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Utilities – Operations and Maintenance conceptual schema

Feature Catalogue

Catalogue containing definitions and descriptions of the spatial object types and their relations, and accompanying codelists and enumerations as depicted in the *Operations and Maintenance conceptual schema*

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1.0	27-07-2018	Ramon ter Huurne	All	The first complete version of the document

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Foreword

This document contains the feature catalogue belonging to the Operations and Maintenance conceptual schema. This feature catalogue clarifies the spatial object types included in the UML (Unified Modelling Language) class models through definitions and descriptions, and by their accompanying codelist and enumerations. The feature catalogue provides guidance when reading the UML class models of the Operations and Maintenance conceptual schema.

To fully comprehend and understand the Operations and Maintenance conceptual schema this document should be used alongside the 'Operations and Maintenance – Data Specification' (OM_Data_Specification.pdf). In addition to the feature catalogue, the documentation of the Operations and Maintenance conceptual schema exists of the following:

[1.] Operations and Maintenance – Data Specification version 4.1
  - OM_Data_Specification.pdf

[2.] Operations and Maintenance – Overview of class models in UML version 4.1
  - OM_UML_Overview.pdf

Altogether the (1) data specification, (2) feature catalogue, and (3) overview of UML class models form the complete documentation of the Operations and Maintenance conceptual schema. Of these three, the data specification is the main document, supported by the feature catalogue. If one only requires the sole class models, the 'Operations and Maintenance – Overview of class models in UML' can be consulted. All documentation can be retrieved from the following online repository:

https://github.com/RamonTerHuurne/UtilityNetwork-OperationsAndMaintenance

The Operations and Maintenance conceptual schema is developed as part of the ReDUCE (Reduction of Damage to Utilities & Careful Excavation) programme, hosted by the University of Twente (Enschede, the Netherlands). In the context of the ReDUCE programme, the Operations and Maintenance conceptual schema not only covers reduction of damages to utilities and careful excavation, but also extends towards the domain of operations and maintenance. The Operations and Maintenance conceptual schema is developed with support of the developers of the internationally recognized CityGML UtilityNetwork ADE. As a result, the schema builds upon the CityGML UtilityNetwork ADE conceptual schema and adds those concepts and relations relevant for the domain of operations and maintenance.

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1 Introduction

This document contains the feature catalogue belonging to the Operations and Maintenance conceptual schema. The feature catalogue clarifies the spatial object types, and accompanying codelists and enumerations for each of the eight UML (Unified Modelling Language) class models of the Operations and Maintenance conceptual schema. These eight UML class models are:

[1.] Core and geometry
[2.] Functional characteristics
[3.] Network properties
[4.] Network components
[5.] Component properties
[6.] Maintenance and operations properties
[7.] Performance properties
[8.] Hollow space

Aim of this document is to clarify the spatial object types and their relations covered within the eight class models, through definitions and descriptions, and by their accompanying codelists and enumerations. The feature catalogue provides guidance when reading the UML class models.

This document should be used alongside the 'Operations and Maintenance – Data Specification' (OM_Data_Specification.pdf). The data specification contains all eight class models and their description, as well as an explanation of modelling in UML, an overview of used terms, definitions and abbreviations, information on applied reference systems, and information about the online repository. If one only requires the sole class models, one is referred to the 'Operations and Maintenance – Overview of class models in UML' (OM_UML_Overview.pdf).

This document is structured in two chapters of which this being the first. Chapter 2 includes the feature catalogue belonging to the eight UML class models. For each of the class models a separate section defines and clarifies the models' spatial object types. Each of the sections follow an identical structure. First the feature catalogue is presented, defining the applied spatial object types and their stereotype. Second, the spatial object types, covering the applied feature- and data types, are clarified. For each of these spatial object types a definition and description is provided, as well as their accompanying attributes and association roles. Third and last, the codelists and enumerations are clarified. For each of these codelists and enumerations their definition, extensibility, and values are provided.

After chapter 2, the report includes an index. In this index, all spatial object types, codelist and enumerations are found in an alphabetic order, together with the page numbers where these can be found in the document.

2 Feature catalogue

This chapter provides the feature catalogue and accompanying spatial objects types, and codelists and enumerations. The sections in this chapter follow the ordering of the class models as presented in the 'Operations and Maintenance – Data Specification' (OM_Data_Specification.pdf) and chapter 1 of this report. Within a single section, all is documented in an alphabetic order.

For all spatial object types this chapter follows a specific reporting style. Table 1 presents the reporting style for the spatial object types in this document.

Table 1 – Reporting style adopted for spatial object types

Name	
Name	*Name of spatial object type*
Definition	*Definition of spatial object type*
Description	*Additional description of spatial object type*
Stereotype	*Stereotype of spatial object types (for example FeatureType)*
Attribute:	
Name	*Name of attribute*
Value type	*Value type of attribute (for example boolean)*
Definition	*Definition of attribute*
Multiplicity	*Multiplicity of attribute (for example 0...1)*
Association role:	
Name	*Name of association role*
Class	*Associated class*
Definition	*Definition of association role*
Multiplicity	*Multiplicity of association role (for example 0...1)*

For all codelists and enumerations this chapter follows a specific reporting style. Table 2 presents the reporting style for the codelist and enumerations in this document.

Table 2 – Reporting style adopted for codelists or enumerations

Name	
Name	*Name of codelist or enumeration*
Definition	*Definition of codelist or enumeration*
Description	*Additional description for codelist or enumeration*
Extensibility	*Extensibility of codelist or enumeration by the user*
Stereotype	*<< Codelist >> or << Enumeration >>*
Values	*Values within codelist or enumeration*

The tables clarifying the spatial object types, codelist and enumerations have the same colour as their corresponding UML class. Three colours are distinguished, each describing whether the class is copied from CityGML UtilityNetwork ADE, copied with alterations from CityGML UtilityNetwork ADE, or newly added to CityGML UtilityNetwork ADE:

- Purple : copied from CityGML UtilityNetwork ADE version 0.9.2
- Orange : copied with alterations from CityGML UtilityNetwork ADE version 0.9.2
- White : newly added CityGML UtilityNetwork ADE version 0.9.2

Alterations to the CityGML UtilityNetwork ADE classes include changes in the naming of the classes and attributes, the addition of new attributes, and the removal of existing attributes. Developers of the Operations and Maintenance conceptual schema made these alterations to better fit the classes to the domain of operations and maintenance of utilities.

2.1 Core and geometry

2.1.1 Feature catalogue

Type	Stereotypes
AbstractLink	<< FeatureType >>
AbstractLinkControl	<< DataType >>
AbstractNetworkFeature	<< FeatureType >>
AbstractSignature	<< DataType >>
CityGML_Core:: AbstractCityObject	<< FeatureType >>
Depth	<< DataType >>
DepthAccuracyLevel	<< Codelist >>
DepthPointOfMeasurement	<< Codelist >>
DepthReferenceLevel	<< Codelist >>
FeatureGraph	<< FeatureType >>
FunctionValue	<< Codelist >>
Geometric primitive:: GM_Curve	<< DataType >>
Geometric primitive:: GM_Point	<< DataType >>
Geometric primitive:: GM_Solid	<< DataType >>
Geometric primitive:: GM_Surface	<< DataType >>
InterFeatureLink	<< FeatureType >>
InterFeatureLinkValue	<< Enumeration >>
InteriorFeatureLink	<< FeatureType >>
LocationAccuracyValue	<< Codelist >>
Network	<< FeatureType >>
NetworkClassValue	<< Enumeration >>
NetworkFunction	<< Enumeration >>
NetworkGraph	<< FeatureType >>
NetworkLink	<< FeatureType >>
NetworkUsage	<< Enumeration >>
Node	<< FeatureType >>
NodeValue	<< Enumeration >>
RelativeToTerrainType	<< Enumeration >>
SpatialQualityValue	<< Enumeration >>
StatusValue	<< Enumeration >>

2.1.2 Spatial object types

AbstractLink	
Name	Abstract link
Definition	An abstract utility network class that groups common types of linkages used to graphically model the utility network.

	-
Description	<< FeatureType >>
Stereotype	
Attribute: direction	
Name	Direction
Value type	Sign
Definition	Indication whether the direction is signalled or not.
Multiplicity	0...1
Attribute: linkControl	
Name	Link control
Value type	AbstractLinkControl
Definition	Identification of a link.
Multiplicity	0...1
Association role: start	
Name	Start
Value type	Node
Definition	Node at start of AbstractLink.
Multiplicity	1
Association role: end	
Name	End
Value type	Node
Definition	Node at end of AbstractLink.
Multiplicity	1
Association role: realization	
Name	Realization
Value type	GM_Curve
Definition	Realization of curve geometry through linkages.
Multiplicity	0...1

AbstractLinkControl	
Name	Abstract link control
Definition	Identification of a link.
Description	-
Stereotype	<< DataType >>

AbstractNetworkFeature	
Name	Abstract network feature
Definition	An abstract utility network class that groups utility network features within a utility network.
Description	The 'AbstractNetworkFeature' refers to all those classes being part of a utility network. Every class in the utility network provides some function of interest to the network.
Stereotype	<< FeatureType >>
Attribute: function	
Name	Function
Value type	FunctionValue
Definition	The intended function of the network feature.
Multiplicity	0...1

Attribute: usage	
Name	Function
Value type	FunctionValue
Definition	The actual usage of the network feature.
Multiplicity	0...*
Attribute: connectedCityObject	
Name	Connected city object
Value type	URI
Definition	Unified identifier for the connected city object.
Multiplicity	0...1
Attribute: identifier	
Name	Identifier
Value type	URI
Definition	Unified identifier for the network feature.
Multiplicity	0...1
Attribute: relativeToTerrain	
Name	Relative to terrain
Value type	RelativeToTerrainType
Definition	Qualitative position of the network feature relative to the terrain.
Multiplicity	0...1
Attribute: status	
Name	Status
Value type	StatusValue
Definition	Status of the network feature.
Multiplicity	0...1
Attribute: locationQuality	
Name	Location quality
Value type	SpatialQualityValue
Definition	Qualitative accuracy of the location (x and y coordinates).
Multiplicity	0...1
Attribute: locationAccuracy	
Name	Location accuracy
Value type	LocationAccuracyValue
Definition	Quantitative accuracy of the location (x and y coordinates).
Multiplicity	0...1
Attribute: elevationQuality	
Name	Elevation quality
Value type	SpatialQualityValue
Definition	Qualitative quality of the elevation.
Multiplicity	0...1
Attribute: standardDepth	
Name	Standard depth
Value type	Measure
Definition	Quantitative standard measure of relative depth for a particular component or discipline as a whole.
Multiplicity	0...1
Association role: topoGraph	
Name	Topo graph

Value type	FeatureGraph
Definition	Topograph of component.
Multiplicity	0...1
Association role: depthLevel	
Name	Depth level
Value type	Depth
Definition	Depth of component.
Multiplicity	0...*
Association role: consistOf	
Name	Consist of
Value type	AbstractNetworkFeature
Definition	Component may consist of component(s) itself.
Multiplicity	0...*

AbstractSignature	
Name	Abstract signature
Definition	Identification of node.
Description	-
Stereotype	<< DataType >>

Depth	
Name	Depth
Definition	Relative depth level of utility components measured perpendicular against a certain depth reference level from the top of the component.
Description	-
Stereotype	<< DataType >>
Attribute: depthLevel	
Name	Depth level
Value type	Measure
Definition	Quantitative level of depth.
Multiplicity	0...1
Attribute: dateMeasurementDepth	
Name	Date measurement of depth
Value type	Date
Definition	Date of depth measurement.
Multiplicity	0...1
Attribute: pointOfMeasurement	
Name	Point of measurement
Value type	DepthPointOfMeasurement
Definition	Point of depth measurement on the component.
Multiplicity	0...1
Attribute: depthReference	
Name	Depth reference
Value type	DepthReferenceLevel
Definition	Type of depth reference level.
Multiplicity	0...1
Attribute: depthQuality	
Name	Depth quality

Value type	SpatialQualityValue
Definition	Qualitative quality of depth.
Multiplicity	0...1
Attribute: depthAccuracy	
Name	Depth accuracy
Value type	DepthAccuracyValue
Definition	Quantitative accuracy of depth.
Multiplicity	0...1
Attribute: location	
Name	Location
Value type	GM_Point
Definition	Location of depth measurement in x and y coordinates.
Multiplicity	0...1
Attribute: angleOfRotation	
Name	Angle of rotation
Value type	Measure
Definition	Indication whether the object is laid under an angle of rotation.
Multiplicity	0...1

