D for lifecycle examples of an addressable object.				
lifespan	Information about the period over which an addressable object exists.	O	1	Class	<<type>> Lifespan
	NOTE See Annex D for lifespan examples of an addressable object.				
address	The address that unambiguously determines the addressable object.	O	N	Class	Address
parentAddressableObject	An addressable object that fully encloses the addressable object.	O	1	Class	AddressableObject
childAddressableObject	An addressable object that is fully enclosed by the addressable object.	O	N	Class	AddressableObject

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