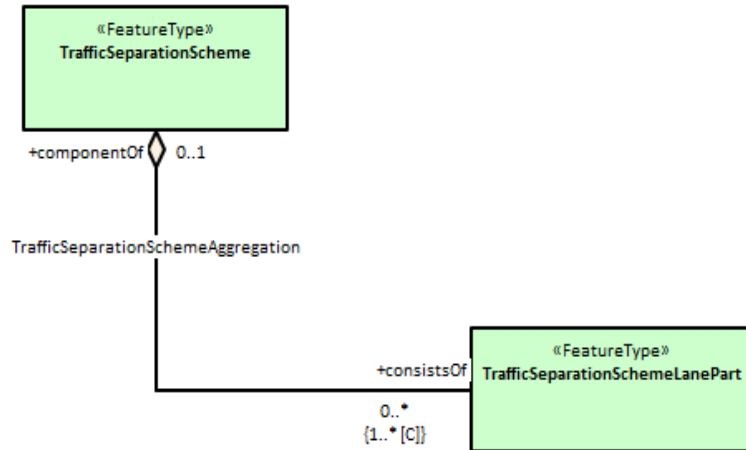


# **Roles in Feature Catalogues**

S-100 TSM8  
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# Usage of *roleType* in feature catalogues



In TrafficSeparationScheme:

```
<S100FC:featureBinding roleType="aggregation">
  <S100FC:multiplicity>
    <S100Base:lower>0</S100Base:lower>
    <S100Base:upper xsi:nil="true" infinite="true"/>
  </S100FC:multiplicity>
  <S100FC:association ref="TrafficSeparationSchemeAggregation"/>
  <S100FC:role ref="consistsOf"/>
  <S100FC:featureType ref="TrafficSeparationSchemeLanePart"/>
</S100FC:featureBinding>
```

In TrafficSeparationSchemeLanePart:

```
<S100FC:featureBinding roleType="aggregation">
  <S100FC:multiplicity>
    <S100Base:lower>0</S100Base:lower>
    <S100Base:upper xsi:nil="false" infinite="false">1</S100Base:upper>
  </S100FC:multiplicity>
  <S100FC:association ref="TrafficSeparationSchemeAggregation"/>
  <S100FC:role ref="componentOf"/>
  <S100FC:featureType ref="TrafficSeparationScheme"/>
</S100FC:featureBinding>
```

- Feature catalogues developed for S-101 and other product specifications use the association type for the *roleType* attribute of *featureBinding*. The *roleType* value is the same in both features.
- Systems need to hard code the determination of which class is “container” and which “containee” based on the value of Role (e.g., consistsOf/componentOf, supports/supportedBy, etc.).
- This does not follow the guidance of S-100, and requires additional product-specific coding or data files. Adding new roles to a product’s feature catalogue will require software updates.

# S-100 needs a clarification

- S-100 5-4.2.5.2 is not clear enough
- The descriptions in Table 5-A-19 describe associations, not association ends.

## 5-4.2.5.2 Feature Bindings

The feature binding describes the association between two feature types. Both the feature association and the association role are specified together with the target feature type. Furthermore the Multiplicity and the role type are defined. The latter describes the nature of the role.

**EXAMPLE** The role 'Lane' used by a traffic separation scheme to associate its lane parts will have the role type Aggregation, whereas the role "Scheme" used from the lane part to the TSS has the role type Association.

Table 5-A-19 — S100\_FC\_RoleType

Role Name	Name	Description	Remarks
Enumeration	S100_FC_RoleType	Defines the type of a role	
Literal	association	An association is used to describe a relationship between two feature types that involves connections between their instances	
Literal	aggregation	An aggregation association is a relationship between two feature types, in which one of the feature types plays the role of a container and the other plays the role of a containee	
Literal	composition	A composition association is a strong aggregation. In a composition association, if a container object is deleted then all of its containee objects are deleted as well. In other words containee objects cannot exist without the container object	

# Proposed Solution for S-100

- S-100 clarification
  - Clarify clause 5-4.2.5.2 and Table 5-A-19
  - Make a corresponding clarification for clause 5-4.2.5.3, which describes information bindings.
  - The details are in the accompanying proposal (reproduced on the next slide).
- Product specification teams must use the correct role types in feature catalogues.

**5-4.2.5.2 Feature bindings**

[Replace the contents of clause 5-4.2.5.2 with the following.]