CityGML_Core:: AbstractCityObject	
Name	CityGML_Core:: AbstractCityObject
Definition	Abstraction of a city object.
Description	The class model shows a direct relation of the Operations and Maintenance conceptual schema with the CityGML standard. The CityGML core abstract city object is the basis for city modelling.
Stereotype	<< FeatureType >>

FeatureGraph	
Name	Feature graph
Definition	Separate graph structure for every utility feature.
Description	A feature graph always consist of nodes and links and does describe a single network feature. The feature graph provides the graph representation for the network feature.
Stereotype	<< FeatureType >>
Association role: linkMember	
Name	LinkMember
Value type	InteriorFeatureLink
Definition	Feature graph consists of zero to many interior feature links.
Multiplicity	0...*
Association role: networkLink-Member	
Name	Network link member
Value type	NetworkLink
Definition	Feature graph has zero to many network links.
Multiplicity	0...*
Association role: nodeMember	
Name	Node member
Value type	Node

Definition	Feature graph consist of one to many nodes.
Multiplicity	1...*

Geometric primitive:: GM_Curve	
Name	Geometry curve
Definition	See ISO 19107:2003 Spatial Schema.
Description	-
Stereotype	<< type >>
Association role: surfaceMember	
Name	Surface member
Value type	GM_Surface
Definition	Curve as member of a surface.
Multiplicity	0...1

Geometric primitive:: GM_Point	
Name	Geometry point
Definition	See ISO 19107:2003 Spatial Schema.
Description	-
Stereotype	<< type >>

Geometric primitive:: GM_Solid	
Name	Geometry solid
Definition	See ISO 19107:2003 Spatial Schema.
Description	-
Stereotype	<< type >>
Association role: exterior	
Name	Exterior
Value type	GM_Surface
Definition	Solid has an exterior surface.
Multiplicity	1
Association role: interior	
Name	Interior
Value type	GM_Surface
Definition	Solid has zero to many interior surface(s).
Multiplicity	0...*

Geometric primitive:: GM_Surface	
Name	Geometry surface
Definition	See ISO 19107:2003 Spatial Schema.
Description	-
Stereotype	<< type >>

InterFeatureLink	
Name	Inter feature link
Definition	Line-like object to connect exterior nodes between network features.
Description	Connecting network features allows linkage of network features with each other. This leads to the creation of a network graph.

Stereotype	<< FeatureType >>
Attribute: type	
Name	Type
Value type	InteriorFeatureLinkValue
Definition	The type of an interior feature link.
Multiplicity	0...1

InteriorFeatureLink	
Name	Interior feature link
Definition	Line-like object to connect exterior nodes with interior nodes of a single network feature.
Description	Interior feature links graphically represent the linkages of exterior nodes with the interior node of a single feature. Nodes connected through interior feature links create feature graphs.
Stereotype	<< FeatureType >>

Network	
Name	Network
Definition	A collection of network features belonging to a single transported commodity.
Description	Networks may contain sub- and superordinate networks expressed by the two self-associations. Network hierarchies therefore can be easily represented.
Stereotype	<< FeatureType >>
Attribute: class	
Name	Class
Value type	NetworkClassValue
Definition	The type of a network.
Multiplicity	0...1
Attribute: function	
Name	Function
Value type	NetworkFunction
Definition	The intended function of the network.
Multiplicity	0...1
Attribute: usage	
Name	Usage
Value type	NetworkFunction
Definition	The actual usage of the network.
Multiplicity	0...1
Association role: subNetwork	
Name	Sub-network
Value type	Network
Definition	Network is part of a network itself.
Multiplicity	0...*
Association role: subOrdinate-Network	
Name	Sub-ordinate network

Value type	Network
Definition	Network has a sub-ordinate network.
Multiplicity	0...*
Association role: superOrdinate-Network	
Name	Super-ordinate network
Value type	Network
Definition	Network has a super-ordinate network.
Multiplicity	0...*
Association role: component	
Name	Component
Value type	AbstractNetworkFeature
Definition	Network has zero to many components.
Multiplicity	0...*

NetworkGraph	
Name	Network graph
Definition	Graph representing a utility network through a collection of abstract network features.
Description	Network features represented through feature graphs are collection in a network graph. This collection together forms the network graph delivering the graph representation for the network.
Stereotype	<< FeatureType >>
Association role: linkMember	
Name	Link member
Value type	InterFeatureLink
Definition	Network graph consist of zero to many inter feature links.
Multiplicity	0...*

NetworkLink	
Name	Network link
Definition	Linkage allowing linking of a feature graph to multiple networks.
Description	-
Stereotype	<< FeatureType >>

Node	
Name	Node
Definition	Point-like object used for connectivity.
Description	Nodes are found at both ends of an 'AbstractLink'.
Stereotype	<< FeatureType >>
Attribute: type	
Name	Type
Value type	NodeValue
Definition	Type of node.
Multiplicity	0...1
Attribute: connectionSignature	
Name	Connection signature
Value type	AbstractSignature

Definition	Identification of node.
Multiplicity	0...1
Attribute: linkControl	
Name	Link control
Value type	AbstractLinkControl
Definition	Identification of a link.
Multiplicity	0...1
Association role: realization	
Name	Realization
Value type	GM_Point
Definition	Realization of point geometry through nodes.
Multiplicity	0...1

2.1.3 Codelists and enumerations

DepthAccuracyLevel	
Name	Depth accuracy level
Definition	Classification of depth accuracy level.
Description	-
Extensibility	Open
Stereotype	<< Codelist >>
Values	'unknown', '30 cm', '50 cm', '100 cm'

DepthPointOfMeasurement	
Name	Depth point of measurement
Definition	Classification of depth point of measurement.
Description	-
Extensibility	Open
Stereotype	<< Codelist >>
Values	'unknown', 'top', 'center', 'bottom', 'other'

DepthReferenceLevel	
Name	Depth reference level
Definition	Classification of depth reference level.
Description	-
Extensibility	Open
Stereotype	<< Codelist >>
Values	'unknown', 'groundLevel', 'seaLevel', 'other'

FunctionValue	
Name	Function value
Definition	Classification of function values.
Description	-
Extensibility	Open
Stereotype	<< Codelist >>
Values	'unknown', 'abstraction', 'branch', 'control', 'distribution', 'draining', 'feeding', 'measurement', 'observer', 'protection', 'shortCircuit', 'shutOff', 'storage', 'venting', 'other'

InterFeatureLinkValue	
Name	Inter feature link value
Definition	Classification of inter feature link values.
Description	Inter-feature links can either have the value 'connects' or 'contains'. Connects refers to a network feature which exists of both interior and exterior nodes. Therefore, multiple inter feature links connect the network feature together. Contains refers to a network feature which only exist of two exterior nodes. Therefore, the single inter feature link contains all links within the network feature.
Extensibility	Closed
Stereotype	<< Enumeration >>
Values	'connects', 'contains'

LocationAccuracyValue	
Name	Location accuracy value
Definition	Classification of location accuracy values.
Description	-
Extensibility	Open
Stereotype	<< Codelist >>
Values	'unknown', '30 cm', '50 cm', '100 cm'

NetworkClassValue	
Name	Network class value
Definition	Classification of network class values.
Description	-
Extensibility	Closed
Stereotype	<< Enumeration >>
Values	'unknown', 'electricity', 'oilGasChemicals', 'sewage', 'water', 'thermal', 'telecommunication'

NetworkFunction	
Name	Network function
Definition	Classification of network functions.
Description	-
Extensibility	Closed
Stereotype	<< Enumeration >>
Values	'unknown', 'supply', 'disposal', 'communication'

NetworkUsage	
Name	Network usage
Definition	Classification of network usages.
Description	-
Extensibility	Closed
Stereotype	<< Enumeration >>
Values	'unknown', 'supply', 'disposal', 'communication'

NodeValue	
Name	Node value
Definition	Classification of node values.
Description	Interior nodes establish internal connections within a network feature. External nodes establish the connection between network features.
Extensibility	Closed
Stereotype	<< Enumeration >>
Values	'interior', 'exterior'

RelativeToTerrainType	
Name	Relative to terrain type
Definition	Classification of position of component relative to the terrain.
Description	-
Extensibility	Closed
Stereotype	<< Enumeration >>
Values	'unknown', 'entirelyAboveTerrain', 'substantiallyAboveTerrain', 'substantiallyAboveAndBelowTerrain', 'substantaillyBelowTerrain', 'entirelyBelowTerrain'

SpatialQualityValue	
Name	Spatial quality value
Definition	Classification of spatial quality values.
Description	-
Extensibility	Closed
Stereotype	<< Enumeration >>
Values	'unknown', 'standard', 'estimated', 'surveyed'

StatusValue	
Name	Status value
Definition	Classification of status values.
Description	-
Extensibility	Closed
Stereotype	<< Enumeration >>
Values	'unknown', 'decommissioned', 'disused', 'functional', 'projected', 'underConstruction', 'other'

2.2 Functional characteristics

2.2.1 Feature catalogue

Type	Stereotypes
AbstractCityObject	<< ADEElement >>
AbstractCommoditySupply	<< DataType >>
AbstractNetworkFeature	<< FeatureType >>
CityGML_Core:: AbstractCityObject	<< FeatureType >>
CityObjectGroup	<< FeatureType >>
ElectricalCommodityValue	<< Enumeration >>
ElectricalSupply	<< DataType >>

FunctionValue	<< Codelist >>
GaseousCommodityValue	<< Enumeration >>
GaseousSupply	<< DataType >>
LiquidCommodityValue	<< Enumeration >>
LiquidSupply	<< DataType >>
Network	<< FeatureType >>
OpticalCommodityValue	<< Enumeration >>
OpticalSupply	<< DataType >>
RelativeToTerrainType	<< Enumeration >>
RoleInNetwork	<< FeatureType >>
SolidCommodityValue	<< Enumeration >>
SolidSupply	<< DataType >>
StatusValue	<< Enumeration >>
Storage	<< DataType >>
StorageComponentValue	<< Codelist >>
Supply	<< DataType >>
SupplyArea	<< FeatureType >>

2.2.2 Spatial object types

AbstractCityObject	
Name	Abstract city object
Definition	Objects situated in a city which can be both visible or invisible at ground level.
Description	The class 'AbstractCityObject' is inherited from CityGML. CityGML defines many city objects to create city models. In the Operations and Maintenance conceptual schema only those city objects related to subsurface utilities are taken into consideration. These include water objects (e.g. fountains), city furniture (e.g. streetlamps), vegetation objects (e.g. trees) and transportation objects (e.g. drainage).
Stereotype	<< ADEElement >>
Attribute: supply	
Name	Supply
Value type	AbstractCommoditySupply
Definition	Supply needed by the city object in order to function.
Multiplicity	0...*
Attribute: relativeToTerrain	
Name	Relative to terrain
Value type	RelativeToTerrainType
Definition	Qualitative position of component relative to the terrain.
Multiplicity	0...1
Association role: roleInNetwork	
Name	Role in network
Value type	RoleInNetwork
Definition	Role of city object in a network.
Multiplicity	0...*

AbstractCommoditySupply	
Name	Abstract commodity supply
Definition	Supply needed by a connected component within the utility network.
Description	An example of a component may be a fountain or a clock. The first requires water to be supplied, the latter electricity.
Stereotype	<< DataType >>
Attribute: potentialSupply	
Name	Potential supply
Value type	Supply
Definition	Potential supply of commodity towards the city object.
Multiplicity	0...1
Attribute: currentSupply	
Name	Current supply
Value type	Supply
Definition	Current and actual supply of commodity towards the city object.
Multiplicity	0...1
Attribute: storage	
Name	Storage
Value type	Storage
Definition	Maximum storage capacity of the commodity.
Multiplicity	0...*

AbstractNetworkFeature
See section 2.1.2 for 'AbstractNetworkFeature'

CityGML_Core:: AbstractCityObject
See section 2.1.2 for 'CityGML_Core:: AbstractCityObject'

CityObjectGroup	
Name	City object group
Definition	Group of city objects located within a particular supply area.
Description	Grouping city objects is used to relate a supply area to the specific city objects in that area.
Stereotype	<< FeatureType >>

ElectricalSupply	
Name	Electrical supply
Definition	Electrical commodity supplied to the city object.
Description	-
Stereotype	<< DataType >>
Attribute: type	
Name	Type
Value type	ElectricalCommodityValue
Definition	Type of electrical commodity.
Multiplicity	0...1

GaseousSupply	
Name	Gaseous supply
Definition	Gaseous commodity supplied to the city object.
Description	-
Stereotype	<< DataType >>
Attribute: type	
Name	Type
Value type	GaseousCommodityValue
Definition	Type of gaseous commodity.
Multiplicity	0...1

