Paper for Consideration by the S-100WG

Scale properties at feature to geometry relations

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Executive Summary:	Proposal to fix errors in the definition of scale properties at relations from feature objects to geometry
Related document(s):	S-100 Part 3 + S-100 Part 10a

Introduction / Background

In S-57 two feature attributes exists to control the depiction of a feature instance: SCAMIN and SCAMAX.

The SCAMIN attribute is defined in the Feature catalogue as follows:

„**The minimum scale at which the object may be used e.g. for ECDIS presentation.** “

In the indication section the following is noted:

„**The modulus of the scale is indicated, that is 1:1 250 000 is encoded as 1250000;** “

Though the correct mathematical term should *reciprocal* or *multiplicative inverse* instead of *modulus*, the example makes it quite clear, and the definition is correct. It is the smallest scale, means that for any smaller scale the feature should not be used (e.g., depicted).

The attribute SCAMAX is similar defined as the maximum scale. Nevertheless, in S-57 ENCs the attribute SCAMAX is not used at all.

The S-100 general feature model defines a second mechanism to control the scale related depiction (or other uses) of feature objects. It defines two properties at the relation from the feature to the geometry: scaleMinimum and scaleMaximum. It is modelled in the class ***S100_GF_SpatialAttributeType*** (***S-100 3-5.3.5***). The main reason for these properties is to allow different geometries to be used for depiction at different scales for the same feature object.

Analysis/Discussion

The definition in S-100 part 3 reads:

Role Name	Name	Description	Mult.	Type
Class	S100_GF_ SpatialAttributeType	Class representing a spatial attribute, which shall be used to express spatial characteristics of a feature type	-	-
Attribute	scaleMinimum	The smallest denominator of a scale for that an instance of a feature type shall be used (for example for portrayal)	0..1	PositiveInteger
Attribute	scaleMaximum	The largest denominator of a scale for that an instance of a feature type shall be used (for example, for portrayal)	0..1	PositiveInteger
Attribute	geometry	The object that describes the geometry of an instance of a feature type	1	GM_Object
Attribute	maskReference	Reference indicating masked or truncated spatial primitives or objects	0..*	S100_MaskReference

The definitions for scaleMinimum and scaleMaximum are wrong, and they are misleading. The smallest denominator leads to the largest scale, which is not correct for the scaleMinimum property. Also, the wording is not very clear it does not specify how the behaviour should be regarding this scale. Additionally, the properties do not control the usage of the instance of the feature type but the usage of the related geometry for the instance of the feature type.

Another occurrence of these properties can be found in S-100 Part 10a (ISO8211 encoding)

The definition of the **SPAS** field (***S-100 10a-5.10.2.3***) reads:

Field Tag: **SPAS**	Field Name: Spatial Association

Subfield name	**Label**	**Format**	**Subfield content and specification**
Referenced Record name	*RRNM	b11	Record name of the referenced record
Referenced Record identifier	RRID	b14	Record identifier of the referenced record
Orientation	ORNT	b11	{1} Forward {2} Reverse {255} NULL (Not Applicable)
Scale Minimum	SMIN	b14	Denominator of the largest scale for which the feature type can be depicted by the referenced spatial object If the value is 0 it does not apply
Scale Maximum	SMAX	b14	Denominator of the smallest scale for which the feature type can be depicted by the referenced spatial object If the value is 2^{32}-1 it does not apply
…			

Here the definitions are not correct as well. The wording is better, but the definitions are swapped, the definition for scaleMinimum must be used for scaleMaximum and vice versa.

It is worth to be mentioned that the values for ‘not apply’ do not conform to the general use for the ISO8211 encoding but should be kept for backward compatibility.

Conclusions

To correct the error in the definitions in Part 3 the following definitions should be used.

S-100 3-5.3.5

Attribute	scaleMinimum	The denominator of the smallest scale for which the referenced geometry can be used for the instance of the feature type e.g., for depiction.	0..1	PositiveInteger
Attribute	scaleMaximum	The denominator of the largest scale for which the referenced geometry can be used for the instance of the feature type e.g., for depiction.	0..1	PositiveInteger

In part 10a the definitions should be amended as follows using the same definitions:

S-100 10a-5.10.2.3

Subfield name	**Label**	**Format**	**Subfield content and specification**
Referenced Record name	*RRNM	b11	Record name of the referenced record
Referenced Record identifier	RRID	b14	Record identifier of the referenced record

Orientation	ORNT	b11	{1} Forward {2} Reverse {255} NULL (Not Applicable)
Scale Minimum	SMIN	b14	The denominator of the smallest scale for which the referenced geometry can be used for the instance of the feature type e.g., for depiction. {2^{32}-1} NULL (Not Applicable) (See Note)
Scale Maximum	SMAX	b14	The denominator of the largest scale for which the referenced geometry can be used for the instance of the feature type e.g., for depiction. {2^{32}-1} NULL (Not Applicable) (See Note)
…			

The following note should be added to the table:

For a correct handling of older data, robust parsers should consider both 0 and 2^{32}-1 as 'Not Applicable' for the SMIN and the SMAX sub-field.

Recommendations

Amend S-100 Part 3 and Part 10a as described above.

Action Required by the S-100WG

The S-100WG is invited to:

a. Note this paper
b. Discuss the paper
c. Revise the proposals if necessary
d. Endorse the proposed changes