The feature binding describes the association between two feature types. Each feature binding is contained within the type definition for a “source” feature type in the feature catalogue, and describes the relation of a feature type (the “target”) to the source feature type. A feature binding specifies:

- the name of the feature association;
- the target feature type;
- the role of the target feature type in relation to the source feature (the “role” is the name of the association end at the target);
- the type of association end at the target (ordinary association, aggregation, or composition);
- the multiplicity of the target feature type.

EXAMPLE: The **TrafficSeparationScheme** feature type is associated to the **TrafficSeparationSchemeLanePart** feature by the **TrafficSeparationSchemeAggregation** association. This association is an aggregation and is depicted in the UML diagram below.

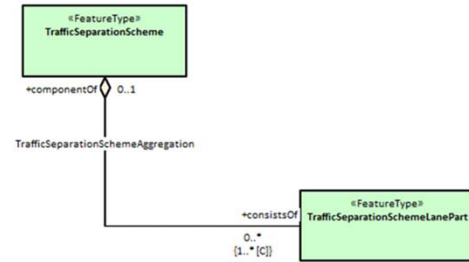


Figure X.X - UML diagram of the TrafficSeparationSchemeAggregation association between TrafficSeparationScheme and TrafficSeparationSchemeLanePart feature classes.

In accordance with UML conventions, the diamond at the TrafficSeparationScheme end means that TrafficSeparationScheme is the “whole” or “container” in the association and TrafficSeparationSchemeLanePart is the “part” or “containeed”. The feature bindings in the respective feature types in the XML feature catalogue are:

In TrafficSeparationScheme:

```

<S100FC:featureBinding roleType="association">
<S100FC:multiplicity>
  <S100Base:lower>0</S100Base:lower>
  <S100Base:upper xsi:nil="true" infinite="true"/>
</S100FC:multiplicity>
<S100FC:association ref="TrafficSeparationSchemeAggregation"/>
<S100FC:role ref="consistsOf"/>
<S100FC:featureType ref="TrafficSeparationSchemeLanePart"/>
</S100FC:featureBinding>
  
```

In TrafficSeparationSchemeLanePart:

```

<S100FC:featureBinding roleType="aggregation">
<S100FC:multiplicity>
  <S100Base:lower>0</S100Base:lower>
  <S100Base:upper xsi:nil="false" infinite="false">1</S100Base:upper>
</S100FC:multiplicity>
<S100FC:association ref="TrafficSeparationSchemeAggregation"/>
<S100FC:role ref="componentOf"/>
<S100FC:featureType ref="TrafficSeparationScheme"/>
</S100FC:featureBinding>
  
```

Note that Product Specifications or data formats may impose constraints on whether bindings are actually encoded in either of the participating feature instances in datasets.

**5-4.2.5.3 Information bindings**

[Replace the contents of clause 5-4.2.5.3 with the following.]

The information binding describes the association between a feature and information type or between two information types. Each information binding is contained within the type definition for a “source” feature or information type in the feature catalogue, and describes the relation of an information type (the “target”) to the source type. An information binding specifies:

- the name of the information association;
- the target information type;
- the role of the target information type in relation to the source feature or information type (the “role” is the name of the association end at the target);
- the type of association end at the target (ordinary association, aggregation, or composition);
- the multiplicity of the target information type.

The structure of the feature catalogues is similar to the example in clause 5-4.2.5.3 except that one or both of the types will be an information type and the XML will be for “informationBinding” instead of “featureBinding”.

As for feature bindings, Product Specifications or data formats may impose constraints on whether bindings are actually encoded in either of the participating feature instances in datasets (for example, S-101 specifies that for an information association linking a feature to an information type, the binding is encoded only in the feature instance and therefore the S-101 feature catalogue may not include the binding in the information type, only in the feature type).

Table 5-A-19:

[Replace this table with the following table, and add the note following.]

Role Name	Name	Description	Remarks
Enumeration	S100_FC_RoleType	Defines the type of an association end (i.e., a “role”)	
Literal	association	The association end is an ordinary linkage. (In UML terms, the role type is “aggregationKind=ordinary” and the link in a diagram does not have a diamond.)	The object at this end may be participating in an ordinary association, an aggregation, or a composition.
Literal	aggregation	The association end is a UML aggregation. (In UML terms, the role type is “aggregationKind=aggregation” and the link in a diagram has an unfilled diamond at this association end.)	The object at this end is the “owner”, “whole” or “container” in an aggregation association.
Literal	composition	The association end is a UML aggregation. (In UML terms, the role type is “aggregationKind=composition” and the link in a diagram has a filled diamond at this association end.)	The object at this end is the “owner”, “whole” or “container” in a composition association.

NOTE: If one end of the association is “aggregation” or “composition”, the other end must be coded as “association”.