LiquidSupply	
Name	Liquid supply
Definition	Liquid commodity supplied to the city object.
Description	-
Stereotype	<< DataType >>
Attribute: type	
Name	Type
Value type	LiquidCommodityValue
Definition	Type of liquid commodity.
Multiplicity	0...1

Network	
See section 2.1.2 for 'Network'	
Association role: supplies	
Name	Supplies
Value type	SupplyArea
Definition	Network supplies a supply area.
Multiplicity	0...1

OpticalSupply	
Name	Optical supply
Definition	Optical commodity supplied to the city object.
Description	-
Stereotype	<< DataType >>
Attribute: type	
Name	Type
Value type	OpticalCommodityValue
Definition	Type of optical commodity.
Multiplicity	0...1

RoleInNetwork	
Name	Role in network
Definition	Role of the city object within the utility network.
Description	City objects may have various functions and / or usages. They may for example drain (in case of a clock for example) the utility network, but can also feed it (in case of a basin for example).
Stereotype	<< FeatureType >>

Attribute: functionInNetwork	
Name	Function in network
Value type	FunctionValue
Definition	The intended function of the city object.
Multiplicity	0...1
Attribute: usageInNetwork	
Name	Usage in network
Value type	FunctionValue
Definition	The actual usage of the city object.
Multiplicity	0...*
Association role: network	
Name	Network
Value type	Network
Definition	Role is associated with a network.
Multiplicity	1

SolidSupply	
Name	SolidSupply
Definition	Solid commodity supplied to the city object.
Description	-
Stereotype	<< DataType >>
Attribute: type	
Name	Type
Value type	SolidCommodityValue
Definition	Type of solid commodity.
Multiplicity	0...1

Storage	
Name	Storage
Definition	Storage of commodity in the utility network as a back-up in case of breakdowns.
Description	-
Stereotype	<< DataType >>
Attribute: type	
Name	Type
Value type	StorageComponentValue
Definition	Type of storage component.
Multiplicity	0...1
Attribute: inFlowRate	
Name	In flow rate
Value type	Measure
Definition	Rate of commodity flowing in the storage.
Multiplicity	0...1
Attribute: outFlowRate	
Name	Out flow rate
Value type	Measure
Definition	Rate of commodity flowing out of the storage.
Multiplicity	0...1

Attribute: fillLevel	
Name	Fill level
Value type	Measure
Definition	Actual capacity of the storage component.
Multiplicity	0...1
Attribute: maxCapacity	
Name	Max capacity
Value type	Measure
Definition	Max capacity in volume of the storage component.
Multiplicity	0...1

Supply	
Name	Supply
Definition	Supply of commodity in terms of flow rate and reliably.
Description	-
Stereotype	<< DataType >>
Attribute: flowRate	
Name	Flow rate
Value type	Measure
Definition	Explicit quantitative flow rate of the commodity.
Multiplicity	0...1
Attribute: status	
Name	Status
Value type	StatusValue
Definition	Supply reliability of the commodity.
Multiplicity	0...1

SupplyArea	
Name	Supply area
Definition	Geographic area a specific commodity is supplied to by a network.
Description	-
Stereotype	<< FeatureType >>
Association role: suppliedBy	
Name	Supplied by
Value type	Network
Definition	Supply area is supplied by a network.
Multiplicity	0...*

2.2.3 Codelists and enumerations

ElectricalCommodityValue	
Name	Electrical commodity value
Definition	Classification of electrical commodity values.
Description	-
Extensibility	Closed
Stereotype	<< Enumeration >>
Values	'unknown', 'directCurrent', 'singlePhaseAlternatingCurrent', 'threePhaseAlternatingCurrent', 'undulatoryCurrent', 'telephone', 'data', 'other'

FunctionValue
See section 2.1.3 for 'FunctionValue'

GaseousCommodityValue	
Name	Gaseous commodity value
Definition	Classification of gaseous commodity values.
Description	-
Extensibility	Closed
Stereotype	<< Enumeration >>
Values	'uknown', 'naturalGas', 'petroleumGas', 'helium', 'air', 'dioxygen', 'nitrogenGas', 'naturalGasAndTetrahydrothiophene', 'hydrogen', 'carbon', 'methane', 'residualGas', 'argon', 'butadiene', 'butadiene1,3', 'butane', 'propane', 'compressedAir', 'ethylene', 'isobutane', 'vinylChloride', 'oxygen', 'propylene', 'other'

LiquidCommodityValue	
Name	Liquid commodity value
Definition	Classification of liquid commodity values.
Description	-
Extensibility	Closed
Stereotype	<< Enumeration >>
Values	'unknown', 'potableWater', 'rawWater', 'stormWater', 'sanitaryWater', 'wasteWater', 'combinedWater', 'reclaimedWater', 'districtHeatingWater', 'saltWater', 'gasoline', 'oil', 'gasohol', 'acid', 'kerosine', 'liquefiedNaturalGas', 'liquefiedPetroleumGas', 'accetone', 'chlorine', 'crude', 'dichloroethane', 'gasoil', 'liquidAmmonia', 'liquidHydrocarbon', 'tetrachloroethane', 'other'

OpticalCommodityValue	
Name	Optical commodity value
Definition	Classification of optical commodity values.
Description	-
Extensibility	Closed
Stereotype	<< Enumeration >>
Values	'unknown', 'light', 'other'

RelativeToTerrainType
See section 2.1.3 for 'RelativeToTerrainType'

SolidCommodityValue	
Name	Solid commodity value
Definition	Classification of solid commodity values.
Description	-
Extensibility	Closed
Stereotype	<< Enumeration >>
Values	'unknown', 'carbonDust', 'stone', 'ore', 'sand', 'phenol', 'other'

StatusValue
See section 2.1.3 for 'StatusValue'

StorageComponentValue	
Name	Storage component value
Definition	Classification of storage component values.
Description	-
Extensibility	Open
Stereotype	<< Codelist >>
Values	'unknown', 'storageBassin', 'battery', 'tank', 'cistern', 'clearWell', 'inLineStoragePipe', 'other'

2.3 Network properties

2.3.1 Feature catalogue

Type	Stereotypes
AbstractCommodity	<< FeatureType >>
AbstractCommodityClassifier	<< FeatureType >>
AddresRepresentation	<< DataType >>
ChemicalClassifier	<< FeatureType >>
Contact	<< DataType >>
ElectricalCommodity	<< FeatureType >>
ElectricalCommodityValue	<< Enumeration >>
GaseousCommodity	<< FeatureType >>
GaseousCommodityValue	<< Enumeration >>
GenericClassifier	<< FeatureType >>
GHSClassifier	<< FeatureType >>
HazardClass	<< DataType >>
LiquidCommodity	<< FeatureType >>
LiquidCommodityValue	<< Enumeration >>
Network	<< FeatureType >>
OpticalCommodity	<< FeatureType >>
OpticalCommodityValue	<< Enumeration >>
OpticalModeValue	<< Enumeration >>
PartyRoleValue	<< Enumeration >>
RelatedParty	<< FeatureType >>
SignalWordValue	<< Enumeration >>
SolidCommodity	<< FeatureType >>
SolidCommodityValue	<< Enumeration >>

2.3.2 Spatial object types

AbstractCommodity	
Name	Abstract commodity
Definition	An abstract utility network class that groups the types of commodity transported and their classification.
Description	-

Stereotype	<< FeatureType >>
Association role: associatedNetwork	
Name	Associated network
Value type	Network
Definition	Commodity is transported through an associated network.
Multiplicity	0...*
Association role: isClassifiedBy	
Name	Is classified by
Value type	AbstractCommodityClassifier
Definition	Commodity is classified through various classifiers.
Multiplicity	0...*

AbstractCommodityClassifier	
Name	Abstract commodity classifier
Definition	An abstract utility network class describing chemical properties of the commodity by grouping standardized classifiers.
Description	Following well-defined and standardized classifiers, this class allows further detailing of the transported commodity.
Stereotype	<< FeatureType >>
Attribute: molFormula	
Name	Mol formula
Value type	CharacterString
Definition	Mol formula of commodity.
Multiplicity	0...1
Attribute: description	
Name	Description
Value type	CharacterString
Definition	Description of the commodity.
Multiplicity	0...1
Attribute: physicalForm	
Name	Physical form
Value type	CharacterString
Definition	Physical form of the commodity.
Multiplicity	0...1
Attribute: molecularWeight	
Name	Molecular weight
Value type	CharacterString
Definition	Molecular weight of the commodity.
Multiplicity	0...1
Attribute: signalWord	
Name	Signal word
Value type	SignalWordValue
Definition	Signal value depicting whether the commodity is non-hazardous, requires attention, or is hazardous.
Multiplicity	0...1
Attribute: isChemicalComplex	
Name	Chemical complexity

Value type	Boolean
Definition	Indication whether the commodity is chemically complex
Multiplicity	0...1
Attribute: hazardClass	
Name	Hazard class
Value type	HazardClass
Definition	Qualitative depiction of the hazard class of the commodity.
Multiplicity	0...1
Association role: consistsOfFurtherElements	
Name	Consists of further elements
Value type	AbstractCommodityClassifier
Definition	Classifier may exist of further elements itself.
Multiplicity	0...*
Association role: definesCommodity	
Name	Defines commodity
Value type	AbstractCommodity
Definition	Classifier defines properties of commodity.
Multiplicity	0...1

AddressRepresentation	
Name	Address representation
Definition	The address information of the related party.
Description	-
Stereotype	<< DataType >>
Attribute: countryCode	
Name	Country code
Value type	CharacterString
Definition	The country code.
Multiplicity	0...1
Attribute: postName	
Name	Post name
Value type	CharacterString
Definition	The post name.
Multiplicity	0...1
Attribute: postCode	
Name	Post code
Value type	CharacterString
Definition	The postal code.
Multiplicity	0...1
Attribute: houseNumber	
Name	House number
Value type	CharacterString
Definition	The house number.
Multiplicity	0...1
Attribute: houseLetter	
Name	House letter

Value type	CharacterString
Definition	The house letter.
Multiplicity	0...1
Attribute: houseNumberAddition	
Name	House number addition
Value type	CharacterString
Definition	The house number addition.
Multiplicity	0...1

ChemicalClassifier	
Name	Chemical classifier
Definition	Classifier for the chemical properties of the transported commodity.
Description	This class allows proper classification and identification of the transported commodity through well-known identifiers.
Stereotype	<< FeatureType >>
Attribute: ECNo	
Name	EC number
Value type	CharacterString
Definition	The Enzyme Commission number is a numerical identifier for enzymes, based on the chemical reactions they catalyse.
Multiplicity	0...1
Attribute: CASNo	
Name	CAS registry number
Value type	CharacterString
Definition	Unique numerical identifier assigned by the Chemical Abstracts Service to a chemical substance
Multiplicity	0...1
Attribute: IUCLIDChemicalData-Sheet	IUCLID chemical data sheet
Name	CharacterString
Value type	Data sheet by the International Uniform Chemical Information Database including data the intrinsic and hazard properties of a chemical substance.
Definition	
Multiplicity	0...1

Contact	
Name	Contact
Definition	The contact information of the related party.
Description	-
Stereotype	<< DataType >>
Attribute: address	
Name	Address
Value type	AddressRepresentation
Definition	The address information of the related party.
Multiplicity	0...1
Attribute: contactInstruction	
Name	Contact instruction
Value type	CharacterString
Definition	Instruction when contacting related party.

Multiplicity	0...1
Attribute: electronicMailAddress	
Name	Electronic mail address
Value type	CharacterString
Definition	Mail address of the related party.
Multiplicity	0...1
Attribute: hoursOfService	
Name	Hours of service
Value type	CharacterString
Definition	Hours of service the related party can be contacted.
Multiplicity	0...1
Attribute: telephoneFacsimile	
Name	Telephone facsimile
Value type	CharacterString
Definition	Telephone facsimile (fax) number of the related party.
Multiplicity	0...1
Attribute: telephoneVoiceOrganisation	
Name	Telephone voice organisation
Value type	CharacterString
Definition	Organisational telephone number of the related party.
Multiplicity	0...1
Attribute: telephoneVoiceIndividual	
Name	Telephone voice individual
Value type	CharacterString
Definition	Telephone number of related individual within the related party.
Multiplicity	0...1
Attribute: website	
Name	Website
Value type	CharacterString
Definition	Website of the related party.
Multiplicity	0...1
Attribute: coc	
Name	Chamber of Commerce
Value type	CharacterString
Definition	Chamber of Commerce number of the actor.
Multiplicity	0...1

ElectricalCommodity	
Name	Electrical commodity
Definition	Commodity of electrical nature.
Description	-
Stereotype	<< FeatureType >>
Attribute: type	
Name	Type
Value type	ElectricalCommodityValue
Definition	The type of electrical commodity.

