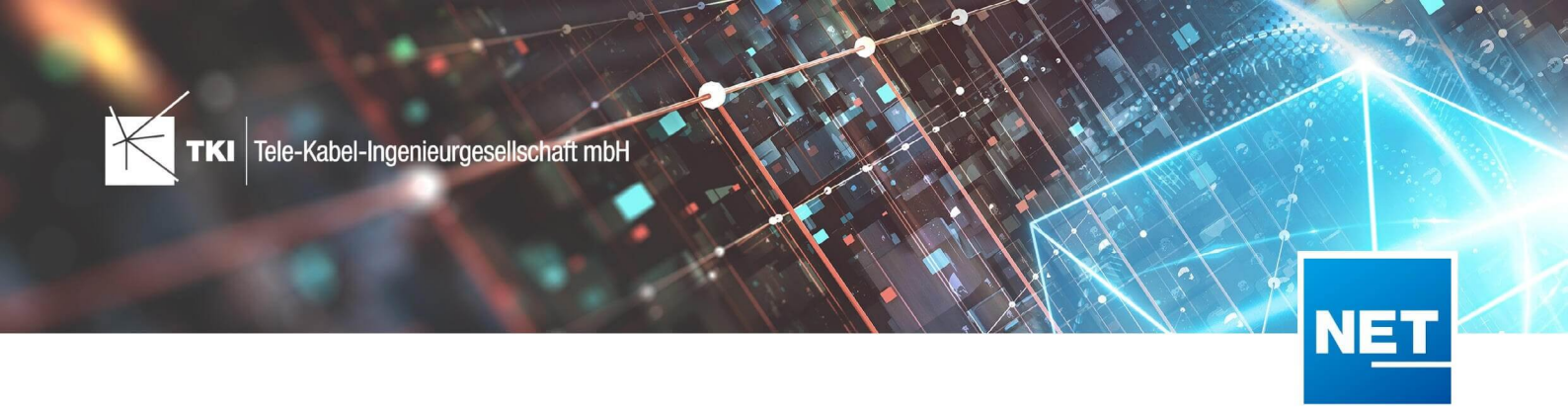

TNIM v2.1 Datamodel Documentation

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1 Overview

1.1 What is TNIM?

TNIM stands for “Telecom Network Information Model” and is the exchange format for telecommunications networks of TKI Chemnitz. With TNIM, data from NET Engineering projects can be exported and made accessible, or data from other systems can be transferred to NET Engineering.

TNIM is deployed as a single file. This can be generated or read using the .NET class libraries provided.

2 The structure of TNIM

2.1 Objects

TNIM consists of attributed objects, all of which are listed and described in the data dictionary. Roughly speaking, a TNIM file includes the following objects:

- **Features**: These are the majority of all objects in TNIM. They describe the concrete parts of the telecommunication network with geographical data, descriptions and other details.
- **Models**: These are the master data sets used to describe features - many features can be assigned a suitable model in order to have recurring information stored centrally.
- **Relations**: Relations enable connections between features (and models) and turn the collection of objects into a real network. All common situations can be reproduced via different types of relations and an assignment to parent or child positions.
- **Data types**: These are objects that hold information in bundles and can be referenced by other objects, but are not unique.

2.2 Attributes

There are a variety of attribute types used for objects, which we will examine in more detail here.

- **Identifier**: The identifier is a single-line text which may only consist of letters, numbers, underscore, dot and minus. In addition, the first character must be a letter or underscore.
  The identifier must always be specified and be unique in the TNIM file so that relations between classes can be recognised correctly! The identifier is not saved during a *NET Import*.
- **Text**: Text is an arbitrary string whose maximum expected or expected character length is indicated by the numbers in square brackets.
- **Boolean**: There are only two possible values for attributes of the type boolean: 'true' and 'false'.
- **Integer**: Any integer value is considered an integer. Negative values are not expected anywhere in the TNIM.
- **Float**: Float numbers must always be used with a dot as a separator.
- **Geometry**: Geometries are a sequence of coordinates that describe points, lines and polygons in coordination with the provided coordinate system.
- **Measure & Length**: Both attribute types consist of a (measured) value and an associated (length) unit, which is specified as text.
- **Enumerations**: These are values that must be selected from a fixed list of options and thus can only have predefined contents.
- **Data types**: Mentioned in the last section, data types can be directly assigned via an attribution.
- **References**: Most relations are managed in the Element Relationship. An exception here is the assignment of a model, which can be found directly as an attribute in the feature.
- **Collections**: All of the listed attribute types can in principle also occur as a list instead of individually. If this is expected, round brackets are given after the attribute in the data dictionary, e.g. for 'additionalAttribute()'. If there is a number in the brackets, it corresponds to the (maximum) expected number of values.

2.3 What is needed for a TNIM file?

A complete, coordinated TNIM file is ultimately a very large list of objects containing the features mentioned with their models and the relations between them. In addition, each TNIM file should have the unique meta information 'Spatial Information', which provides the coordinate system for all geometries used.

If the update capability (from TNIM v2.1) is to be used, a 'Source Value' should also be specified (usually exactly) as the source element for all objects to which the features and models can refer.
For all attributes that are not covered by the interface definition of TNIM, but which should nevertheless be stored with the objects, there is the additional attribute. This is available to all features and models and can be freely filled via key and value(s).

2.4 How is a network assembled in TNIM?

An important part of TNIM are the relations between the features. In order to understand the result of a *NET Export* or to perform a successful and flawless *NET Import*, it is indispensable to have a look at the net structure of TNIM (which is based on NET Engineering).

3 Interaction with NET Engineering

3.1 NET Export

The *NET Export* offers the possibility to output not only a complete industry model as a TNIM file. It can be limited by selecting a boundary polygon in the geography. Furthermore, it is possible to restrict the output to the cable, duct or survey plan level only.

If attributes have been stored in feature classes in the NET data model, which are not part of TNIM but are still to be exported, the output of these values as additional attributes can be activated in the *NET Export* via an option. As a result, the column name of the additional attribute is the key, while the value for the object is transported in the value attribute.

If the import extension is active in the structure update and source information is to be exported (possible from TNIM v2.1), while no source information is stored on the objects or no source was created as a feature, the *NET Export* generates default values for the TNIM file. The default key "sourceID" of each feature is the FID (for utility features the FID of the geometry features), The default source of a industry model is described by its name.

3.2 NET Import

The *NET Import* enables TNIM files to be imported into an existing NET Engineering project. You can choose whether the entire scope of the file should be imported or whether it should be limited to the cable, duct or survey plan level.

It can only be imported into industry models with a set coordinate system. In addition, if the coordinate system of TNIM deviates from that in the industry model, transformation must be possible. If one of the two cases is not fulfilled, the *TNIM Import* will stop immediately.

In order to obtain data that is as consistent as possible, there is the option of carrying out a test run in *NET Import*. Like an import, this outputs a comprehensive log, but does not yet write any data to the industry model. In addition, a large number of validations are carried out to point out problems in the data model.

Irrespective of partial imports, which are considered in the next section, the import without partial imports already uses synchronization in order to prevent objects from being created more than once. Master data such as models, persons, streets, cities and postcodes as well as duct nodes are always mapped to existing objects in the target industry model, if this is possible. The objects are only created newly if no assignment can be found. In most cases, the name of the object is decisive, in the data dictionary this is specified for each object. Pipe nodes are mapped based solely on their point geometry.

3.3 NET Import partial imports

3.3.1 What is the requirement for a partial import?

In order to use this functionality, the *TNIM Import* extension must be activated in Infrastructure Administrator and applied to the target industry model. In addition, the *NET Import* must be started using the TNIM v2.1 schema, which can be selected in the import dialog. In order for an object to be recognized as 'already available' and thus updated, the "sourceID" attribute must be uniquely filled. In addition, the TNIM file needs a "Source Value" feature.

3.3.2 What will be updated and what will not?

All attributes of objects are checked and updated if there are any changes. If an attribute is no longer filled/ specified in the newly imported data, the corresponding attribute in the target industry model is also emptied.

The *TNIM Import* never deletes features from the target industry model. If the TNIM file for an update does not contain an existing element, this remains untouched, and existing relations are not adjusted if they are not part of TNIM. It is also not possible to specify a relation or object to be deleted in TNIM.

