

Revised S-100 Part 8

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Executive Summary:	Describes revisions to S-100 5.0.0 Part 8 (Imagery and Gridded Data).
Related Documents:	S-100TSM9-3 (Alignment with Part 8); Parts 8 and 10c redlines
Related Projects:	S-100

Introduction / Background

This paper describes revisions made in the accompanying draft of S-100 Part 8 to harmonize it with the rest of S-100 especially Part 10c. Since the IHO specified that this task should not add extensions, no extensions to Part 8 or other Parts of S-100 have been included.

The resulting draft does not require any changes to data products which are compatible with S-100 Edition 5.0.0. Since clause numbering, figures, tables, and some class names in Part 8 have changed, editorial changes to Product Specifications should be made the next time they are updated after publication of S-100 Edition 5.1, to update any references to Part 8 or Part 10c which have been made obsolete by this version. The HDF5 encoding format is not affected by the revisions and therefore changes to implementations are not required.

Summary of revisions

Introductory and overview material has been revised to bring old information and references up-to-date and align with practice in recent HDF5 product specifications (S-102, S-104, S-111).

Statements relating to the provision of discovery metadata in the exchange catalogue (Part 17) have been added to discussions of metadata.

Discrete grid point coverage has been included as an additional option for grids because S-111 (Surface Currents) uses discrete grid point coverage.

A new figure and new material clarifying the relationship of grid points to sample space have been added to Clause 8-6.2.8 (Grid cell structure).

Attributes of various spatial schema classes in Part 8 have been updated to align with the HDF5 encoding (Part 10c). The spatial schema has been simplified by removing some S-100 classes that are identical to ISO 19123 and ISO 19129 classes. Class names have been updated to use the S100_IF_ prefix (ISO 19129 uses IF_).

Attributes and roles in UML diagrams are documented in tables like UML diagrams in other Parts.

The “template application schemas” for quadrilateral grids and Riemann grids have been deleted.

Minor corrections have been made throughout to update statements or phrases obsoleted by later developments.

Revision details

This section lists the revisions in more detail but does not describe every difference from Edition 5.0.0. The omissions are believed to be minor but the accompanying redline document should be reviewed for full details about differences from Edition 5.0.0.

- 1) Clause 8-1 Scope has been updated to align the content with actual practice in S-102, S-104, S-111 and other Product Specifications under development.
- 2) Clause 8-2 Conformance has been updated with new content describing conformance of Part 8 to ISO standards, backward compatibility.
- 3) Clause 8-3 References has been divided into normative and informative references. References have been updated and older references still being used by S-100 have had the publication date added to fix the reference to particular editions which have been or may be superseded by newer editions.
- 4) Clause 8-4 Symbols and abbreviated terms - “LIDAR” has been added to TIN. I recommend that both abbreviations be added to S-100 Annex A (Glossary), after which this entire clause can be deleted.
- 5) Clause 8-5 Imagery and Gridded data Framework - Figure 8-2 Overall relationships has been updated to replace obsolete references and remove discrete surfaces, which are not used in Part 8. A brief paragraph referencing the role of external metadata in the exchange catalogue (Part 17) is added.