Multiplicity	0...1
Attribute: nominalVoltage	
Name	Nominal voltage
Value type	Measure
Definition	The nominal and accepted value of the voltage by the commodity.
Multiplicity	0...1
Attribute: operatingVoltage	
Name	Operating voltage
Value type	Measure
Definition	The actual operating voltage by the commodity.
Multiplicity	0...1
Attribute: voltageRange	
Name	Voltage range
Value type	QuantityExtent
Definition	The range in voltage between the minimum and maximum voltage.
Multiplicity	0...1
Attribute: amperageRange	
Name	Amperage range
Value type	QuantityExtent
Definition	The range in amperage between the minimum and maximum amperage.
Multiplicity	0...1
Attribute: bandWidth	
Name	Bandwidth
Value type	QuantityExtent
Definition	Bandwidth by the commodity.
Multiplicity	0...1
Attribute: phaseValue	
Name	Phase value
Value type	Integer
Definition	Phase value of the commodity.
Multiplicity	0...1

GaseousCommodity	
Name	GaseousCommodity
Definition	Commodity of gaseous nature.
Description	-
Stereotype	<< FeatureType >>
Attribute: type	
Name	Type
Value type	GaseousCommodityValue
Definition	The type of gaseous commodity.
Multiplicity	0...1
Attribute: nominalPressure	
Name	Nominal pressure
Value type	Measure
Definition	The nominal and accepted value of the pressure by the commodity.
Multiplicity	0...1
Attribute: operatingPressure	

Name	Operating pressure
Value type	Measure
Definition	The actual operating pressure by the commodity.
Multiplicity	0...1
Attribute: maximumPressure	
Name	Maximum pressure
Value type	Measure
Definition	The maximum pressure by the commodity while retaining the required properties during its lifetime.
Multiplicity	0...1
Attribute: pressureRange	
Name	Pressure range
Value type	QuantityExtent
Definition	The range in pressure between the minimum and maximum pressure.
Multiplicity	0...1
Attribute: electricConductivity	
Name	Electric conductivity
Value type	QuantityExtent
Definition	Extent of electric conductivity by the commodity.
Multiplicity	0...1
Attribute: concentration	
Name	Concentration
Value type	Measure
Definition	The amount of gaseous commodity by volume in the air.
Multiplicity	0...1
Attribute: isExplosive	
Name	Is explosive
Value type	Boolean
Definition	Indication whether the commodity is explosive.
Multiplicity	0...1
Attribute: lighterThanAir	
Name	Lighter than air
Value type	Boolean
Definition	Indication whether the commodity is lighter than air.
Multiplicity	0...1

GenericClassifier	
Name	Generic classifier
Definition	Generic and additional general classifier for the commodity.
Description	-
Stereotype	<< FeatureType >>

GHSClassifier	
Name	GHS classifier
Definition	Globally Harmonized System of Classification and Labelling of Chemicals (GHS).
Description	The GHS classifier includes elements to classify substances but also to more effectively communicate information related to those substances. The EC

	number and CAS registry number provide a proper basis to classify the substance (commodity).
Stereotype	<< FeatureType >>
Attribute: ECNo	
Name	EC number
Value type	CharacterString
Definition	The Enzyme Commison number is a numerical identifier for enzymes, based on the chemical reactions they catalyze.
Multiplicity	0...1
Attribute: CASNo	
Name	CAS registry number
Value type	CharacterString
Definition	Unique numerical identifier assigned by the Chemical Abstracts Service to a chemical substance
Multiplicity	0...1

HazardClass	
Name	Hazard class
Definition	Qualitative depiction of the hazard class of the transported commodity.
Description	-
Stereotype	<< DataType >>
Attribute: hazardClass	
Name	Hazard class
Value type	CharacterString
Definition	Qualitative description of the hazard class.
Multiplicity	0...1
Attribute: categoryCode	
Name	Category code
Value type	CharacterString
Definition	Category code of the hazard class.
Multiplicity	0...1
Attribute: statementCode	
Name	Statement code
Value type	CharacterString
Definition	Statement code of the hazard class.
Multiplicity	0...1
Attribute: pictogramCode	
Name	Pictogram code
Value type	CharacterString
Definition	Pictogram code of the hazard class.
Multiplicity	0...1
Attribute: pictogramCode	
Name	Pictogram URI
Value type	URI
Definition	The uniform resource identifier for used pictogram of the hazard class.
Multiplicity	0...1

LiquidCommodity	
Name	LiquidCommodity
Definition	Commodity of liquid nature.
Description	-
Stereotype	<< FeatureType >>
Attribute: type	
Name	Type
Value type	LiquidCommodityValue
Definition	The type of liquid commodity.
Multiplicity	0...1
Attribute: nominalPressure	
Name	Nominal pressure
Value type	Measure
Definition	The nominal and accepted value of the pressure by the commodity.
Multiplicity	0...1
Attribute: operatingPressure	
Name	Operating pressure
Value type	Measure
Definition	The actual operating pressure by the commodity.
Multiplicity	0...1
Attribute: maximumPressure	
Name	Maximum pressure
Value type	Measure
Definition	The maximum pressure by the commodity while retaining the required properties during its lifetime.
Multiplicity	0...1
Attribute: pressureRange	
Name	Pressure range
Value type	QuantityExtent
Definition	The range in pressure between the minimum and maximum pressure.
Multiplicity	0...1
Attribute: flowRateRange	
Name	Flow rate range
Value type	QuantityExtent
Definition	The range in flow between the minimum and maximum flow rate.
Multiplicity	0...1
Attribute: temperatureRange	
Name	Temperature range
Value type	QuanitytExtent
Definition	The range in temperature between the minimum and maximum accepted temperature.
Multiplicity	0...1
Attribute: phValueRange	
Name	PH value range
Value type	QuantityExtent
Definition	The range in pH value between the minimum and maximum accepted pH value.
Multiplicity	0...1

Attribute: electricConductivity	
Name	Electric conductivity
Value type	QuantityExtent
Definition	Extent of electric conductivity by the commodity.
Multiplicity	0...1
Attribute: isExplosive	
Name	Is explosive
Value type	Boolean
Definition	Indication whether the commodity is explosive.
Multiplicity	0...1
Attribute: isCorrosive	
Name	Is corrosive
Value type	Boolean
Definition	Indication whether the commodity is corrosive.
Multiplicity	0...1
Attribute: isFlammable	
Name	Is flammable
Value type	Boolean
Definition	Indication whether the commodity is flammable.
Multiplicity	0...1

Network	
See section 2.1.2 for 'Network'	
Association role: transportedCommodity	
Name	Transported commodity
Value type	AbstractCommodity
Definition	Network transports a commodity.
Multiplicity	0...1
Association role: associatedParty	
Name	Associated party
Value type	RelatedParty
Definition	Network can be associated with a related party.
Multiplicity	0...*

OpticalCommodity	
Name	Optical commodity
Definition	Commodity of optical nature.
Description	-
Stereotype	<< FeatureType >>
Attribute: type	
Name	Type
Value type	OpticalCommodityValue
Definition	The type of optical commodity.
Multiplicity	0...1
Attribute: modeType	
Name	Mode type
Value type	OpticalModeValue

Definition	The mode type of the optical commodity.
Multiplicity	0...1
Attribute: bandWidth	
Name	Bandwidth
Value type	QuantityExtent
Definition	Bandwidth by the commodity.
Multiplicity	0...1

RelatedParty	
Name	Related party
Definition	Properties of the related party(ies).
Description	-
Stereotype	<< FeatureType >>
Attribute: individualName	
Name	Individual name
Value type	CharacterString
Definition	Name of associated individual within the related party.
Multiplicity	0...1
Attribute: organisationName	
Name	organisationName
Value type	CharacterString
Definition	Name of the organisation (related party).
Multiplicity	0...1
Attribute: role	
Name	Role
Value type	PartyRoleValue
Definition	Role within the associated network of the related party.
Multiplicity	0...1
Attribute: contact	
Name	Contact
Value type	Contact
Definition	The contact information of the related party.
Multiplicity	0...1
Association role: associatedNetwork	
Name	Associated network
Value type	Network
Definition	Network where the related party is associated with.
Multiplicity	1...*

SolidCommodity	
Name	Optical commodity
Definition	Commodity of solid nature.
Description	-
Stereotype	<< FeatureType >>
Attribute: type	
Name	Type
Value type	SolidCommodityValue

Definition	The type of solid commodity.
Multiplicity	0...1
Attribute: nominalPresusure	
Name	Nominal pressure
Value type	Measure
Definition	The nominal and accepted value of the pressure by the commodity.
Multiplicity	0...1
Attribute: operatingPressure	
Name	Operating pressure
Value type	Measure
Definition	The actual operating pressure by the commodity.
Multiplicity	0...1
Attribute: maximumPressure	
Name	Maximum pressure
Value type	Measure
Definition	The maximum pressure by the commodity while retaining the required properties during its lifetime.
Multiplicity	0...1
Attribute: pressureRange	
Name	Pressure range
Value type	QuantityExtent
Definition	The range in pressure between the minimum and maximum pressure.
Multiplicity	0...1
Attribute: electricConductivity	
Name	Electric conductivity
Value type	QuantityExtent
Definition	Extent of electric conductivity by the commodity.
Multiplicity	0...1
Attribute: concentration	
Name	Concentration
Value type	Measure
Definition	The amount of solid commodity by the total volume of the solution.
Multiplicity	0...1
Attribute: isExplosive	
Name	Is explosive
Value type	Boolean
Definition	Indication whether the commodity is explosive.
Multiplicity	0...1
Attribute: isFlammable	
Name	Is flammable
Value type	Boolean
Definition	Indication whether the commodity is flammable.
Multiplicity	0...1

2.3.3 Codelists and enumerations

ElectricalCommodityValue
See section 2.2.3 for 'ElectricalCommodityValue'

GaseousCommodityValue
See section 2.2.3 for 'GaseousCommodityValue'

LiquidCommodityValue
See section 2.2.3 for 'LiquidCommodityValue'

OpticalCommodityValue
See section 2.2.3 for 'OpticalCommodityValue'

OpticalModeValue	
Name	Optical mode value
Definition	Classification of optimal mode values.
Description	Mode of optical cables can be either single-mode or multi-mode. Single-mode optical cables have a small diametrical core and only allow one mode of light to propagate. Multi-mode optical cables on the other hand have a large diametrical core that allows multiple modes of light to propagate.
Extensibility	Closed
Stereotype	<< Enumeration >>
Values	'unknown', 'singleMode', 'multiMode'

PartyRoleValue	
Name	Party role value
Definition	Classification of party role values.
Description	-
Extensibility	Closed
Stereotype	<< Enumeration >>
Values	'unknown', 'supplier', 'owner', 'operator', 'contractor', 'manufacturer', 'other'

SignalWordValue	
Name	Signal word value
Definition	Classification of signal word values.
Description	Signal whether the transported commodity is non-hazardous, requires careful attention or is hazardous. Signals are especially of importance during works.
Extensibility	Closed
Stereotype	<< Enumeration >>
Values	'unknown', 'nonHazardous', 'attention', '' hazardous'

SolidCommodityValue
See section 2.2.3 for 'SolidCommodityValue'

2.4 Network components

2.4.1 Feature catalogue

Type	Stereotypes
AbstractCable	<< FeatureType >>

AbstractDistributionComponent	<< FeatureType >>
AbstractFunctionalComponent	<< FeatureType >>
AbstractNetworkFeature	<< FeatureType >>
AbstractPipe	<< FeatureType >>
AbstractProtectiveComponent	<< FeatureType >>
Actuator	<< FeatureType >>
Bedding	<< FeatureType >>
ComplexFunctionalComponent	<< FeatureType >>
ComplexFunctionalComponentValue	<< Codelist >>
ConnectionComponent	<< FeatureType >>
ConnectionComponentValue	<< Codelist >>
ControllerComponent	<< FeatureType >>
ControllerComponentValue	<< Codelist >>
ElectricityCable	<< FeatureType >>
ElectricityCableTypeValue	<< Codelist >>
FunctionValue	<< Codelist >>
LineMeaningValue	<< Codelist >>
LineValue	<< Codelist >>
MeasurementComponent	<< FeatureType >>
MeasurementComponentValue	<< Codelist >>
OilGasChemicalsPipe	<< FeatureType >>
OilGasChemicalsPipeTypeValue	<< Codelist >>
OtherComponent	<< FeatureType >>
OtherComponentValue	<< Codelist >>
OtherShell	<< FeatureType >>
ProtectiveShell	<< FeatureType >>
RectangularShell	<< FeatureType >>
Regulator	<< FeatureType >>
RoundShell	<< FeatureType >>
SewerPipe	<< FeatureType >>
SewerPipeTypeValue	<< Codelist >>
SimpleFunctionalComponent	<< FeatureType >>
SpatialQualityValue	<< Enumeration >>
StatusValue	<< Enumeration >>
Storage	<< DataType >>
StorageComponent	<< FeatureType >>
StorageComponentValue	<< Codelist >>
TelecommunicationCable	<< FeatureType >>
TelecommunicationCableTypeValue	<< Codelist >>
TerminalComponent	<< FeatureType >>
TerminalComponentValue	<< Codelist >>
ThermalPipe	<< FeatureType >>
ThermalPipeTypeValue	<< Codelist >>
WaterPipe	<< FeatureType >>
WaterPipeTypeValue	<< Codelist >>