Some relations generate objects in the industry model, these are topological connections, segment-duct, segment-cable, duct-duct and duct-cable assignments as well as the duct model-duct model relation. Since a change to these relations, for example if a cable is no longer to be assigned to a duct, would mean that the duct-cable assignment object is to be deleted in the industry model, a new assignment object is created instead. As already mentioned, this is due to the fact that the assignment to be deleted cannot be part of TNIM and is therefore ignored. Attributes of existing relations, i.e. the positions, can also be overwritten and emptied like other attributes.

All other relations in the TNIM, such as the assignment of a device to a switching point, can be updated through the partial updates, but here too it is only possible to replace the relation with a new one of this type, in this example assigning a new switching point, not to remove the relation completely.

4 Data Dictionary

4.1 Common data types

4.1.1 Spatial Infomation (meta information)

The spatial information of a TNIM file is expected to be unique. It describes it describes how to interpret all geometries of the TNIM file.

NET Import: This information is not imported but is used to compare the TNIM coordinate system to the target industry model coordinate system. If there are deviations, a geometry transformation is applied if possible.

Attribute	Type	Description	Comments
csName	text	Descriptive name of the coordinate system.	
csWKT	text	Well known text to describe the coordinate system.	
csID	integer	This SRID corresponds to the ESPG code.	

4.1.2 Color Value

Color values are master data of the TNIM format and describe colors that are used by various other objects for description via the data type color. Color values should be described once in each TNIM file.

TNIM Import: Based on the name and RGB value and dashed, an attempt is made before the import to map the color value to existing color values in the target industry model.

Attribute	Type	Description	Comments
colorName	text[50]	The name of the color value should be specified.	
rgb	text[6]	The rgb value of the color value should be specified. A leading hashtag is optional.	
dashed	boolean	This attribute determines whether the color is solid or dashed.	

4.1.3 Color (data type)

This data type is used to assign a combination of colors to objects.

Attribute	Type	Description	Comments
colorCaption	text	The caption of the color can be specified.	This value is only provided by *NET Export* as the combination "colorReference1.colorName/,colorReference2.colorName".
colorReference	reference(2)	References to color values (see ColorValue) should be specified.	

4.1.4 Source Value

Source values represent the origins of objects used for partial imports.

Attribute	Type	Description	Comments
sourceName	text[255]	The name of the source must be specified.	

4.1.5 Source (data type)

This data type describes the source information of an object that is used for the partial import.

Attribute	Type	Description	Comments
sourceID	text[255]	A unique ID to mark this object for import updates.	
sourceReference	reference	References to the source value (see SourceValue) should be specified.	

4.1.6 Element Relationship

A element relationship describes a connection from one object to one or more other objects in a specific relationship type.

Attribute	Type	Description	Comments
element	reference	A (parent) element for this relationship must be specified.	
relationship	relationshipTypeValue	A relationship from the selection below must be specified.	
otherElement	reference()	Other (child) elements in this relation must be specified (see PositionedReference).	

Possible relationship types:

Relationship type	Description
additionalRelation	This is used for a relation that is not part of TNIM but is still intended to be transmitted.
connectedTo	This is used to describe an unspecified connection.
contains	This is used to describe the structure of internal or child objects. The position attribute of the positioned reference is often used.
relatedTo	This is used to describe an unspecified minor connection.
backwardFlow	This is part of the TNIM topology and is used for directional connections such as cable-to-device connections. This is interchangeable with ForwardFlow depending on the mapping to element/otherElement.
forwardFlow	This is part of the TNIM topology and is used for directional connections such as cable-to-device connections. This is interchangeable with BackwardFlow depending on the mapping to element/otherElement.
bothFlow	This is part of the TNIM topology and is used for non-directional connections such as trunk connections.
supports	This is used to indicate support or assistance, such as a technician for a device.
uses	This is used to represent a use or ownership, such as a client for ducts and cables.

4.1.7 Positioned Reference (data type)

A positioned reference represents an object that can is located based on its position.

Attribute	Type	Description	Comments
reference	reference	An element for this relationship must be specified.	
position	integer	Position numbers should start with 1.	
additionalDescription	text	This is used together with the relationship 'AdditionalRelation' to represent a relation between element and otherElement that is not defined in TNIM. The attribute name that links both types is specified here.	

4.1.8 Additional Attribute (data type)

With this data type, additional attributes can be added to objects.

NET Export: If the option "Write unknown attributes" is activated, custom attributes are created as an additional attribute with the attribute name as the key and its value in the string representation as the value. Relationships to domain tables are also covered.

NET Import: If the option "Write unknown attributes" is activated, the target industry model will be checked for a custom attribute matching the key as name. If found, the additional attribute will be imported. Relationships to domain tables are also covered.

Attribute	Type	Description	Comments
key	text	Key of the additional attribute.	
value	text	Value of the additional attribute.	

4.2 Administration

4.2.1 Cluster

Clusters are used for the surface allocation of infrastructure to a specific area.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is mandantory.

Attribute	Type	Description	Comments
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
elementName	text[100]	The name of the cluster can be specified.	
elementInfo	text[255]	Additional information on the cluster can be specified.	
spatialRepresentation	geometry	A spatial representation is highly recommended.	Expected geometry: polygon
type	text	A type, e.g. as district, can be specified. (No default values.)	The values are part of an enumeration that is expanded when importing unknown values.
status	text	A current construction status can be specified. Default values: • Planning (DE Planung) • Existed (DE Bestand) • Under construction (DE Im Bau)	The values are part of an enumeration that is expanded when importing unknown values.
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

4.2.2 Person

Employees (technicians), clients, customers and manufacturers are all managed as individuals. It is thus possible to clearly assign them to the various objects and models of the network.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.

Attribute	Type	Description	Comments
elementName	text[100]	The name of the person can be specified.	This value is only provided by *NET Export* as the combination “lastName, firstName”.
elementInfo	text[510]	Additional information on the person can be specified.	
firstName	text[100]	The first name of the person can be specified.	
lastName	text[100]	The last name of the person can be specified.	
company	text[100]	An associated company can be specified.	
title	text[50]	A title can be specified.	
email	text[255]	An email adress can be specified.	
phone	text[40](3)	Three phone numbers can be specified, in order of office, mobile and private number.	
isTechnician	boolean	If the type of the person is specified as ‘Employee (DE Angestelltenverhältnis)’, an indication can be made as to whether the person is a technician.	
type	text[255]	A person category is recommended. Default values: • Manufacturer (DE Hersteller) • Client (DE Mandant) • Customer (DE Kunde) • Employee (DE Angestelltenverhältnis)	The values are part of an enumeration that is expanded when importing unknown values. However, it is highly recommended to select a type from the default values.

Attribute	Type	Description	Comments
rating	text[255]	A rating (priority) can be specified. Default values: • A (DE A) • B (DE B) • C (DE C)	The values are part of an enumeration that is expanded when importing unknown values.
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with persons are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	connected to	numerous other objects - see their description	

4.2.3 Switching Point

The switching point is a management element that allows connections between multiple points, such as closures and terminators.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is mandantory.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
elementName	text[100]	The name of the switching point can be specified.	
elementInfo	text[255]	Additional information on the switching point can be specified.	
modelReference	reference	Assigned type of the switching point model (see SwitchingPointModel) can be specified.	

Attribute	Type	Description	Comments
spatialRepresentation	geometry	A spatial representation is highly recommended.	Expected geometry: point
status	text[100]	A current construction status can be specified. Default values: • Planning (DE Planung) • Existed (DE Bestand) • Under construction (DE Im Bau)	The values are part of an enumeration that is expanded when importing unknown values.
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with switching points are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	uses / supports	switching point	
building	connected to	switching point	
switching point	contains	device	

4.2.4 Switching Point Model

Switiching point models hold details and manufacturer specifications about used switching points.

NET Import: If these models have no source information, they are compared by name to existing switching point models in the target industry model and matched if they are identical.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is mandantory.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.

