Paper for Consideration by the S-101PT

Use of SMIN/SMAX in S-101

***Submitted by**:*	SevenCs GmbH – Holger Bothien
***Executive Summary**:*	Proposal to clearly define the use of SMIN/SMAX values at feature to geometry relations
Related Documents:	S-101 Product Specification

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.

In S-101 the attribute ‘scaleMinimum’ is used as a successor of SCAMIN with the identical definition and the indication is use in the remark section of the feature catalogue.

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 are wrong, and they are misleading. A separate proposal will be made to the S-100 WG to fix this.

For information: Then the definition should read:

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

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
Spatial Association Update Instruction	SAUI	b11	{1} - Insert {2} - Delete

Here the definitions are swapped again. The above-mentioned proposal for S-100 will cover this as well.

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.

In the S-101 product specification in Annex B the wrong definitions can be found since they have been copied from S-100 to here.

The two occurrences can be found in S-101 B-5.1.31 and B-6.1.30.

Since the mechanism is not used in S-101 it is not necessary to repeat the definition in this place.

Conclusions

In the S-101 product specification a section should be included to clearly state that the scaleMinimum/scaleMaximum properties of ***S100_GF_SpatialAttributeType*** are not used for the product. The best place for this is the section 4.8 inserting a new section 4.8.2 named "Use of scales properties at the feature to geometry relations".

The text of this section should read:

> The properties scaleMinimum and scaleMaximum of S100_GF_SpatialAttributeType will not be used. Therefore, the encoding must always encode the values for 'Not Apply'.
>
> The scale dependent depiction will be controlled by the thematic attribute 'scaleMinimum' at the feature type only.

In the Annex B the description of the field SPAS (S-101 B-5.1.31 and S-101 B-6.1.30) should be amended to:

Scale Minimum	SMIN	b14	{2^{32}-1} – NULL (Not Applicable) – see Note
Scale Maximum	SMAX	b14	{0} – NULL (Not Applicable) – see Note

The following note should be entered to both tables (S-101 B-5.1.31 and S-101 B-6.1.30)

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

We recommend including the proposed changes in the S-101 product specification.

Action Required by the S-101PT

The S-101PT is invited to:

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