2.4.2 Spatial object types

AbstractCable	
Name	Cable
Definition	An abstract utility network class that groups utility links or sequences used for energy supply or signal transmission from one location to another.
Description	-
Stereotype	<< FeatureType >>
Attribute: numberOfConductors	
Name	Number of conductors
Value type	Integer
Definition	Number of conductors inside the cable required for conducting the commodity through the cable.
Multiplicity	0...1
Attribute: conductorCrossSection	
Name	Conductor cross section
Value type	Area
Definition	Area of cross section of each conductor inside the cable.
Multiplicity	0...1

AbstractDistributionComponent	
Name	Abstract distribution
Definition	An abstract utility network class that groups common utility distribution components used to transport the commodity.
Description	Class used to group all utility components responsible for transporting commodities through the network, being 'Pipe'(s) and 'Cable'(s).
Stereotype	<< FeatureType >>
Attribute: class	
Name	Class
Value type	LineValue
Definition	The type of the distribution line.
Multiplicity	0...1
Attribute: functionOfLine	
Name	Function of line
Value type	LineMeaningValue
Definition	The function of the distribution line.
Multiplicity	0...1

AbstractFunctionalComponent	
Name	Abstract component
Definition	An abstract utility network class that groups functional utility components.
Description	Class used to group all functional components present in the utility network besides distribution and protection components. << FeatureType >>
Stereotype	
Attribute: isAccessible	
Name	Is accessible
Value type	Boolean

Definition	Defining whether the particular object is directly accessible by people or not.
Multiplicity	0...1

AbstractNetworkFeature
See section 2.1.2 for 'AbstractNetworkFeature'

AbstractPipe	
Name	Pipe
Definition	An abstract utility network class that groups utility links or sequences used to transport gases, liquids and solids from on location to another.
Description	-
Stereotype	<< FeatureType >>
Attribute: isGravity	
Name	Is gravity
Value type	Boolean
Definition	Indication whether the pipe and its transported commodity is under the influence of gravity.
Multiplicity	0...1
Attribute: angleOfRotation	
Name	Angle of rotation
Value type	Measure
Definition	Indication whether the pipe is laid under an angle of rotation.
Multiplicity	0...1
Attribute: cathodicProtection	
Name	Cathodic protection
Value type	Boolean
Definition	Indication whether cathodic protection is applied to the pipe to prevent it from corroding.
Multiplicity	0...1
Attribute: directionalDrilling	
Name	Directional drilling
Value type	Boolean
Definition	Indication whether the pipe is laid under directional drilling.
Multiplicity	0...1
Attribute: pressureGrade	
Name	Pressure grade
Value type	Measure
Definition	Pressure grade indicating the pressure the pipe can support under certain temperatures.
Multiplicity	0...1
Attribute: maxCapacity	
Name	Max capacity
Value type	Measure
Definition	Max capacity in volume of the pipe linear per measuring unit.
Multiplicity	0...1

AbstractProtectiveComponent	
Name	Abstract protective component
Definition	An abstract utility network class that groups common protective components for the protection of distribution components.
Description	Class used to group all components responsible for protecting 'AbstractDistributionComponent'(s).
Stereotype	<< FeatureType >>
Attribute: numberOfPipes	
Name	Number of pipes
Value type	Integer
Definition	Number of pipes inside the protective component.
Multiplicity	0...1
Attribute: numberOfCables	
Name	Number of cables
Value type	Integer
Definition	Number of cables inside the protective component.
Multiplicity	0...1
Association role: contains	
Name	Contains
Value type	AbstractNetworkFeature
Definition	A protective component can contain zero to many components.
Multiplicity	0...*

Actuator	
Name	Actuator
Definition	Mechanical component for moving or controlling a mechanism.
Description	An actuator is a component that is responsible for moving or controlling of a mechanism when receiving a signal. An example is opening a valve.
Stereotype	<< FeatureType >>

Bedding	
Name	Bedding
Definition	Lines or tracks build around the surroundings of a distribution component filled with material to protect the component inside the bedding.
Description	-
Stereotype	<< FeatureType >>
Attribute: width	
Name	Width
Value type	Length
Definition	Width of the bedding, measured from side to side.
Multiplicity	0...1

ComplexFunctionalComponent	
Name	Complex functional component
Definition	Functional component existing of multiple components on its own, fulfilling a more complex task than those component are capable of individually.
Description	Complex components can exists of all kinds of other components, resulting in complex combinations such as stations or power plants.

Stereotype	<< FeatureType >>
Attribute: type	
Name	Type
Value type	ComplexFunctionalComponentValue
Definition	The type of a complex functional component.
Multiplicity	0...1
Association role: component	
Name	Component
Value type	AbstractFunctionalComponent
Definition	A complex functional component has many functional component.
Multiplicity	0...1

ConnectionComponent	
Name	Connection component
Definition	Component used to link a utility link or sequence with another.
Description	Connection component are applied to link component to one another, by for example, applying a coupling of a cross fitting.
Stereotype	<< FeatureType >>
Attribute: type	
Name	Type
Value type	ConnectionComponentValue
Definition	The type of a connection component.
Multiplicity	0...1
Attribute: neutralEarthConnection	
Name	Neutral earth connection
Value type	Boolean
Definition	Indication whether the neutral and earth of an electric component are connected to each other.
Multiplicity	0...1

ControllerComponent	
Name	Controller component
Definition	Component used to control, limit or influence the flow of the transported commodity.
Description	A controller component is applied to control the flow of the commodity, which can be, in case of a switch, whether an electricity line is powered or shut off.
Stereotype	<< FeatureType >>
Attribute: type	
Name	Type
Value type	ControllerComponentValue
Definition	The type of a controller component.
Multiplicity	0...1
Attribute: preferredMode	
Name	Preferred mode
Value type	CharacterString

Definition	Preferred mode of the component for set up (open or closed, on or off).
Multiplicity	0...1
Attribute: actualMode	
Name	Actual mode
Value type	CharacterString
Definition	Actual mode of the component in set up (open or closed, on or off).
Multiplicity	0...1
Attribute: rotationalDirection	
Name	Rotational direction
Value type	CharacterString
Definition	Rotational direction of the rotating element (left or right).
Multiplicity	0...1
Attribute: numberOfRotations	
Name	Number of rotations
Value type	Integer
Definition	Number of rotations for the rotating element to be opened.
Multiplicity	0...1
Attribute: neutralEarthConnection	
Name	Neutral earth connection
Value type	Boolean
Definition	Indication whether the neutral and earth of an electric component are connected to each other.
Multiplicity	0...1
Association role: actuator << Property >>	
Name	Actuator << Property >>
Value type	Actuator
Definition	Controller component inherits properties of an actuator.
Multiplicity	1
Association role: regulator << Property >>	
Name	Regulator << Property >>
Value type	Regulator
Definition	Controller component inherits properties of a regulator.
Multiplicity	1

ElectricityCable	
Name	ElectricityCable
Definition	Utility link or sequence used to distribute electricity from one location to another.
Description	-
Stereotype	<< FeatureType >>
Attribute: electricityCableType	
Name	Electricity cable type
Value type	ElectricityCableTypeValue
Definition	The type of electricity cable.
Multiplicity	0...1
Attribute: voltageGrade	

Name	Voltage grade
Value type	Measure
Definition	Maximum voltage the cable is designed for to function as intended.
Multiplicity	0...1
Attribute: ampacity	
Name	Ampacity
Value type	Measure
Definition	Maximum amperage the cable is designed for to function as intended.
Multiplicity	0...1

MeasurementComponent	
Name	Measurement component
Definition	Component that detects or measures a physical property and records, indicates or responds to it.
Description	Measurement components are used in utility networks to provide information on the well-being of the network. An example is a pressure sensor.
Stereotype	<< FeatureType >>
Attribute: type	
Name	Type
Value type	MeasurementComponentValue
Definition	The type of a measurement component.
Multiplicity	0...1

OilGasChemicalsPipe	
Name	Oil gas chemicals pipe
Definition	Utility link or sequence used to distribute oil, gas or chemicals from one location to another.
Description	-
Stereotype	<< FeatureType >>
Attribute: oilGasChemicalsPipe-Type	
Name	Oil gas chemicals pipe type
Value type	OilGasChemicalsPipeTypeValue
Definition	The type of oil gas chemicals pipe.
Multiplicity	0...1

OtherComponent	
Name	Other component
Definition	Component not being a connection, storage, controller, measurement, terminal or complex component.
Description	-
Stereotype	<< FeatureType >>
Attribute: type	
Name	Type
Value type	OtherComponentValue
Definition	The type of other component.
Multiplicity	0...1

OtherShell	
Name	Other shell
Definition	Types of protective shells all other than a duct or mantle tube.
Description	-
Stereotype	<< FeatureType >>

ProtectiveShell	
Name	Protective shell
Definition	A class that groups common protective shell like components.
Description	-
Stereotype	<< FeatureType >>

RectangularShell	
Name	Rectangular shell
Definition	A rectangular utility link or sequence that is used to protect and guide cables and pipes through an encasing construction.
Description	A rectangular linear object and acts as the outermost casing. A rectangular shell may contain 'AbstractDistributionComponent', 'AbstractFunctionalComponent', and / or 'AbstractProtectiveComponent'(s).
Stereotype	<< FeatureType >>

Regulator	
Name	Regulator
Definition	Independent component that determines and maintains the required operating parameters of a system.
Description	-
Stereotype	<< FeatureType >>

RoundShell	
Name	Round shell
Definition	A circular utility link or sequence that is used to protect and guide cables through an encasing construction.
Description	A circular linear object and acts as the outermost casing. A circular shell does contain 'AbstractDistributionComponent'(s), in specific 'Cable'(s).
Stereotype	<< FeatureType >>

SewerPipe	
Name	Sewer pipe
Definition	Utility link or sequence used to distribute sanitary water (sewer) from one location to another.
Description	-
Stereotype	<< FeatureType >>
Attribute: sewerPipeType	
Name	Sewer pipe type
Value type	SewerPipeTypeValue
Definition	The type of sewer pipe.