Attribute	Type	Description	Comments
elementName	text[100]	The name of the switching point model can be specified.	
elementInfo	text[255]	Additional information on the switching point model can be specified.	
active	boolean	Only active types can be selected and assigned using NET Engineering.	Recommended value: true
type	text[100]	A model designation can be specified.	Manufacturer specification
orderNumber	text[100]	A order number can be specified.	Manufacturer specification
elementDescription	text[255]	A description regarding the model can be specified.	Manufacturer specification
materialPrice	measure	The material cost can be specified.	Manufacturer specification
servicePrice	measure	The service cost can be specified.	Manufacturer specification
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with switching point models are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	supports	switching point model	

4.3 Topography

4.3.1 Address (data type)

An address provides information about the location of buildings.

Attribute	Type	Description	Comments
streetName	text[100]	The name of the street shpuld be specified.	Streets are independent objects in *NET*. During *NET Import*, they are compared by name to existing and already imported streets and matched if they are identical.
housenumber	text[30]	The house number of the adress should be specified.	
housenumberSuffix	text[10]	An addition for the house number can be specified.	
municipality	text[100]	The name of the municipality (city) should be specified.	Municipalities (cities) are independent objects in *NET*. During *NET Import*, they are compared by name to existing and already imported municipalities and matched if they are identical.
postcode	text[10]	The postcode should be specified. There can be several postcodes for a municipality.	Postcodes are independent objects in *NET*. During *NET Import*, they are compared by value to existing and already imported postcodes and matched if they are identical.

4.3.2 Building Unit

Building units are used to model apartments or businesses in buildings.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
floor	integer	A floor number can be specified.	
unitOnFloor	integer	A number for the building unit on the floor can be specified.	
type	text[255]	A building unit category can be specified. Default values: • Homes (DE Wohneinheiten) • Businesses (DE Geschäftseinheiten)	The values are part of an enumeration that is expanded when importing unknown values.
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with building units are commonly used:

Parent element	Relationship type	Child element(s)	Comments
building	contains	building unit	The position attribute is used to describe the unit number.

4.3.3 Building

Buildings can be used to assign points and lines to their addresses.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
elementName	text[50]	The name of the building can be specified.	
elementInfo	text[255]	Additional information on the building can be specified.	
spatialRepresentation	geometry	A spatial representation is highly recommended.	Expected geometry: point or polygon
address	address	An adress for the building should be specified.	
type	text[255]	A building category can be specified. Default values: • Unknown (DE Unbekannt) • Single-familiy house (DE Einfamilienhaus) • Two-family house (DE Zweifamilienhaus) • Apartment building (DE Mehrfamilienhaus) • Business building (DE Geschäftsgebäude) • Residential building (DE Wohngebäude)	The values are part of an enumeration that is expanded when importing unknown values.
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with buildings are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	uses / supports	building	
building	connected to	numerous other objects - see their description	

Parent element	Relationship type	Child element(s)	Comments
building	contains	building unit	The position attribute is used to describe the unit number.

4.4 Survey Plan

4.4.1 Segment

A segment is a spatial placeholder for one or more linear elements, sharing the same path. A segment can be for example a trench containing multiple linear elements like ducts and/or cables. Another example is the path a telecom cable follows along a facade.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
elementName	text[100]	The name of the segment can be specified.	
elementInfo	text[255]	Additional information on the segment can be specified.	
modelReference	reference	Assigned type of the segment (see SegmentModel) can be specified.	
spatialRepresentation	geometry	The specification of a spatial representation is highly recommended.	Expected geometry: line
length	measure	The length of the segment will be calculated by its spatial representation.	This value is not taken into account in the *NET Import*, but calculated based on the given geometry.
depth	text[25]	The depth of the segment can be specified.	

Attribute	Type	Description	Comments
accuracy	text[255]	The accuracy of the measurement can be specified. Default values: • Location calibrated (DE Lage eingemessen) • Location projected (DE Lage projektiert) • Location located (DE Lage geortet) • Location unknown (DE Lage unbekannt)	The values are part of an enumeration that is expanded when importing unknown values.
layingType	text[255]	A type of installation can be specified. Default values: • Underground (DE Erdverlegt) • Duct layed (DE Rohrverlegt) • Overground (DE Oberirdisch) • Inhouse (DE Im Haus)	The values are part of an enumeration that is expanded when importing unknown values.
type	text[255]	A type of segment function can be specified. Default values: • Feeder segment (DE Zuführungstrasse) • Drop segment (DE Hausanschluss-Trasse)	The values are part of an enumeration that is expanded when importing unknown values.
usage	text[255]	A segment usage can be specified. Default values: • Fiber optic (DE LWL) • Copper (DE Kupfer) • Empty duct (DE Leerrohr) • Mixed (DE Gemischt)	The values are part of an enumeration that is expanded when importing unknown values.
status	text[100]	A current construction status can be specified. Default values: • Planning (DE Planung) • Existed (DE Bestand) • Under construction (DE Im Bau)	The values are part of an enumeration that is expanded when importing unknown values.
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with segments are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	uses / supports	segment	
building	connected to	segment	
segment	bothflow	segment	
segment / manhole	bothflow	manhole / segment	
segment / cabinet	bothflow	cabinet / segment	
segment / pole	bothflow	pole / segment	
segment	contains	duct	The position attribute is used to describe the position of the duct.
segment	contains	cable	The position attribute is used to describe the position of the cable.

4.4.2 Segment Model

Segment models hold details and manufacturer specifications about used segments.

NET Import: If these models have no source information, they are compared by name to existing segment models in the target industry model and matched if they are identical.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
elementName	text[100]	The name of the segment model can be specified.	

Attribute	Type	Description	Comments
elementInfo	text[255]	Additional information on the segment model can be specified.	
active	boolean	Only active types can be selected and assigned using NET Engineering.	Recommended value: true
type	text[100]	A model designation can be specified.	Manufacturer specification
orderNumber	text[100]	A order number can be specified.	Manufacturer specification
elementDescription	text[255]	A description regarding the model can be specified.	Manufacturer specification
materialPrice	measure	The material cost can be specified.	Manufacturer specification
servicePrice	measure	The service cost can be specified.	Manufacturer specification
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with segment models are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	supports	segment model	

4.4.3 Cabinet

Cabinets represent node objects that can contain multiple telecom networks objects. They can be modeled in detail using rack panels and patch panels.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
elementName	text[100]	The name of the cabinet can be specified.	
elementInfo	text[255]	Additional information on the cabinet can be specified.	
modelReference	reference	Assigned type of the cabinet (see CabinetModel) can be specified.	
spatialRepresentation	geometry	A spatial representation is highly recommended.	Expected geometry: point
accuracy	text[255]	The accuracy of the measurement can be specified. Default values: • Location calibrated (DE Lage eingemessen) • Location projected (DE Lage projektiert) • Location located (DE Lage geortet) • Location unknown (DE Lage unbekannt)	The values are part of an enumeration that is expanded when importing unknown values.
status	text[100]	A current construction status can be specified. Default values: • Planning (DE Planung) • Existed (DE Bestand) • Under construction (DE Im Bau)	The values are part of an enumeration that is expanded when importing unknown values.
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with cabinets are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	uses / supports	cabinet	
building	connected to	cabinet	
segment / cabinet	bothflow	cabinet / segment	
pole	related to	cabinet	Provided by *NET Export*, not required for *NET Import*.
cabinet	contains	rack panel	
cabinet	contains	duct fitting	
cabinet	contains	duct insertion	
cabinet	contains	device	

4.4.4

Cabinet models hold details and manufacturer specifications about used cabinets.

NET Import: If these models have no source information, they are compared by name to existing cabinet models in the target industry model and matched if they are identical.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
elementName	text[100]	The name of the cabinet model can be specified.	
elementInfo	text[255]	Additional information on the cabinet model can be specified.	
numberOfRackUnits	integer	If rack panels are used, the number of height units must be specified.	