- 6) Clause 8-5.3 paragraph 3 has been split and extended with a clarification about how the Part 3 GFM is applied to coverage features.
- 7) Clause 8-5.3.1 revised to clarify that Product Specifications are not required to use or specify the metadata elements in the table, and that if they do it may be encoded as embedded or external metadata (the forthcoming editions of S-104, S-111, S-102 encode their product-specific metadata only embedded within the HDF5 files).
- 8) Clause 8-5.3.2 Encoding has been revised to remove general information about various encoding formats, given that S-100 uses the HDF5 format specified in Part 10c, which was developed after Part 8 was originally written. This clause now consists of just a brief introduction followed by a reference to Part 10c.
- 9) Clause 8-6.1 Coverages has been restructured to distinguish discrete and continuous coverages.
- 10) Clause 8-6.2.1 - 7: Minor updates to harmonize with actual practice in S-104, S-111, and S-102.
- 11) Clause 8-6.2.8 (Grid cell structure) has a new figure and new material clarifying the relationship of grid points to sample space.
- 12) Clause 8-6.3 (Dataset structure) Figure and text have been updated to:
 - a. harmonize class names with the corresponding diagram from ISO 19129 (which uses the IF_ prefix);
 - b. clarify that S-100 datasets realize IF_Collection instead of having an unexplained 1..* association;
 - c. add classes for content, identification, and CRS information to S100_IF_CollectionMetadata (Part 10c already defines metadata attributes corresponding to these concepts)
 - d. make the *metadata* attribute embedded in the dataset (class S100_IF_Collection) optional (none of S-102, S-104, or S-111 is actually using it);
 - e. add the abstract class S100_Tiling; since a uniform tiling scheme for S-100 has not been developed, this is an optional abstract class that Product Specifications must realize and define if they use tiling.
- 13) Attributes and roles in the UML diagrams are now documented in tables like the diagrams in other S-100 Parts, excepting placeholder classes which are not developed further in this Part.
- 14) Clause 8-8 (Spatial Schema): All the UML diagrams have been revised:
 - a. Figure 8-21 (ex 8-20) S100_Point - the surfaceType attribute has been removed - it is not provided in Part 10c and no Project Team appears to have used it.
 - b. A new clause describing the ISO 19123 class CV_GeometryValuePair and its subclasses CV_PointValuePair and CV_GridPointValuePair is added. They are used elsewhere in Part 8.
 - c. Figure 8-22 (ex 8-21) S100_PointCoverage is simplified by removing S100_VertexPoint, which added nothing to CV_PointValuePair. New notes below the corresponding table clarify the use of the attributes domainExtent and commonPointRule.
 - d. Figure 8-23 (ex. 8-22) S100_TINCoverage is simplified by removing S100_VertexPoint and S100_Triangle, which added nothing to the corresponding ISO classes. The multiplicity of domainExtent is made 0..1 to synchronize with Part 10c.
 - e. Figure 8-24 (ex. 8-23) S100_GridCoverage is modified to:
 - i. add discrete grid point coverage as a supertype of S100_Grid;
 - ii. add the attribute interpolationParameters (Part 10c has it) and display the attributes domainExtent, rangeType, commonPointRule which are inherited from CV_Coverage (corresponding encoding is already defined in Part 10c);
 - iii. add CV_GeometryValuesPair as an alternate to S100_IF_GridValues (the former applies only to regular grids and variable cell size grids, irregular and ungeorectified grids use the latter because they encode the coordinates of individual grid points as well as data values);
 - iv. change the relationship between S100_IF_GridCoverage and S100_IF_Grid from realization to composition (a grid coverage must own a grid spatial instance).
- 15) The former clause 8-9 "Rectified or Georeferencable Grids" is now placed within clause 8-8 "Spatial Schema", because clause 8-9 describes spatial models for specific types of grids which are already covered by the grid model in clause 8-8. The figure 8-25 (ex 8-24) "Rectified or Georeferenceable Grids" has been updated by adding S100_IF_Grid to show that the S-100 class is capable of modelling both georectified and georeferencable grids.
- 16) The new clause 8-8.7 adds the ISO 19129 enumerations currently in Part 10c to Part 8.

- 17) The Ed. 5.0.0 clause 8-15 “Spatial Schema for Point Sets” combined four disparate topics (Template Application Schema for a Quadrilateral Grid Coverage, Template Application Schema for a Riemann Grid Coverage, metadata for scanned images, and a model for feature oriented images). The two template application schemas have been removed and the other two topics promoted to separate top-level clauses).
- 18) Appendix 8-A (Abstract Test Suite) has been updated to harmonize with changes to the rest of Part 8 (i.e., update class names and remove references to deleted classes).
- 19) Minor editorial corrections have been made throughout Part 8 to align with the evolution of S-100 since Part 8 was originally prepared.

Recommendations

Part 8 contains several discussions addressing topics which may be better suited to other documents:

- (1) Metadata specific to coverage and gridded metadata is addressed in some detail in several places, particularly: Clause 8-5.3.1; Clause 8-6.3; Clause 8-10; Clause 8-14; Appendix 8-D. Given that in the near term application systems especially ECDIS are not expected to make use of metadata encoded elsewhere than in the exchange catalogue discovery blocks, should such details about metadata be retained or removed?
Recommendation: Retain the discussion in Appendix 8-D and delete the tables and larger text blocks which describe metadata located in other places within Part 8 (or move all the metadata discussions to Appendix 8-D).
- (2) There are multiple places where Part 8 contains discussions specific to pictures/imagery as opposed to coverage datasets. Examples are the fourth paragraph of clause 8-5.3 (redline document); clause 8-14 (Metadata for scanned image); Appendix 8-C (Quality model for Imagery and Gridded Data - all the checks pertain to visual quality). Noting that the title of Part 8 does include “Imagery”, should these details about picture/image data be retained or removed?
Recommendation: Remove clause 8-14 (Metadata for scanned image) and the metadata discussion in clause 8-5.3. Retain Appendix 8-C for potential elaboration and use by Product Specifications, since some tests are apparently relevant to “screen-filling” portrayals too.
- (3) Is Appendix 8-B (Terminology), which explains ISO usages of terms related to coverage/gridded data in relation to S-57 usages, still needed?
Recommendation: Ask the relevant project teams (S-102, S-104, S-111, S-412, ...) if anyone wants to retain it.

None of the above issues is considered critical for the publication of S-100 Edition 5.1.

Actions Requested

The S-100 WG is invited to:

- Review and endorse the corrections to S-100 Part 8.
- Advise on the questions and recommendations in the Recommendations section of this paper, noting that none of them are critical issues for S-100 Edition 5.1.
- Endorse the accompanying S-100 maintenance proposal detailing changes to other Parts of S-100 necessary for alignment with the revised Part 8.