Multiplicity	0...1

SimpleFunctionalComponent	
Name	Simple functional component
Definition	Simple components functioning as a single entity.
Description	Simple components operate and function as a single entity, without support of other components.
Stereotype	<< FeatureType >>
Attribute: isActive	
Name	Is active
Value type	Boolean
Definition	Indication whether the functional component is active. An active component is a component with an active moment to generate, regulate or continue flow of commodities transported through the network. .
Multiplicity	0...1

Storage
See section 2.2.2 for 'Storage'

StorageComponent	
Name	Storage component
Definition	Component used for storage and buffer of commodities for future use.
Description	-
Stereotype	<< FeatureType >>
Attribute: storage	
Name	Storage
Value type	Storage *(see section 2.2.2 for 'Storage')*
Definition	Storage properties of the component.
Multiplicity	0...1

TelecommunicationCable	
Name	Telecommunication cable
Definition	Utility link or sequence used to distribute data signals from one location to another.
Description	-
Stereotype	<< FeatureType >>
Attribute: telecommunication-CableType	
Name	Telecommunication cable type
Value type	TelecommunicationCableTypeValue
Definition	The type of telecommunication cable.
Multiplicity	0...1
Attribute: maxBandwidth	
Name	Maximum bandwidth
Value type	QuantityExtent
Definition	Max bandwidth supported.
Multiplicity	0...1
Attribute: impedance	

Name	Impedance
Value type	Measure
Definition	The ratio of the input voltage to the input current, measured in ohms.
Multiplicity	0...1
Attribute: attenuation	
Name	Attenuation
Value type	Measure
Definition	The loss of signal in decibels per unit of length.
Multiplicity	0...1

TerminalComponent	
Name	Terminal component
Definition	Component at the end of a distribution line consuming the transported commodity.
Description	Terminal components are those components at the end of a distribution line, using the transported commodity to function. Example is a street light requiring electricity. Terminal components represent the interface of the utility network with the environment.
Stereotype	<< FeatureType >>
Attribute: type	
Name	Type
Value type	TerminalComponentValue
Definition	The type of a terminal component.
Multiplicity	0...1
Attribute: preferredMode	
Name	Preferred mode
Value type	CharacterString
Definition	Preferred mode of the component for set up (open or closed, on or off).
Multiplicity	0...1
Attribute: actualMode	
Name	Actual mode
Value type	CharacterString
Definition	Actual mode of the component in set up (open or closed, on or off).
Multiplicity	0...1
Attribute: rotationalDirection	
Name	Rotational direction
Value type	CharacterString
Definition	Rotational direction of the rotating element (left or right).
Multiplicity	0...1
Attribute: numberOfRotations	
Name	Number of rotations
Value type	Integer
Definition	Number of rotations for the rotating element to be opened.
Multiplicity	0...1
Attribute: neutralEarthConnection	
Name	Neutral earth connection
Value type	Boolean

Definition	Indication whether the neutral and earth of an electric component are connected to each other.
Multiplicity	0...1

ThermalPipe	
Name	Thermal pipe
Definition	Utility link or sequence used to distribute heating or cooling from one location to another.
Description	-
Stereotype	<< FeatureType >>
Attribute: thermalPipeType	
Name	Thermal pipe type
Value type	ThermalPipeTypeValue
Definition	The type of thermal pipe.
Multiplicity	0...1

WaterPipe	
Name	Water pipe
Definition	Utility link or sequence used to distribute water from one location to another.
Description	-
Stereotype	<< FeatureType >>
Attribute: waterPipeType	
Name	Water pipe type
Value type	WaterPipeTypeValue
Definition	The type of water pipe.
Multiplicity	0...1

2.4.3 Codelists and enumerations

ComplexFunctionalComponentValue	
Name	Complex component value
Definition	Classification of complex component values.
Description	-
Extensibility	Open
Stereotype	<< Codelist >>
Values	'unknown', 'mainStation', 'netStation', 'subStation', 'cabinet', 'factory', 'waterWork', 'treatmentPlant', 'heatingPlant', 'powerPlant', 'pumpingStation', 'transformer', 'tideGate', 'samplingStation', 'storageFacility', 'other'

ConnectionComponentValue	
Name	Connection component value
Definition	Classification of connection component values.
Description	-
Extensibility	Open
Stereotype	<< Codelist >>

Values	'unknown', 'flange', 'coupling', 'adapter', 'teeFitting', 'crossFitting', 'compressionFitting', 'manhole', 'connectionBox', 'spliceCassette', 'patchPanel', 'culvert', 'expansionJoint', 'insulationJoint', 'other'

ControllerComponentValue	
Name	Controller component value
Definition	Classification of controller component values.
Description	-
Extensibility	Open
Stereotype	<< Codelist >>
Values	'unknown', 'switch', 'valve', 'blowOffValve', 'slideValve', 'shutOffValve', 'pump', 'generator', 'turbine', 'voltageRegulator', 'pressureRegulator', 'tap', 'fuse', 'loadTapCharger', 'capacitorControl', 'recloserElectricControl', 'recloserHydraulicControl', 'regulatorControl', 'relayControl', 'sectionizerElectricControl', 'sectionizerHydraulicControl', 'flowRegulator', 'surgeReliefTank', 'invertedSyphon', 'overflow', 'other'

ElectricityCableTypeValue	
Name	Electricity cable type value
Definition	Classification of electricity cable type values.
Description	-
Extensibility	Open
Stereotype	<< Codelist >>
Values	'unknown', 'beltedCable', 'H-typeCable', 'SL-typeCable', 'oilFilledCable', 'gasPressuredCable', 'other'

FunctionValue
See section 2.1.3 for 'FunctionValue'

LineMeaningValue	
Name	Line meaning value
Definition	Classification of utility line meaning values.
Description	Utility lines can have, aside their line value, have different meanings. This meaning is especially of use in particular complex components, or for example, in HVAC systems (cooling lines and return lines).
Extensibility	Open
Stereotype	<< Codelist >>
Values	'unknown', 'coolingLine', 'constantLine', 'flowLine', 'returnLine', 'steamLine', 'condensateLine'

LineValue	
Name	Line value
Definition	Classification of utility line values.
Description	Line value refers to the type of line in terms of top level purpose. A line may be used as the main line within the network, but also as the house service line.
Extensibility	Open
Stereotype	<< Codelist >>

Values	'unknown', 'mainLine', 'transportLine', 'supplyLine', 'houseServiceLine'

MeasurementComponentValue	
Name	Measurement component value
Definition	Classification of measurement component values.
Description	-
Extensibility	Open
Stereotype	<< Codelist >>
Values	'unknown', 'anode', 'corrosionDetector', 'pressureSensor', 'meter', 'scadaSensor', 'other'

OilGasChemicalsPipeTypeValue	
Name	Oil gas chemicals pipe type value.
Definition	Classification of oil gas chemicals pipe type values.
Description	-
Extensibility	Open
Stereotype	<< Codelist >>
Values	'unknown', 'distributionPipe', 'pressuredPipe', 'other'

OtherComponentValue	
Name	Other component value
Definition	Classification of other component values.
Description	-
Extensibility	Open
Stereotype	<< Codelist >>
Values	'unknown', 'transformerEnd', 'deliveryPoint', 'vent', 'endCap', 'other'

SewerPipeTypeValue	
Name	Sewer pipe type value.
Definition	Classification sewer pipe type values.
Description	-
Extensibility	Open
Stereotype	<< Codelist >>
Values	'unknown', 'distributionPipe', 'openChannelPipe', 'vacuumPipe', 'pressuredPipe', 'other'

SpatialQualityValue
See section 2.1.3 for 'SpatialQualityValue'

StatusValue
See section 2.1.3 for 'StatusValue'

StorageComponentValue
See section 2.2.3 for 'StorageComponentValue'

TelecommunicationCableTypeValue	
Name	Telecommunication cable type value

Definition	Classification of telecommunication cable type values.
Description	-
Extensibility	Open
Stereotype	<< Codelist >>
Values	'unknown', 'coaxial', 'unshieldedTwisterPair', 'shieldedTwisterPair', 'opticalFiber', 'other'

TerminalComponentValue	
Name	Terminal component value
Definition	Classification of terminal component values.
Description	-
Extensibility	Open
Stereotype	<< Codelist >>
Values	'unknown', 'lamp', 'clock', 'hydrant', 'streetLight', 'trafficLight', 'barrier', 'solarCell', 'advertismColumn', 'beacon', 'waterExhaustPoint', 'waterServicePoint', 'waterDischargePoint', 'fountain', 'other'

ThermalPipeTypeValue	
Name	Thermal pipe type value.
Definition	Classification of thermal pipe type values.
Description	-
Extensibility	Open
Stereotype	<< Codelist >>
Values	'unknown', 'distributionPipe', 'pressuredPipe', 'other'

WaterPipeTypeValue	
Name	Water pipe type value.
Definition	Classification of water pipe type values.
Description	-
Extensibility	Open
Stereotype	<< Codelist >>
Values	'unknown', 'distributionPipe', 'pressuredPipe', 'other'

2.5 Component properties

2.5.1 Feature catalogue

Type	Stereotypes
AbstractDimensionalProperties	<< FeatureType >>
AbstractExtraInformation	<< FeatureType >>
AbstractMaterialProperties	<< FeatureType >>
AbstractNetworkFeature	<< FeatureType >>
AddressRepresentation	<< DataType >>
Contact	<< DataType >>
ExteriorDimensions	<< FeatureType >>
ExteriorMaterial	<< FeatureType >>
FillingMaterial	<< FeatureType >>
GroundWater	<< DataType >>
GroundWaterReference	<< Codelist >>

IdentifierTypeValue	<< Codelist >>
InteriorDimensions	<< FeatureType >>
InteriorMaterial	<< FeatureType >>
Label	<< FeatureType >>
MaterialValue	<< Codelist >>
Network	<< FeatureType >>
PartyRoleValue	<< Enumeration >>
RelatedParty	<< FeatureType >>
ShapeValue	<< Codelist >>
SoilValue	<< Codelist >>
SurroundingSoilProperties	<< FeatureType >>

2.5.2 Spatial object types

AbstractDimensionalProperties	
Name	Abstract dimensional properties
Definition	An abstract utility network class that groups classes describing dimensional properties.
Description	Dimensional properties exist of both exterior and interior dimensions in combination with its shape value.
Stereotype	<< FeatureType >>
Attribute: shape	
Name	Shape
Value type	ShapeValue
Definition	The type of shape of a component.
Multiplicity	0...1
Association role: associatedComponent	
Name	Associated component
Value type	AbstractNetworkFeature
Definition	Component where the dimensional properties are associated with.
Multiplicity	1...*
Association role: hasInfluenceOn	
Name	Has influence on
Value type	AbstractMaterialProperties
Definition	Dimensional properties have an influence on chosen material type in order to achieve a particular value for strength and ductility.
Multiplicity	0...*

AbstractExtraInformation	
Name	Abstract extra information
Definition	An abstract utility network class that groups classes describing identification related information.
Description	-
Stereotype	<< FeatureType >>
Attribute: identifierType	
Name	Identifier type
Value type	IdentifierTypeValue

Definition	Type of identifier of a component.
Multiplicity	0...1
Attribute: description	
Name	Description
Value type	CharacterString
Definition	Additional description of the identifier in addition to its type and URI.
Multiplicity	0...1
Attribute: color	
Name	Colour
Value type	CharacterString
Definition	The colour of component.
Multiplicity	0...1
Association role: associatedComponent	
Name	Associated component
Value type	AbstractNetworkFeature
Definition	Component where the extra information is associated with.
Multiplicity	1...*

AbstractMaterialProperties	
Name	Abstract material properties
Definition	An abstract utility network class that groups material related classes.
Description	-
Stereotype	<< FeatureType >>
Association role: complexType	
Name	Complex type
Value type	CharacterString
Definition	Specific combination of materials the component is build up from.
Multiplicity	0...*
Association role: associatedComponent	
Name	Associated component
Value type	AbstractNetworkFeature
Definition	Component where the material properties are associated with.
Multiplicity	1...*
Association role: hasInfluenceOn	
Name	Has influence on
Value type	AbstractDimensionalProperties
Definition	Material properties have an influence on chosen dimensional properties in order to achieve a particular value for strength and ductility.
Multiplicity	0...*

AbstractNetworkFeature	
See section 2.1.2 for 'AbstractNetworkFeature'	
Association role: hasDimensionalProperties	
Name	Has dimensional properties
Value type	AbstractDimensionalProperties

Definition	Component has dimensional properties.
Multiplicity	0...*
Association role: hasDimensional-Properties	
Name	Has dimensional properties
Value type	AbstractDimensionalProperties
Definition	Component has dimensional properties.
Multiplicity	0...*
Association role: hasSurrounding-SoilProperties	
Name	Has surrounding soil properties
Value type	SurroundingSoilProperties
Definition	Component has surrounding soil properties.
Multiplicity	0...*
Association role: hasExtraInforma-tion	
Name	Has extra information
Value type	AbstractExtraInformation
Definition	Component has extra information.
Multiplicity	0...*
Association role: hasMaterialPro-perties	
Name	Has material properties
Value type	AbstractMaterialProperties
Definition	Component has material properties.
Multiplicity	0...*
Association role: hasMaterialPro-perties	
Name	Has material properties
Value type	AbstractMaterialProperties
Definition	Component has material properties.
Multiplicity	0...*
Association role: associatedParty	
Name	Associated party
Value type	RelatedParty
Definition	Component can be associated with a related party.
Multiplicity	0...*

AddressRepresentation
See section 2.3.2 for 'AddressRepresentation'

Contact
See section 2.3.2 for 'Contact'

ExteriorDimensions	
Name	Exterior dimensions
Definition	Class describing exterior dimensions of a component.
Description	-

Stereotype	<< FeatureType >>
Attribute: exteriorWidth	
Name	Exterior width
Value type	Length
Definition	Exterior width of the component, measured from side to side.
Multiplicity	0...1
Attribute: exteriorHeigth	
Name	Exterior height
Value type	Length
Definition	Exterior height of the component, measured from top to bottom.
Multiplicity	0...1
Attribute: exteriorDiameter	
Name	Exterior diameter
Value type	Length
Definition	Exterior diameter of the component, being the largest chord of the circle.
Multiplicity	0...1