Attribute	Type	Description	Comments
active	boolean	Only active types can be selected and assigned using NET Engineering.	Recommended value: true
type	text[100]	A model designation can be specified.	Manufacturer specification
orderNumber	text[100]	A order number can be specified.	Manufacturer specification
elementDescription	text[255]	A description regarding the model can be specified.	Manufacturer specification
length	length	The size for the cabinet model can be specified.	Manufacturer specification
width	length	The size for the cabinet model can be specified.	Manufacturer specification
heigth	length	The size for the cabinet model can be specified.	Manufacturer specification
material	text[255]	A more precise classification of the material can be specified. Default values: • Unknown (DE Unbekannt) • Concrete (DE Beton) • Copper (DE Kupfer) • Iron (DE Eisen) • Steel (DE Stahl) • Wood (DE Holz) • Aluminium (DE Aluminium) • Synthetic (DE Kunststoff) • Cement (DE Zement)	Manufacturer specification The values are part of an enumeration that is expanded when importing unknown values.
materialPrice	measure	The material cost can be specified.	Manufacturer specification
servicePrice	measure	The service cost can be specified.	Manufacturer specification

Attribute	Type	Description	Comments
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with cabinet models are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	supports	cabinet model	

4.4.5 Manhole

Manholes are simple container objects which may contain multiple telecom networks objects.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
elementName	text[100]	The name of the manhole can be specified.	
elementInfo	text[255]	Additional information on the manhole can be specified.	
modelReference	reference	Assigned type of the manhole (see ManholeModel) can be specified.	
spatialRepresentation	geometry	A spatial representation is highly recommended.	Expected geometry: point

Attribute	Type	Description	Comments
accuracy	text[255]	The accuracy of the measurement can be specified. Default values: • Location calibrated (DE Lage eingemessen) • Location projected (DE Lage projektiert) • Location located (DE Lage geortet) • Location unknown (DE Lage unbekannt)	The values are part of an enumeration that is expanded when importing unknown values.
status	text[100]	A current construction status can be specified. Default values: • Planning (DE Planung) • Existed (DE Bestand) • Under construction (DE Im Bau)	The values are part of an enumeration that is expanded when importing unknown values.
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with manholes are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	uses / supports	manhole	
building	connected to	manhole	
segment / manhole	bothflow	manhole / segment	
manhole	contains	rack panel	
manhole	contains	duct fitting	
manhole	contains	duct insertion	
manhole	contains	device	

4.4.6 Manhole Model

Manhole models hold details and manufacturer specifications about used manholes.

NET Import: If these models have no source information, they are compared by name to existing manhole models in the target industry model and matched if they are identical.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
elementName	text[100]	The name of the manhole model can be specified.	
elementInfo	text[255]	Additional information on the manhole model can be specified.	
numberOfRackUnits	integer	If rack panels are used, the number of height units must be specified.	
active	boolean	Only active types can be selected and assigned using NET Engineering.	Recommended value: true
type	text[100]	A model designation can be specified.	Manufacturer specification
orderNumber	text[100]	A order number can be specified.	Manufacturer specification
elementDescription	text[255]	A description regarding the model can be specified.	Manufacturer specification
length	length	The size for the cabinet model can be specified.	Manufacturer specification
width	length	The size for the cabinet model can be specified.	Manufacturer specification

Attribute	Type	Description	Comments
heigth	length	The size for the cabinet model can be specified.	Manufacturer specification
material	text[255]	A more precise classification of the material can be specified. Default values: • Unknown (DE Unbekannt) • Concrete (DE Beton) • Copper (DE Kupfer) • Iron (DE Eisen) • Steel (DE Stahl) • Wood (DE Holz) • Aluminium (DE Aluminium) • Synthetic (DE Kunststoff) • Cement (DE Zement)	Manufacturer specification The values are part of an enumeration that is expanded when importing unknown values.
materialPrice	measure	The material cost can be specified.	Manufacturer specification
servicePrice	measure	The service cost can be specified.	Manufacturer specification
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with manhole models are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	supports	manhole model	

4.4.7 Marker

Markers are installed at important points of cable networks to make it easier to find underground components (closures, fittings) or important points of the cable or duct infrastructure (duct ends, protective ducts, cable rings).

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
elementInfo	text[255]	Additional information on the marker can be specified.	
serialNumber	text[255]	The serial number of the marker can be specified.	
modelReference	reference	Assigned type of the marker (see MarkerModel) can be specified.	
spatialRepresentation	geometry	A spatial representation is highly recommended.	Expected geometry: point
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

4.4.8 Marker Model

Marker models hold details and manufacturer specifications about used markers.

NET Import: If these models have no source information, they are compared by name to existing marker models in the target industry model and matched if they are identical.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
elementName	text[100]	The name of the pole model can be specified.	
elementInfo	text[255]	Additional information on the pole model can be specified.	

Attribute	Type	Description	Comments
frequence	float	The frequence can be specified.	
rfid	boolean	It can be selected whether the marker type has an RFID function.	
range	lengthValue	The transmission range of the marker type can be specified.	
rfidRange	lengthValue	The transmission range of the RFID can be specified.	
color	color	The color of the marker type can be specified.	A maximum of one referenced color is expected here.
active	boolean	Only active types can be selected and assigned using NET Engineering.	Recommended value: true
type	text[100]	A model designation can be specified.	Manufacturer specification
orderNumber	text[100]	An order number can be specified.	Manufacturer specification
elementDescription	text[255]	A description regarding the model can be specified.	Manufacturer specification
materialPrice	measure	The material cost can be specified.	Manufacturer specification
servicePrice	measure	The service cost can be specified.	Manufacturer specification
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with marker models are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	supports	marker model	

4.4.9 Pole

A pole is a vertical columnar structure that can contain multiple telecommunications network objects.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
elementName	text[100]	The name of the pole can be specified.	
elementInfo	text[255]	Additional information on the pole can be specified.	
modelReference	reference	Assigned type of the pole (see PoleModel) can be specified.	
spatialRepresentation	geometry	A spatial representation is highly recommended.	Expected geometry: point
accuracy	text[255]	The accuracy of the measurement can be specified. Default values: • Location calibrated (DE Lage eingemessen) • Location projected (DE Lage projektiert) • Location located (DE Lage geortet) • Location unknown (DE Lage unbekannt)	The values are part of an enumeration that is expanded when importing unknown values.

Attribute	Type	Description	Comments
type	text[255]	A pole category can be specified. Default values: • Unknown (DE Unbekannt) • Support structure (DE Abstützung) • Bracing (DE Abspannung) • Others (DE Andere) • Not been defined (DE Noch nicht festgelegt)	The values are part of an enumeration that is expanded when importing unknown values.
status	text[100]	A current construction status can be specified. Default values: • Planning (DE Planung) • Existed (DE Bestand) • Under construction (DE Im Bau)	The values are part of an enumeration that is expanded when importing unknown values.
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with poles are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	uses / supports	pole	
building	connected to	pole	
segment / pole	bothflow	pole / segment	
pole	related to	cabinet	Provided by *NET Export*, not required for *NET Import*.
pole	contains	rack panel	
pole	contains	duct fitting	
pole	contains	duct insertion	

Parent element	Relationship type	Child element(s)	Comments
pole	contains	device	

4.4.10 Pole Model

Pole models hold details and manufacturer specifications about used poles.

NET Import: If these models have no source information, they are compared by name to existing pole models in the target industry model and matched if they are identical.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
elementName	text[100]	The name of the pole model can be specified.	
elementInfo	text[255]	Additional information on the pole model can be specified.	
active	boolean	Only active types can be selected and assigned using NET Engineering.	Recommended value: true
type	text[100]	A model designation can be specified.	Manufacturer specification
orderNumber	text[100]	A order number can be specified.	Manufacturer specification
elementDescription	text[255]	A description regarding the model can be specified.	Manufacturer specification
length	length	The size for the cabinet model can be specified.	Manufacturer specification
width	length	The size for the cabinet model can be specified.	Manufacturer specification

Attribute	Type	Description	Comments
heigth	length	The size for the cabinet model can be specified.	Manufacturer specification
material	text[255]	A more precise classification of the material can be specified. Default values: • Unknown (DE Unbekannt) • Concrete (DE Beton) • Copper (DE Kupfer) • Iron (DE Eisen) • Steel (DE Stahl) • Wood (DE Holz) • Aluminium (DE Aluminium) • Synthetic (DE Kunststoff) • Cement (DE Zement)	Manufacturer specification The values are part of an enumeration that is expanded when importing unknown values.
materialPrice	measure	The material cost can be specified.	Manufacturer specification
servicePrice	measure	The service cost can be specified.	Manufacturer specification
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with pole models are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	supports	pole model	

4.4.11 Rack Panel

Rack panels are main parts of a rack that contains patch panels and trays. They can occupy one or more height units.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
elementName	text[100]	The name of the rack panel can be specified.	
elementInfo	text[255]	Additional information on the rack panel can be specified.	
modelReference	reference	Assigned type of the rack panel (see RackPanelModel) can be specified.	
numberOfPositions	integer	This determines how many child elements can be assigned.	
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with rack panels are commonly used:

Parent element	Relationship type	Child element(s)	Comments
manhole	contains	rack panel	
cabinet	contains	rack panel	
pole	contains	rack panel	
rack panel	contains	patch panel	The position attribute is used to describe the place number of the patch panel.
rack panel	contains	tray	The position attribute is used to describe the place number of the tray.

4.4.12 Rack Panel Model

Rack panel models hold details and manufacturer specifications about used rack panels.

NET Import: If these models have no source information, they are compared by name, row count and column count to existing rack panel models in the target industry model and matched if they are identical.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
elementName	text[100]	The name of the rack panel model can be specified.	
elementInfo	text[255]	Additional information on the rack panel model can be specified.	
numberOfRackUnits	integer	The number of height units occupied should be specified.	
columns	integer	The number of columns within the rack panel should be specified.	
rows	integer	The number of rows within the rack panel should be specified.	
orientation	rackOrientation	The orientation of the rack should be provided, that indicates the way, rack content is to be arranged.	
active	boolean	Only active types can be selected and assigned using NET Engineering.	Recommended value: true
type	text[100]	A model designation can be specified.	Manufacturer specification
orderNumber	text[100]	A order number can be specified.	Manufacturer specification

Attribute	Type	Description	Comments
elementDescription	text[255]	A description regarding the model can be specified.	Manufacturer specification
materialPrice	measure	The material cost can be specified.	Manufacturer specification
servicePrice	measure	The service cost can be specified.	Manufacturer specification
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with rack panel models are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	supports	rack panel model	

4.4.13 Patch Panel

Patch panels are the part of a rack that contains connectors.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
elementName	text[100]	The name of the patch panel can be specified.	
elementInfo	text[255]	Additional information on the patch panel can be specified.	
modelReference	reference	Assigned type of the patch panel (see PatchPanelModel) can be specified.	

Attribute	Type	Description	Comments
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with patch panels are commonly used:

Parent element	Relationship type	Child element(s)	Comments
rack panel	contains	patch panel	The position attribute is used to describe the place number of the patch panel.
patch panel	contains	connector	The position attribute is used to describe the place number of the connector in panel.

4.4.14 Patch Panel Model

Patch panel models hold details and manufacturer specifications about used patch panels.

NET Import: If these models have no source information, they are compared by name, row count and column count to existing patch panel models in the target industry model and matched if they are identical.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
elementName	text[100]	The name of the patch panel model can be specified.	
elementInfo	text[255]	Additional information on the patch panelmodel can be specified.	
numberOfRackUnits	integer	The number of height units occupied should be specified.	

Attribute	Type	Description	Comments
columns	integer	The number of columns within the patch panel should be specified.	
rows	integer	The number of rows within the patch panel should be specified.	
orientation	rackOrientation	The orientation of the panel should be provided, that indicates the way, panel content is to be arranged.	
active	boolean	Only active types can be selected and assigned using NET Engineering.	Recommended value: true
type	text[100]	A model designation can be specified.	Manufacturer specification
orderNumber	text[100]	A order number can be specified.	Manufacturer specification
elementDescription	text[255]	A description regarding the model can be specified.	Manufacturer specification
materialPrice	measure	The material cost can be specified.	Manufacturer specification
servicePrice	measure	The service cost can be specified.	Manufacturer specification
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with patch panel models are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	supports	patch panel model	

4.5 Duct Infrastructure

4.5.1 Duct

Ducts can include cables as well as other ducts. They represent every type of duct, both protective ducts, compound ducts and micro ducts. Their function results from their relationships to one another.

As soon as a duct is cut, it ends and another duct joins (through fitting for example).

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
elementName	text[100]	The name of the duct can be specified.	
elementInfo	text[255]	Additional information on the duct can be specified.	
modelReference	reference	Assigned type of the duct (see DuctModel) should be specified.	
spatialRepresentation	geometry	A spatial representation should only be provided, if the duct is not assigned to segments or other ducts.	If specified, expected geometry: line
length	measure	The length of the duct will be calculated by its spatial representation.	This value is not taken into account in the *NET Import*, but calculated based on the given geometry or assignments to ducts/segments.
color	color	A duct color can be specified.	A maximum of two referenced colors is expected here.

Attribute	Type	Description	Comments
type	text[255]	A duct category can be specified. (No default values)	The values are part of an enumeration that is expanded when importing unknown values.
status	text[100]	A current construction status can be specified. Default values: • Planning (DE Planung) • Existed (DE Bestand) • Under construction (DE Im Bau)	The values are part of an enumeration that is expanded when importing unknown values.
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with ducts are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	uses / supports	duct	
building	connected to	duct	
segment	contains	duct	The position attribute is used to describe the position of the duct.
duct bundle	contains	duct	
duct	contains	duct	The position attribute is used to describe the position of the inner duct.
duct	contains	cable	The position attribute is used to describe the position of the cable.

Parent element	Relationship type	Child element(s)	Comments
duct / duct insertion	bothflow	duct insertion / duct	
duct / duct fitting	bothflow	duct fitting / duct	
duct	connectedTo	duct insertion	Provided by *NET Export*, not required for *NET Import*.

4.5.2 Duct Model

Duct models hold details and manufacturer specifications about used ducts.

NET Import: If these models have no source information, they are compared by name to existing duct models in the target industry model and matched if they are identical.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
elementName	text[100]	The name of the duct model can be specified.	
elementInfo	text[255]	Additional information on the duct model can be specified.	
diameter	length	The specification of the diameter of the modeled duct is highly recommended.	The diameter of inner ducts should always be smaller than the diameter of outer ducts.
active	boolean	Only active types can be selected and assigned using NET Engineering.	Recommended value: true
type	text[100]	A model designation can be specified.	Manufacturer specification

Attribute	Type	Description	Comments
orderNumber	text[100]	A order number can be specified.	Manufacturer specification
elementDescription	text[255]	A description regarding the model can be specified.	Manufacturer specification
materialPrice	measure	The material cost can be specified.	Manufacturer specification
servicePrice	measure	The service cost can be specified.	Manufacturer specification
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

In order to describe the pattern according to which ducts are placed inside one another, this duct-duct assignment is also applied to duct models:

Parent element	Relationship type	Child element(s)	Comments
duct model	contains	duct model	The position attribute is used to describe the position of the inner channel. For every position in this assignement, a relationship is required. For example, duct model A, which is to describe a duct with 8 inner ducts of duct model B, would require 8 identical relations between duct model A and duct model B, differing only in their position.
person	supports	duct model	

4.5.3 Duct Fitting

Duct fittings are used to connect two or more ducts. During import, duct point objects are automatically created at each location where a fitting has been created. These duct points are used to visualize the fittings in NET.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
elementName	text[100]	The name of the duct fitting can be specified.	
elementInfo	text[255]	Additional information on the duct fitting can be specified.	
modelReference	reference	Assigned type of the duct fitting (see DuctFittingModel) can be specified.	
spatialRepresentation	geometry	A spatial representation is highly recommended.	Expected geometry: point
status	text[100]	A current construction status can be specified. Default values: • Planning (DE Planung) • Existed (DE Bestand) • Under construction (DE Im Bau)	The values are part of an enumeration that is expanded when importing unknown values.
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with duct fittings are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	uses / supports	duct fitting	
building	connected to	duct fitting	
manhole	contains	duct fitting	
cabinet	contains	duct fitting	

Parent element	Relationship type	Child element(s)	Comments
pole	contains	duct fitting	
duct / duct insertion	bothflow	duct insertion / duct	

4.5.4 Duct Fitting Model

Duct fitting models hold details and manufacturer specifications about used duct fittings.