ExteriorMaterial	
Name	Exterior material
Definition	Material applied to the exterior of a component.
Description	-
Stereotype	<< FeatureType >>
Attribute: type	
Name	Type
Value type	MaterialValue
Definition	Type of material.
Multiplicity	0...*
Attribute: specificClass	
Name	Specific class
Value type	CharacterString
Definition	Specific subclass of the material type chosen.
Multiplicity	0...*
Attribute: strength	
Name	Strength
Value type	Integer
Definition	Strength of material measured in its compressive strength.
Multiplicity	0...*
Attribute: ductility	
Name	Ductility
Value type	Integer
Definition	Ductility of the material measured in its yield strength.
Multiplicity	0...*
Attribute: conductivity	
Name	Conductivity
Value type	Integer
Definition	Ability of the material to conduct an electric current.
Multiplicity	0...*

FillingMaterial	
Name	Filling material
Definition	Material applied as filling of a component.
Description	-
Stereotype	<< FeatureType >>
Attribute: type	
Name	Type
Value type	MaterialValue
Definition	Type of material.
Multiplicity	0...*
Attribute: specificClass	
Name	Specific class
Value type	CharacterString
Definition	Specific subclass of the material type chosen.
Multiplicity	0...*
Attribute: strength	
Name	Strength
Value type	Integer
Definition	Strength of material measured in its compressive strength.
Multiplicity	0...*
Attribute: ductility	
Name	Ductility
Value type	Integer
Definition	Ductility of the material measured in its yield strength.
Multiplicity	0...*
Attribute: conductivity	
Name	Conductivity
Value type	Integer
Definition	Ability of the material to conduct an electric current.
Multiplicity	0...*

GroundWater	
Name	Ground water
Definition	Properties describing water found in underground cracks and spaces of soil, sand and rock.
Description	-
Stereotype	<< DataType >>
Attribute: isRealTime	
Name	Is real time
Value type	Boolean
Definition	Indicating whether the ground water level is real time.
Multiplicity	0...1
Attribute: level	
Name	Level
Value type	Measure
Definition	Level of the ground water.
Multiplicity	0...1
Attribute: reference	

Name	Reference
Value type	GroundWaterReference
Definition	Reference level to which the ground water level is measured perpendicular to.
Multiplicity	0...1

InteriorDimensions	
Name	Interior dimensions
Definition	Class describing interior dimensions of a component.
Description	-
Stereotype	<< FeatureType >>
Attribute: interiorWidth	
Name	Interior width
Value type	Length
Definition	Interior width of the component, measured from side to side.
Multiplicity	0...1
Attribute: interiorHeigth	
Name	Interior height
Value type	Length
Definition	Interior height of the component, measured from top to bottom.
Multiplicity	0...1
Attribute: interiorDiameter	
Name	Interior diameter
Value type	Length
Definition	Interior diameter of the component, being the largest chord of the circle.
Multiplicity	0...1

InteriorMaterial	
Name	Interior material
Definition	Material applied to the interior of a component.
Description	-
Stereotype	<< FeatureType >>
Attribute: type	
Name	Type
Value type	MaterialValue
Definition	Type of material.
Multiplicity	0...*
Attribute: specificClass	
Name	Specific class
Value type	CharacterString
Definition	Specific subclass of the material type chosen.
Multiplicity	0...*
Attribute: strength	
Name	Strength
Value type	Integer
Definition	Strength of material measured in its compressive strength.
Multiplicity	0...*
Attribute: ductility	

Name	Ductility
Value type	Integer
Definition	Ductility of the material measured in its yield strength.
Multiplicity	0...*
Attribute: conductivity	
Name	Conductivity
Value type	Integer
Definition	Ability of the material to conduct an electric current.
Multiplicity	0...*

Label	
Name	Label
Definition	Physical piece attached to a component and giving information about it.
Description	-
Stereotype	<< FeatureType >>
Attribute: isLabelVisible	
Name	Is label visible
Value type	Boolean
Definition	Indication whether the label is visible for the naked eye.
Multiplicity	0...1
Attribute: locationLabel	
Name	Location label
Value type	CharacterString
Definition	Location on the component where the label is situated.
Multiplicity	0...1

Network
See section 2.1.2 for 'Network'

RelatedParty	
See section 2.3.2 for 'RelatedParty'	
Association role: associatedComponent	
Name	Associated component
Value type	AbstractNetworkFeature
Definition	Component where the related party is associated with.
Multiplicity	1...*

SurroundingSoilProperties	
Name	Surrounding soil properties
Definition	Characteristics describing the soil surrounding utility components.
Description	-
Stereotype	<< FeatureType >>
Attribute: type	
Name	Type
Value type	SoilValue
Definition	Type of soil.
Multiplicity	0...1

Attribute: reactivity	
Name	Reactivity
Value type	Measure
Definition	Rate at which substances tend to undergo a chemical reaction.
Multiplicity	0...1
Attribute: permeability	
Name	Permeability
Value type	Measure
Definition	Ability of the material (such as soil) to transmit fluids.
Multiplicity	0...1
Attribute: strength	
Name	Strength
Value type	Measure
Definition	Strength of material measured in its compressive strength.
Multiplicity	0...1
Attribute: density	
Name	Density
Value type	Measure
Definition	Mass of particles of the material divided by the volume they occupy.
Multiplicity	0...1
Attribute: moistureContent	
Name	Moisture content
Value type	Measure
Definition	Quantity of water contained in a material (such as soil).
Multiplicity	0...1
Attribute: groundWaterProperties	
Name	Ground water properties
Value type	GroundWater
Definition	Properties describing water found in underground cracks and spaces of soil, sand and rock.
Multiplicity	0...1
Association role: associatedComponent	
Name	Associated component
Value type	AbstractNetworkFeature
Definition	Component where the surrounding soil properties are associated with.
Multiplicity	1...*

2.5.3 Codelists and enumerations

GroundWaterReference	
Name	Ground water reference
Definition	Classification of ground water reference values.
Description	Reference level to which the ground water level is measured perpendicular against. Codelist includes various ground water references, but can be extend by the user if required.
Extensibility	Open
Stereotype	<< Codelist >>
Values	'unknown', 'groundLevel', 'seaLevel', 'other'

IdentifierTypeValue	
Name	Identifier type value
Definition	Classification of identifier type values.
Description	Various identifier types may be used to assign an identifier to a component. The codelist includes various identifier types, but can be extended by the user if required.
Extensibility	Open
Stereotype	<< Codelist >>
Values	'unknown', 'EAN', 'CPID', 'other'

MaterialValue	
Name	Material value
Definition	Classification of material values.
Description	-
Extensibility	Open
Stereotype	<< Codelist >>
Values	'unknown', 'air', 'glass', 'jute', 'paper', 'wood', 'asbestos', 'asbestosCement', 'pitchFibre', 'brick', 'concrete', 'compositeConcrete', 'fiberReinforcedConcrete', 'permeableConcrete', 'prestressedReinforcedConcrete', 'reinforcedConcrete', 'sprayedConcrete', 'reinforcedPolymerMortar', 'stoneware', 'clay', 'vitrifiedClay', 'quartzSilica', 'sand', 'terracotta', 'aluminium', 'brass', 'copper', 'blackIron', 'castIron', 'ductileCastIron', 'lead', 'steel', 'blackSteel', 'galvanizedSteel', 'stainlessSteel', 'bitumen', 'carbon', 'polyButylene', 'polyEthylene', 'polyPropylene', 'polyVinylChloride', 'chlorinatedPolyVinylChloride', 'lowDensityPolyEthylene', 'mediumDensityPolyEthylene', 'highDensityPolyEthylene', 'crossLinkedPolyEthylene', 'polyEthyleneRaisedTemperature', 'fiberReinforcedPlastic', 'ethyleneVinylAlcohol', 'polymericOpticablFibre', 'acrylonitrileButadieneStyrene', 'epoxy', 'paint', 'hostalite', 'rubber', 'other'

PartyRoleValue
See section 2.3.3 for 'PartyRoleValue'

ShapeValue	
Name	Shape value
Definition	Classification of shape values.
Description	-
Extensibility	Open
Stereotype	<< Codelist >>
Values	'unknown', 'circular', 'rectangular', 'ellipsoidal', 'trapezoid', 'irregular'

SoilValue	
Name	Soil value
Definition	Classification of soil types.
Description	-
Extensibility	Open

Stereotype	<< Codelist >>
Values	'unknown', 'sand', 'peat', 'seaClay', 'riverClay', 'other'

2.6 Maintenance and operations properties

2.6.1 Feature catalogue

Type	Stereotypes
AbstractNetworkFeature	<< FeatureType >>
AddressRepresentation	<< DataType >>
Contact	<< DataType >>
CostProperties	<< FeatureType >>
CostTypeValue	<< Codelist >>
DateProperties	<< FeatureType >>
MaintenanceActivityType	<< Codelist >>
MaintenanceProperties	<< FeatureType >>
MaintenanceTimelineType	<< Enumeration >>
MaintenanceType	<< Codelist >>
Network	<< FeatureType >>
PartyRoleValue	<< Enumeration >>
RelatedParty	<< FeatureType >>

2.6.2 Spatial object types

AbstractNetworkFeature	
See section 2.1.2 for 'AbstractNetworkFeature'	
Association role: hasMaintenance-Properties	
Name	Has maintenance properties
Value type	MaintenanceProperties
Definition	Component has maintenance properties.
Multiplicity	0...*
Association role: hasCostPro-perties	
Name	Has cost properties
Value type	CostProperties
Definition	Component has cost properties.
Multiplicity	0...*
Association role: hasDatePro-perties	
Name	Has date properties
Value type	DateProperties
Definition	Component has date properties.
Multiplicity	0...*

AddressRepresentation
See section 2.3.2 for 'AddressRepresentation'

Contact
See section 2.3.2 for 'Contact'

CostProperties	
Name	Cost properties
Definition	Cost properties involved in the operational life of a component, calculated based on the component as a whole.
Description	-
Stereotype	<< FeatureType >>
Attribute: costType	
Name	Cost type
Value type	CostTypeValue
Definition	Type of costs.
Multiplicity	0...1
Attribute: currency	
Name	Currency
Value type	CharacterString
Definition	Applied currency for the costs.
Multiplicity	0...1
Attribute: totalCosts	
Name	Total costs
Value type	Decimal
Definition	Quantity of costs for the component as a whole.
Multiplicity	0...1
Attribute: costsMeasuringUnit	
Name	Measuring unit
Value type	CharacterString
Definition	Unit against which the costs are measured and calculated, for example, per unit of length of a water pipe or per component as a whole.
Multiplicity	0...1
Attribute: costsPerUnit	
Name	Measuring unit
Value type	Decimal
Definition	Quantity of costs for a single unit of the component.
Multiplicity	0...1
Association role: associatedComponent	
Name	Associated component
Value type	AbstractNetworkFeature
Definition	Component where the cost properties are associated with.
Multiplicity	1...*
Association role: associatedMaintenanceActivity	
Name	Associated maintenance activity
Value type	MaintenanceProperties
Definition	Cost properties can be associated with a particular maintenance activity.
Multiplicity	0...*

DateProperties	
Name	Date properties
Definition	Date properties of interest in the operational life of a component.
Description	-
Stereotype	<< FeatureType >>
Attribute: dateOfInstallation	
Name	Date of installation
Value type	Date
Definition	Date the component is installed.
Multiplicity	0...1
Attribute: dateInUse	
Name	Date in use
Value type	Date
Definition	Date the component is firstly used.
Multiplicity	0...1
Attribute: dateOfLocationMeasuring	
Name	Date of measuring
Value type	Date
Definition	Date of when the coordinates of the component are measured.
Multiplicity	0...1
Attribute: dateOfRegistration	
Name	Date of registration
Value type	Date
Definition	Date of when the coordinates of the component are registered.
Multiplicity	0...1
Association role: associatedComponent	
Name	Associated component
Value type	AbstractNetworkFeature
Definition	Component where the date properties are associated with.
Multiplicity	1...*
Association role: associatedMaintenanceActivity	
Name	Associated maintenance activity
Value type	MaintenanceProperties
Definition	Date properties can be associated with a particular maintenance activity.
Multiplicity	0...*

MaintenanceProperties	
Name	Maintenance properties
Definition	Properties describing the maintenance related characteristics of a component.
Description	Maintenance properties describe the type of maintenance and the specific activity performed. Class allows the maintenance activity to be placed in the maintenance planning. << FeatureType >>