NET Import: If these models have no source information, they are compared by name to existing duct fitting models in the target industry model and matched if they are identical.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
elementName	text[100]	The name of the duct fitting model can be specified.	
elementInfo	text[255]	Additional information on the duct fitting model can be specified.	
numberOfDucts	integer	The number of ducts connected by the fitting model should be specified.	
active	boolean	Only active types can be selected and assigned using NET Engineering.	Recommended value: true
type	text[100]	A model designation can be specified.	Manufacturer specification
orderNumber	text[100]	A order number can be specified.	Manufacturer specification
elementDescription	text[255]	A description regarding the model can be specified.	Manufacturer specification

Attribute	Type	Description	Comments
materialPrice	measure	The material cost can be specified.	Manufacturer specification
servicePrice	measure	The service cost can be specified.	Manufacturer specification
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with duct fitting models are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	supports	duct fitting model	

4.5.5 Duct Insertion

Duct insertions represents the insertion of a duct into a building or a manhole.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
elementName	text[100]	The name of the duct insertion can be specified.	
elementInfo	text[255]	Additional information on the duct insertion can be specified.	
modelReference	reference	Assigned type of the duct insertion (see DuctInsertionModel) can be specified.	
spatialRepresentation	geometry	A spatial representation is highly recommended.	Expected geometry: point

Attribute	Type	Description	Comments
status	text[100]	A current construction status can be specified. Default values: • Planning (DE Planung) • Existed (DE Bestand) • Under construction (DE Im Bau)	The values are part of an enumeration that is expanded when importing unknown values.
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with duct insertions are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	uses / supports	duct insertion	
building	connected to	duct insertion	
manhole	contains	duct insertion	
cabinet	contains	duct insertion	
pole	contains	duct insertion	
duct / duct insertion	bothflow	duct insertion / duct	
duct	connectedTo	duct insertion	Provided by export, not required for import.

4.5.6 Duct Insertion Model

Duct insertion models hold details and manufacturer specifications about used duct insertions.

NET Import: If these models have no source information, they are compared by name to existing duct insertion models in the target industry model and matched if they are identical.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
elementName	text[100]	The name of the duct insertion model can be specified.	
elementInfo	text[255]	Additional information on the duct insertion model can be specified.	
active	boolean	Only active types can be selected and assigned using NET Engineering.	Recommended value: true
type	text[100]	A model designation can be specified.	Manufacturer specification
orderNumber	text[100]	A order number can be specified.	Manufacturer specification
elementDescription	text[255]	A description regarding the model can be specified.	Manufacturer specification
materialPrice	measure	The material cost can be specified.	Manufacturer specification
servicePrice	measure	The service cost can be specified.	Manufacturer specification
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with duct insertion models are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	supports	duct insertion model	

4.5.7 Duct Bundle

A duct bundle is used for managing ducts. The duct bundle itself has no geometry and should not be confused with a compound duct.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
elementName	text[100]	The name of the duct bundle can be specified.	
elementInfo	text[255]	Additional information on the duct bundle can be specified.	
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with duct bundles are commonly used:

Parent element	Relationship type	Child element(s)	Comments
duct bundle	contains	duct	

4.6 Cable Infrastructure

4.6.1 Cable

Cables are used to convey data from one location to another.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.

Attribute	Type	Description	Comments
telecomType	telecomType	This value must be specified.	Recomended value: fiberOptics
elementName	text[100]	The name of the cable can be specified.	
elementInfo	text[255]	Additional information on the cable can be specified.	
modelReference	reference	Assigned type of the cable (see CableModel) should be specified.	
spatialRepresentation	geometry	A spatial representation should only be provided, if the cable is not assigned to segments or ducts.	If specified, expected geometry: line
length	measure	The length of the cable will be calculated by its spatial representation.	This value is not taken into account in the *NET Import*, but calculated based on the given geometry or assignments to ducts/segments.
measureAtStart	measure	The cable measure at the start point can be specified.	Unit of measure will not be considered.
measureAtEnd	measure	The cable measure at the end point can be specified.	Unit of measure will not be considered.
slackLoop	overlength()	A set of cable loops can be specified.	
type	text[255]	A cable category can be specified. Default values: • Feeder cable (DE Hauptkabel) • Distribution cable (DE Verbindungskabel)	The values are part of an enumeration that is expanded when importing unknown values.

Attribute	Type	Description	Comments
status	text[100]	A current construction status can be specified. Default values: • Planning (DE Planung) • Existed (DE Bestand) • Under construction (DE Im Bau)	The values are part of an enumeration that is expanded when importing unknown values.
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with cables are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	uses / supports	cable	
building	connected to	cable	
segment	contains	cable	The position attribute is used to describe the position of the cable.
duct	contains	cable	The position attribute is used to describe the position of the cable.
cable	contains	fiber	The position attribute is used to describe the position of the fiber in cable.
cable / device	forwardflow / backwardflow	device / cable	

4.6.2 Cable Model

Cable models hold details and manufacturer specifications about used cables.

NET Import: If these models have no source information, they are compared by name to existing cable models in the target industry model and matched if they are identical.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
telecomType	telecomType	This value must be specified.	Recomended value: fiberOptics
elementName	text[100]	The name of the cable model can be specified.	
elementInfo	text[255]	Additional information on the cable model can be specified.	
diameter	length	The diameter of the cable can be specified.	
fiberCount	integer	The specification of the number of fibers in cables of this type is highly recommended.	The number of bundles will be calculated by fiberCount and fiberPerLooseBuffer.
fiberPerLooseBuffer	integer	The specification of the number of fibers per bundle in cables of this type is highly recommended.	The number of bundles will be calculated by fiberCount and fiberPerLooseBuffer.
active	boolean	Only active types can be selected and assigned using NET Engineering.	Recommended value: true
type	text[100]	A model designation can be specified.	Manufacturer specification
orderNumber	text[100]	A order number can be specified.	Manufacturer specification
elementDescription	text[255]	A description regarding the model can be specified.	Manufacturer specification

Attribute	Type	Description	Comments
materialPrice	measure	The material cost can be specified.	Manufacturer specification
servicePrice	measure	The service cost can be specified.	Manufacturer specification
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with cable models are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	supports	cable model	

4.6.3 Overlength (data type)

Overlength is the extra length of a cable at a point.

Attribute	Type	Description	Comments
spatialRepresentation	geometry	A spatial representation is highly recommended.	Expected geometry: point
length	length	The length of the overlength should be specified.	
type	text[255]	A reserve category can be specified. (No default values.)	The values are part of an enumeration that is expanded when importing unknown values.

4.6.4 Device

There are two different types of devices: terminations (have connectors and are most commonly used at the beginning and end of a network path) and closures (may not have connectors).

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
telecomType	telecomType	This value must be specified.	Recomended value: fiberOptics
deviceCategory	deviceCategory	The device category determines whether the device is to be interpreted as a closure or as a termination. This value must be specified.	
elementName	text[100]	The name of the device can be specified.	
elementInfo	text[255]	Additional information on the device can be specified.	
modelReference	reference	Assigned type of the device (see DeviceModel) can be specified.	
spatialRepresentation	geometry	The specification of a spatial representation is highly recommended.	Expected geometry: point
type	text[255]	A device category can be specified. Default values for closures: • Connection closure (DE Verbindungsmuffe) • Junction closure (DE Abzweigmuffe) • Splitting closure (DE Aufteilungsmuffe) • Cable closure (DE Kabelmuffe) • Buried closure (DE Erdmuffe) (No default values for terminators.)	The values are part of an enumeration that is expanded when importing unknown values.
status	text[100]	A current construction status can be specified. Default values: • Planning (DE Planung) • Existed (DE Bestand) • Under construction (DE Im Bau)	The values are part of an enumeration that is expanded when importing unknown values.

Attribute	Type	Description	Comments
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with devices are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	uses / supports	device	
building	connected to	device	
switching point	contains	device	
manhole	contains	device	
cabinet	contains	device	
pole	contains	device	
cable / device	forwardflow / backwardflow	device / cable	
device	contains	cable trunk	
device	contains	tray	The position attribute is used to describe the place of the tray.
device	contains	splice	The position attribute is used to describe the place of the splice in device. This will be the place number of the splice, if there is none provided in a tray splice relation.

Parent element	Relationship type	Child element(s)	Comments
device	contains	splitter	The position attribute is used to describe the place of the splitter.
device	contains	connector	The position attribute is used to describe the place of the connector.

4.6.5 Device Model

Device models hold details and manufacturer specifications about used devices.

NET Import: If these models have no source information, they are compared by name to existing device models in the target industry model and matched if they are identical.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
telecomType	telecomType	This value must be specified.	Recomended value: fiberOptics
deviceCategory	deviceCategory	The device category determines whether the device is to be interpreted as a closure or as a termination. This value must be specified.	
elementName	text[100]	The name of the device model can be specified.	
elementInfo	text[255]	Additional information on the device model can be specified.	
active	boolean	Only active types can be selected and assigned using NET Engineering.	Recommended value: true
type	text[100]	A model designation can be specified.	Manufacturer specification

Attribute	Type	Description	Comments
orderNumber	text[100]	A order number can be specified.	Manufacturer specification
elementDescription	text[255]	A description regarding the model can be specified.	Manufacturer specification
materialPrice	measure	The material cost can be specified.	Manufacturer specification
servicePrice	measure	The service cost can be specified.	Manufacturer specification
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with device models are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	supports	device model	

4.6.6 Cable Trunk

A cable trunk is used for managing cables, the cable trunk itself has no geometry.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
telecomType	telecomType	This value must be specified.	Recomended value: fiberOptics
elementName	text[100]	The name of the cable trunk can be specified.	

Attribute	Type	Description	Comments
elementInfo	text[255]	Additional information on the cable trunk can be specified.	
color	color	A trunk color can be specified.	A maximum of one referenced color is expected here.
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with cable trunks are commonly used:

Parent element	Relationship type	Child element(s)	Description	Comments
device	contains	cable trunk		
cable trunk	contains	cable		

4.7 Fiber Level

4.7.1 Attenuation (data type)

A loss value that can be assigned to both telecom elements and their models. If a loss value is assigned to a model, every telecom element with this model also has this value. If the loss value is assigned directly to a telecom element, the value applies only to this element and also overwrites any value that was set by the model.

Attribute	Type	Description	Comments
wavelength	text[255]	The wavelength of the attenuation should be specified. Default values: • unknown (DE unbekannt) • 850nm (DE 850nm) • 1310nm (DE 1310nm) • 1550nm (DE 1550nm)	The values are part of an enumeration that is expanded when importing unknown values.

Attribute	Type	Description	Comments
value	measure	The attenuation value should be specified.	The unit is always regarded as decibel.

4.7.2 Connector

A connector terminates the end of a fiber, allowing for faster connection and disconnection than splicing.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
telecomType	telecomType	This value must be specified.	Recomended value: fiberOptics
elementName	text[100]	The name of the connector can be specified.	
elementInfo	text[255]	Additional information on the connector can be specified.	
modelReference	reference	Assigned type of the connector (see ConnectorModel) can be specified.	
attenuation	attenuation()	A set of attenuations can be specified specifically for this connector.	If there is no deviation, the attenuation attribute in the ConnectorModel should be used instead.
isStart	boolean	The information as to whether this connector is the start of a network path can be specified.	

Attribute	Type	Description	Comments
status	text[100]	A current construction status can be specified. Default values: • Planning (DE Planung) • Existed (DE Bestand) • Under construction (DE Im Bau)	The values are part of an enumeration that is expanded when importing unknown values.
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with connectors are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	uses / supports	connector	
patch panel	contains	connector	The position attribute is used to describe the position number of the connector in patch panel.
device	contains	connector	The position attribute is used to describe the place of the connector in device.
connector / fiber	forwardflow / backwardflow	fiber / connector	
connector / splitter path	forwardflow / backwardflow	splitter path / connector	
connector / patch	forwardflow / backwardflow	patch / connector	
connector	connected to	splice	

4.7.3 Connector Model

Connector models hold details and manufacturer specifications about used connectors.

NET Import: If these models have no source information, they are compared by name to existing connector models in the target industry model and matched if they are identical.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
telecomType	telecomType	This value must be specified.	Recomended value: fiberOptics
elementName	text[100]	The name of the connector model can be specified.	
elementInfo	text[255]	Additional information on the connector model can be specified.	
angledPolish	boolean	Whether the connector has an angled polish or not can be specified.	
attenuation	attenuation()	A set of attenuations can be specified for this connector model.	
active	boolean	Only active types can be selected and assigned using NET Engineering.	Recommended value: true
type	text[100]	A model designation can be specified.	Manufacturer specification
orderNumber	text[100]	A order number can be specified.	Manufacturer specification
elementDescription	text[255]	A description regarding the model can be specified.	Manufacturer specification
materialPrice	measure	The material cost can be specified.	Manufacturer specification

Attribute	Type	Description	Comments
servicePrice	measure	The service cost can be specified.	Manufacturer specification
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with connector models are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	supports	connector model	

4.7.4 Fiber

Fibers transmit optical signals over long distances. Each fiber must be assigned to exactly one cable.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
telecomType	telecomType	This value must be specified.	Recomended value: fiberOptics
elementName	text[100]	The name of the fiber can be specified.	
elementInfo	text[255]	Additional information on the fiber can be specified.	
modelReference	reference	Assigned type of the fiber (see FiberModel) can be specified.	

Attribute	Type	Description	Comments
attenuation	attenuation()	A set of attenuations can be specified specifically for this fiber.	If there is no deviation, the attenuation attribute in the FiberModel should be used instead.
color	color	A fiber color can be specified.	A maximum of one referenced color is expected here.
status	text[100]	A current construction status can be specified. Default values: • Planning (DE Planung) • Existed (DE Bestand) • Under construction (DE Im Bau)	The values are part of an enumeration that is expanded when importing unknown values.
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with fibers are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	uses / supports	fiber	
building	connected to	fiber	
cable	contains	fiber	The position attribute is used to describe the position of the duct.
connector / fiber	forwardflow / backwardflow	fiber / connector	
splice / fiber	forwardflow / backwardflow	fiber / splice	

Parent element	Relationship type	Child element(s)	Comments
splice	connected to	fiber	Provided by *NET Export*, not required for *NET Import*.
fiber	connected to	patch	

4.7.5 Fiber Model

Fiber models hold details and manufacturer specifications about used fibers.

NET Import: If these models have no source information, they are compared by name to existing fiber models in the target industry model and matched if they are identical.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
telecomType	telecomType	This value must be specified.	Recomended value: fiberOptics
elementName	text[100]	The name of the fiber model can be specified.	
elementInfo	text[255]	Additional information on the fiber model can be specified.	
code	text[5]	A short value for the fiber type can be specified.	
attenuation	attenuation()	A set of attenuations can be specified for this fiber model.	
active	boolean	Only active types can be selected and assigned using NET Engineering.	Recommended value: true
type	text[100]	A model designation can be specified.	Manufacturer specification

Attribute	Type	Description	Comments
orderNumber	text[100]	A order number can be specified.	Manufacturer specification
elementDescription	text[255]	A description regarding the model can be specified.	Manufacturer specification
materialPrice	measure	The material cost can be specified.	Manufacturer specification
servicePrice	measure	The service cost can be specified.	Manufacturer specification
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with fiber models are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	supports	fiber model	

4.7.6 Patch

Patches are used to connect different telecom nodes. Further down, depending on the intended use, a distinction is made as to which additional attributes are used.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
telecomType	telecomType	This value must be specified.	Recomended value: fiberOptics
elementName	text[100]	The name of the patch can be specified.	

Attribute	Type	Description	Comments
elementInfo	text[255]	Additional information on the patch can be specified.	
length	length	The length of the patch can be specified.	
status	text[100]	A current construction status can be specified. Default values: • Planning (DE Planung) • Existed (DE Bestand) • Under construction (DE Im Bau)	The values are part of an enumeration that is expanded when importing unknown values.
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

In the case of regular use as patches between two connectors or between connector and active port, the following is also specified:

Attribute	Type	Description	Comments
attenuation	attenuation()	A set of attenuations can be specified for this patch.	
isStart	boolean	The information as to whether this patch is the start of a network path can be specified.	
isHard	boolean	The information as to whether this patch cannot be replaced can be specified.	
port	text[100]	If this patch connects to an active port, a name can be specified.	