Stereotype	
Attribute: maintenanceTimeline	
Name	Maintenance timeline
Value type	MaintenanceTimelineType
Definition	Type of maintenance activity time line.
Multiplicity	0...1
Attribute: maintenanceType	
Name	Maintenance type
Value type	MaintenanceType
Definition	Type of maintenance.
Multiplicity	0...1
Attribute: activityType	
Name	Maintenance activity type
Value type	MaintenanceActivityType
Definition	Type of maintenance activity.
Multiplicity	0...1
Attribute: extraInformation	
Name	Extra information
Value type	URI
Definition	Repository containing additional information concerning the maintenance activities.
Multiplicity	0...1
Attribute: relatedParty	
Name	Related party
Value type	RelatedParty
Definition	Party related to the maintenance activity.
Multiplicity	0...1
Association role: associatedComponent	
Name	Associated component
Value type	AbstractNetworkFeature
Definition	Component where the maintenance properties are associated with.
Multiplicity	1...*
Association role: hasDateProperties	
Name	Has date properties
Value type	DateProperties
Definition	Maintenance (activities) can be associated with particular dates.
Multiplicity	0...*
Association role: hasCostProperties	
Name	Has cost properties
Value type	CostProperties
Definition	Maintenance (activities) can be associated with particular costs.
Multiplicity	1...*

Network
See section 2.1.2 for 'Network'

RelatedParty
See section 2.3.2 for 'RelatedParty'

2.6.3 Codelists and enumerations

CostTypeValue	
Name	Cost type value
Definition	Classification of cost values.
Description	Capital costs refer to the initial purchase of the component. Rehabilitation cost are the costs made to rehabilitate the component. Replacement cost relate to the cost when the component is complete replaced. Maintenance costs refer to all costs made concerning maintenance of the component. Maintenance can involve replacement of the component, but its cost not include the replacement costs in this case. Operating costs are the costs made to ensure the component of functioning as intended.
Extensibility	Open
Stereotype	<< Codelist >>
Values	'unknown', 'capitalCost', 'rehabilitationCost', 'replacementCost', 'maintenanceCost', 'operatingCost', 'other'

MaintenanceActivityType	
Name	Maintenance activity type
Definition	Classification of maintenance activity values.
Description	-
Extensibility	Maintenance
Stereotype	Open
Values	<< Codelist >> 'unknown', 'inspection', 'surveillance', 'rehabilitation', 'replacement', 'other'

MaintenanceTimelineType	
Name	Maintenance timeline type
Definition	Classification of maintenance timeline values.
Description	The maintenance timeline refers to when maintenance was, is or will be performed. This respectively is indicated by 'lastMaintenance', 'currentMaintenance' or 'plannedMaintenance'.
Extensibility	Closed
Stereotype	<< Enumeration >>
Values	'unknown', 'lastMaintenance', 'currentMaintenance', 'plannedMaintenance'

MaintenanceType	
Name	Maintenance type
Definition	Classification of maintenance values.
Description	Preventive maintenance is maintenance in order to prevent malfunctioning or breakdown. Predictive maintenance is often performed based on certain intervals. Corrective maintenance is maintenance after malfunctioning or breakdown. Predictive maintenance is maintenance based on the prediction

	of when malfunctioning or a breakdown might occur. Right before the prediction tells malfunctioning or breakdown is nearby, maintenance is performed to prevent this from happening. Prescriptive maintenance is maintenance predicted by supporting systems, which also prescribe what kind of maintenance should be done.
Extensibility	Closed
Stereotype	<< Enumeration >>
Values	'unknown', 'preventiveMaintenance', 'correctiveMaintenance', 'predictiveMaintenance', 'prescriptiveMaintenance'

PartyRoleValue
See section 2.3.3 for 'PartyRoleValue'

2.7 Performance properties

2.7.1 Feature catalogue

Type	Stereotypes
AbstractImpactProperties	<< FeatureType >>
AbstractNetworkFeature	<< FeatureType >>
EconomicImpact	<< FeatureType >>
EnvironmentalImpact	<< FeatureType >>
Network	<< FeatureType >>
PerformanceProperties	<< FeatureType >>
PerformanceType	<< Codelist >>
SocialImpact	<< FeatureType >>

2.7.2 Spatial object types

AbstractImpactProperties	
Name	Abstract impact properties
Definition	An abstract utility network class that groups classes describing various kinds of impact utility components and their network as a whole have.
Description	Impact is distinguished on three levels: (1) economic, (2) environmental, (3) social. The abstract class groups these three separate classes describing the particular kind of impact.
Stereotype	<< FeatureType >>
Association role: associatedComponent	
Name	Associated component
Value type	AbstractNetworkFeature
Definition	Component where the impact properties are associated with.
Multiplicity	1...*
Association role: associatedNetwork	
Name	Associated network
Value type	Network
Definition	Network where the impact properties are related with.
Multiplicity	1...*

Association role: hasInfluenceOn	
Name	Has influence on
Value type	PerformanceProperties
Definition	Impact properties can influence performance properties.
Multiplicity	0...*

AbstractNetworkFeature	
See section 2.1.2 for 'AbstractNetworkFeature'	
Association role: hasImpactProperties	
Name	Has impact properties
Value type	AbstractImpactProperties
Definition	Component has impact properties.
Multiplicity	0...*
Association role: hasPerformanceProperties	
Name	Has performance properties
Value type	PerformanceProperties
Definition	Component has performance properties.
Multiplicity	0...*

EconomicImpact	
Name	Economic impact
Definition	A financial effect that a decision, policy, or event has on the institution from a microeconomic perspective.
Description	Economic impact directly relates to the total costs and benefits a particular individual component or the utility network as a whole has. The economic impact is related to the 'CostProperties' class as well as the financial performance. Economic impact is perceived from an organizational viewpoint (microeconomic).
Stereotype	<< FeatureType >>
Attribute: impactScore	
Name	Impact score
Value type	Integer
Definition	Relative score of the impact.
Multiplicity	0...1
Attribute: extraInformation	
Name	Extra information
Value type	URI
Definition	Repository containing additional information concerning the specific type of impact and its measuring and scoring mechanism.
Multiplicity	0...1

EnvironmentalImpact	
Name	Environmental impact
Definition	An effect to organisms or their environment as a result of development, industrial or infrastructural projects or activities.

Description	Utility network are in direct relation with their environment. Utility components may disturb the environment by appropriate space within the environment or by the release of substances into the environment.
Stereotype	<< FeatureType >>
Attribute: impactScore	
Name	Impact score
Value type	Integer
Definition	Relative score of the impact.
Multiplicity	0...1
Attribute: extraInformation	
Name	Extra information
Value type	URI
Definition	Repository containing additional information concerning the specific type of impact and its measuring and scoring mechanism.
Multiplicity	0...1

Network	
See section 2.1.2 for 'Network'	
Association role: hasImpactProperties	
Name	Has impact properties
Value type	AbstractImpactProperties
Definition	Network has impact properties.
Multiplicity	0...*
Association role: hasPerformanceProperties	
Name	Has performance properties
Value type	PerformanceProperties
Definition	Network has performance properties.
Multiplicity	0...*

PerformanceProperties	
Name	Abstract performance
Definition	Properties describing the accomplishment of a given task measured against a certain kind of standard of accuracy.
Description	Performance can be measured for both an individual utility component and the network as a whole. Performance is distinguished by the performance type (codelist 'PerformanceType') and is scored against a particular requirement.
Stereotype	<< FeatureType >>
Attribute: performanceType	
Name	Performance type
Value type	PerformanceType
Definition	Type of performance.
Multiplicity	0...1
Attribute: performanceRequirement	
Name	Performance requirement
Value type	CharacterString

Definition	Performance requirement written out.
Multiplicity	0...1
Attribute: performanceScore	
Name	Performance score
Value type	Integer
Definition	Relative score of the performance given the performance requirement.
Multiplicity	0...1
Attribute: isSufficient	
Name	Is sufficient
Value type	Boolean
Definition	Indication whether the performance is sufficient or not.
Multiplicity	0...1
Attribute: dateOfPerformanceMeasuring	
Name	Date of measuring
Value type	Date
Definition	Data of measurement of performance.
Multiplicity	0...1
Attribute: extraInformation	
Name	Extra information
Value type	URI
Definition	Repository containing additional information concerning the type of performance and its measuring and scoring mechanism.
Multiplicity	0...1
Association role: associatedComponent	
Name	Associated component
Value type	AbstractNetworkFeature
Definition	Component where the performance properties are associated with.
Multiplicity	1...*
Association role: associatedNetwork	
Name	Associated network
Value type	Network
Definition	Network where the performance properties are related with.
Multiplicity	1...*
Association role: hasInfluenceOn	
Name	Has influence on
Value type	AbstractImpactProperties
Definition	Performance properties can influence impact properties.
Multiplicity	0...*

SocialImpact	
Name	Social impact
Definition	The effect on the well-being of the surrounding community.
Description	Social impact refers to the well-being of the surrounding community. Disturbance and hindrance for example by a station or powerplant have an effect on the social impact. Social impact may also refer to calamities due to utilities (gas explosions, sinkholes).

Stereotype	<< FeatureType >>
Attribute: impactScore	
Name	Impact score
Value type	Integer
Definition	Relative score of the impact
Multiplicity	0...1
Attribute: extraInformation	
Name	Extra information
Value type	URI
Definition	Repository containing additional information concerning the specific type of impact and its measuring and scoring mechanism.
Multiplicity	0...1

2.7.3 Codelists and enumerations

PerformanceType	
Name	Performance type
Definition	Classification of performance types.
Description	Engineering performance refers to the structural soundness of the components. Serviceability performance refers to the intended functioning of the component. Safety performance refers to the safety of the component towards human beings. Financial performance refers to the balance between costs and benefits. Sustainability performance refers to the ability of the component to be maintained at a certain serviceable level.
Extensibility	Open
Stereotype	<< Codelist >>
Values	'unknown', 'engineeringPerformance', 'serviceabilityPerformance', 'safetyPerformance', 'fincancialPerformance', 'sustainabilityPerformance'

2.8 Hollow space

2.8.1 Feature catalogue

Type	Stereotypes
AbstractCommodity	<< FeatureType >>
AbstractDimensionalProperties	<< FeatureType >>
AbstractHollowSpace	<< FeatureType >>
AbstractNetworkFeature	<< FeatureType >>
HollowSpaceFree	<< FeatureType >>
HollowSpaceOccupied	<< FeatureType >>
Network	<< FeatureType >>

2.8.2 Spatial object types

AbstractCommodity	
See section 2.3.2 for 'AbstractCommodity'	
Association role: boundedBy	
Name	Bounded by
Value type	AbstractHollowSpace

Definition	Transported commodity is bounded in its transported volume by the available hollow space.
Multiplicity	0...1

AbstractDimensionalProperties
See section 2.5.2 for 'AbstractDimensionalProperties'

AbstractHollowSpace	
Name	Abstract hollow space
Definition	An abstract utility network class that groups classes describing the free and occupied space within either a distribution component or a protective component.
Description	The hollow space is measured as the interior volume of the component. It defines the space available for commodities (within a distribution component) or components (within a protective component).
Stereotype	<< FeatureType >>
Attribute: totalVolume	
Name	Total volume
Value type	Measure
Definition	Total interior volume of the component.
Multiplicity	0...1
Association role: containedBy	
Name	Contained by
Value type	AbstractCommodity
Definition	Hollow space (can) contain(s) a commodity.
Multiplicity	0...1
Association role: determinedBy	
Name	Determined by
Value type	AbstractDimensionalProperties
Definition	Hollow space is determined by dimensional properties of the component.
Multiplicity	0...1
Association role: consistsOfParts	
Name	Consists of parts
Value type	HollowSpaceOccupied
Definition	Hollow space (can) exist(s) of zero to many spaces occupied by either a commodity or (a) component(s).
Multiplicity	0...*

AbstractNetworkFeature	
See section 2.1.2 for 'AbstractNetworkFeature'	
Association role: occupiedHollow-Space	
Name	Occupied hollow space
Value type	AbstractHollowSpace
Definition	Component can occupy part of the hollow space.
Multiplicity	0...1

HollowSpaceFree	
Name	Hollow space free
Definition	Free part of the total hollow space of a component.
Description	-
Stereotype	<< FeatureType >>
Attribute: volumeFree	
Name	Volume free
Value type	Measure
Definition	Free interior volume of the component.
Multiplicity	0...1

HollowSpaceOccupied	
Name	Hollow space occupied
Definition	Occupied part of the total hollow space of a component.
Description	-
Stereotype	<< FeatureType >>
Attribute: volumeOccupied	
Name	Volume occupied
Value type	Measure
Definition	Occupied volume of the component.
Multiplicity	0...1

Network
See section 2.1.2 for 'Network'

2.8.3 Codelists and enumerations

No codelist or enumerations present in the 'Hollow space' UML class model.

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