If the connection is used, for example, as an 'extension' of a fiber connection across cassettes or devices, the following attributes are of interest:

Attribute	Type	Description	Comments
modelReference	reference	Assigned type of the patch (see FiberModel) can be specified.	
color	color	A patch color can be specified.	A maximum of one referenced color is expected here.

The following element relationships with patches are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	uses / supports	patch	
building	connected to	patch	
switching point	contains	patch	
fiber	connected to	patch	
splice / patch	forwardflow / backwardflow	patch / splice	
connector / patch	forwardflow / backwardflow	patch / connector	

4.7.7 Splitter

A fiber optic splitter is an waveguide optical power distribution device that can split an incoming light beam into two or more light beams and vice versa, containing multiple input and output ends.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is mandantory.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.

Attribute	Type	Description	Comments
telecomType	telecomType	This value must be specified.	Recomended value: fiberOptics
elementName	text[100]	The name of the splitter can be specified.	
elementInfo	text[255]	Additional information on the splitter can be specified.	
modelReference	reference	Assigned type of the splitter (see SplitterModel) should be specified.	
attenuation	attenuation()	A set of attenuations can be specified specifically for this splitter.	If there is no deviation, the attenuation attribute in the SplitterModel should be used instead.
status	text[100]	A current construction status can be specified. Default values: • Planning (DE Planung) • Existed (DE Bestand) • Under construction (DE Im Bau)	The values are part of an enumeration that is expanded when importing unknown values.
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with splitters are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	uses / supports	splitter	
building	connected to	splitter	

Parent element	Relationship type	Child element(s)	Comments
device	contains	splitter	The position attribute is used to describe the place of the splitter.
tray	contains	splitter	The position attribute is used to describe the place of the splitter in tray.
splitter	contains	splitter path	The position attribute is used to describe the number of the splitter path in splitter on in/ out.
splitter / splitter path	forwardflow / backwardflow	splitter path / splitter	

4.7.8 Splitter Model

Splitter models hold details and manufacturer specifications about used splitters.

NET Import: If these models have no source information, they are compared by name to existing splitter models in the target industry model and matched if they are identical.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
telecomType	telecomType	This value must be specified.	Recomended value: fiberOptics
elementName	text[100]	The name of the splitter model can be specified.	
elementInfo	text[255]	Additional information on the splitter model can be specified.	
splitCountIn	integer	The number of splitter inputs should be specified.	

Attribute	Type	Description	Comments
splitCountOut	integer	The number of splitter outputs should be specified.	
attenuation	attenuation()	A set of attenuations can be specified for this splitter model.	
active	boolean	Only active types can be selected and assigned using NET Engineering.	Recommended value: true
type	text[100]	A model designation can be specified.	Manufacturer specification
orderNumber	text[100]	A order number can be specified.	Manufacturer specification
elementDescription	text[255]	A description regarding the model can be specified.	Manufacturer specification
materialPrice	measure	The material cost can be specified.	Manufacturer specification
servicePrice	measure	The service cost can be specified.	Manufacturer specification
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with splitter models are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	supports	splitter model	

4.7.9 Splitter Path

A splitter path represents an input/output of a splitter that can be connected to fibers via a splice.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
telecomType	telecomType	This value must be specified.	Recomended value: fiberOptics
elementName	text[100]	The name of the splitter path can be specified.	
elementInfo	text[255]	Additional information on the splitter path can be specified.	
length	length	A length of the splitter path can be specified.	
attenuation	attenuation()	A set of attenuations can be specified for this splitter path.	
type	text[255]	One of the default values must be specified. Default values: • In (DE In) • Out (DE Out)	
status	text[100]	A current construction status can be specified. Default values: • Planning (DE Planung) • Existed (DE Bestand) • Under construction (DE Im Bau)	The values are part of an enumeration that is expanded when importing unknown values.
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with splitter paths are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	uses / supports	splitter path	
building	connected to	splitter path	
splitter path / splice	forwardflow / backwardflow	splice / splitter path	
splitter path / connector	forwardflow / backwardflow	connector / splitter path	
splitter path / splitter	forwardflow / backwardflow	splitter / splitter path	
splitter	contains	splitter path	The position attribute is used to describe the number of the splitter path in splitter on in/ out.
splice	connected to	splitter path	Provided by *NET Export*, not required for *NET Import*.

4.7.10 Splice

A splice is a permanent end-to-end connection between two telecom elements.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
telecomType	telecomType	This value must be specified.	Recomended value: fiberOptics
elementInfo	text[255]	Additional information on the splice can be specified.	

Attribute	Type	Description	Comments
attenuation	attenuation()	A set of attenuations can be specified for this splice.	
status	text[100]	A current construction status can be specified. Default values: • Planning (DE Planung) • Existed (DE Bestand) • Under construction (DE Im Bau)	The values are part of an enumeration that is expanded when importing unknown values.
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with splices are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	uses / supports	splice	
building	connected to	splice	
device	contains	splice	The position attribute is used to describe the position number of the splice in device.
tray	contains	splice	The position attribute is used to describe the place of the splitter in tray.
connector	connected to	splice	
splice / fiber	forwardflow / backwardflow	fiber / splice	
splice / splitter path	forwardflow / backwardflow	splitter path / splice	

Parent element	Relationship type	Child element(s)	Comments
splice / patch	forwardflow / backwardflow	patch / splice	
splice	connected to	fiber	Provided by *NET Export*, not required for *NET Import*.
splice	connected to	splitter path	Provided by *NET Export*, not required for *NET Import*.
splice	connected to	patch	Provided by *NET Export*, not required for *NET Import*.

4.7.11 Tray

Trays are required to store splices, fibers and splitter paths. The tray type determines the number of splice slots available.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
telecomType	telecomType	This value must be specified.	Recomended value: fiberOptics
elementName	text[100]	The name of the tray can be specified.	
modelReference	reference	Assigned type of the tray (see TrayModel) should be specified.	

Attribute	Type	Description	Comments
side	text[255]	A installation side can be specified. Default values: • unknown (DE unbekannt) • A (DE A) • B (DE B)	The values are part of an enumeration that is expanded when importing unknown values. If not specified, this value will automatically be set to “unknown (DE unbekannt)“.
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with trays are commonly used:

Parent element	Relationship type	Child element(s)	Comments
rack panel	contains	tray	The position attribute is used to describe the place of the tray.
device	contains	tray	The position attribute is used to describe the place of the tray.
tray	contains	splice	The position attribute is used to describe the position number of the splice in tray.
tray	contains	splitter	The position attribute is used to describe the place of the splitter in tray.

4.7.12 Tray Model

Tray models hold details and manufacturer specifications about used trays.

NET Import: If these models have no source information, they are compared by name to existing tray models in the target industry model and matched if they are identical.

Attribute	Type	Description	Comments
id	identifier	A unique identifier for the element must be specified.	This attribute is **mandantory**.
source	source	A source identifier that enables import updates can be specified.	Only usable from version 2.1.
telecomType	telecomType	This value must be specified.	Recomended value: fiberOptics
elementName	text[100]	The name of the tray model can be specified.	
elementInfo	text[255]	Additional information on the tray model can be specified.	
numberOfPositions	integer	The specification of the number of positions in tray is highly recommended.	
active	boolean	Only active types can be selected and assigned using NET Engineering.	Recommended value: true
type	text[100]	A model designation can be specified.	Manufacturer specification
orderNumber	text[100]	A order number can be specified.	Manufacturer specification
elementDescription	text[255]	A description regarding the model can be specified.	Manufacturer specification
materialPrice	measure	The material cost can be specified.	Manufacturer specification
servicePrice	measure	The service cost can be specified.	Manufacturer specification
otherAttribute	additionalAttribute()	Additional attributes, that are not included in TNIM, will be exchanged as other attribute.	

The following element relationships with tray models are commonly used:

Parent element	Relationship type	Child element(s)	Comments
person	supports	tray model	