IHO S-121
Maritime Limits and Boundaries

Overview

**Submission to S-100 WG**

**Version 1.0**

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Overview

Our planet’s oceans are subdivided by international and national laws into many zones. At the highest level, these zones define where States exercise sovereignty and sovereign rights and identify areas beyond national boundaries that fall under international jurisdiction.

Maritime Limits and Boundaries (MLBs) are the constructs used to delineate maritime zones. These maritime zones are established in national legislation by their geographic limits.

To effectively distribute MLBs for the due publicity obligations under the United Nations Convention on Law of the Sea (UNCLOS) and for operational purposes, there needs to be a standard framework which ensures legal traceability and compatibility across different platforms for visualization and/or navigation.

The S-121 standard framework aims at providing a set of feature types and an attribute structure that allow for the representation of the legal and spatial aspects of MLBs. These features can be included within any paper product or electronic system that requires the rigorous depiction of MLBs or can be represented separately as “lists of geographical coordinates of points”.

Legal practice still favours the use of hard copy products such as maps and charts or the express declaration of co-ordinates to declare the location of maritime limits and boundaries. An important exchange format for the standard is the encoding in a human readable form that can be presented in a legal setting and understood without specialized knowledge or equipment.

The International Hydrographic Organisation (IHO) has defined the S-100 Universal Hydrographic Data Model as a versatile standard framework aligned with the International Organization for Standardization (ISO) 19100 Geographic Information / Geomatics series of standards. The IHO S-100 standard aims to support a wide range of users by developing digital products and transfer standards for the marine community beyond the core hydrographic applications of the IHO. This includes support for MLBs.

The Maritime Limits and Boundaries standard - S-121 represents an essential extension of the S-100 suite of standards for the administration of the marine domain. S-121 establishes a framework for communicating in a digital form the geographic extents of marine areas and the associated rights and restrictions that apply to them.

The S-121 also delivers a flexible and expandable framework able to support other maritime delimitation requirements such as defining areas of overlapping jurisdiction; Joint Development Areas or any other management areas.

The S-121 standard leverages the capabilities of the ISO 19152 Land Administration Domain Model. ISO 19152 supports the description of associated rights, restriction and responsibilities along with providing proper referencing through sourcing and versioning. This capability aligns the standard with the legal practices of traceability. The use of ISO 19152 provides a foundation to extend S-121 into the management of other regulated boundaries, such as marine reserves and fisheries. Alignment with the land domain model will facilitate consistent administration of the littoral zone for those states that adopt S-121 for their marine spaces and ISO 19152 for their land jurisdiction.

By compliance with S-100, the S-121 standard remains compatible with S-101 (Electronic Nautical Chart Product Specification) to allow for the depiction of the MLB information encoded by the standard to be displayed in electronic navigation charts. That is, a feature object such as the Territorial Sea zone or the Outer Limit of the Territorial Sea can be imported directly into S-101 and become feature objects in an Electronic Nautical Chart. In the S-121 environment these objects would carry additional attribution that allows the description of rights restrictions and responsibilities and support versioning and source referencing to maintain legal traceability.

The S-121 takes a practical step toward achieving the vision of S-100 as it was established to expend the user base. By building on ISO 19152, the S-121 framework provides the capacity to more efficiently and consistently administer across the land and maritime domains. Use of the S-121 standard will reduce costs of enforcement and compliance, and will support the extension of the digital economy into the offshore.

The S-121 standard consists of a product specification compliant with the relevant International Organization for Standardization (ISO) and International Hydrographic Organization (IHO) standards. The product specification for Maritime Limits and Boundaries is based directly on IHO S-100. The data model makes use of the S-100 geometry and the S-100 feature and attribute structure. It defines several new feature types and attributes types. The approach used is the creation of several information object types that behave as attributes to the features by reference. This allows relations to be established between the information objects permitting a complete description of a legal environment including reference to shared versioned parties, rights, restrictions and responsibilities, and sources.

Built on top of the data model structuring the information, there is a need for several encodings (exchange format) to support key usages. (1) MLB objects may be used as a source for some elements of navigation products such as ENC and in that context would follow an S-101 encoding. (2) A separate encoding would be needed for a stand-alone MLB product or the use of MLB objects in a Marine Cadastre. (3) This standard also establishes a structured text record-oriented exchange format that is both readable and comprehensive by both the human eye and a computer. This exchange format is designed to support the description of legal aspects of the MLB objects in a manner so that they can easily be presented in a court or other legal venue. This data needs to look similar to the current text in treaties and laws. This human readable format is the encoding required to meet the States Parties’ deposit obligations under UNCLOS.

MLB objects have four major components:

1. The party component which defines the different actors and the role associated with an object.
2. The geospatial component which defines the location and type of the object.
3. The legal component, which supports the description of the associated jurisdictions, and rights, restrictions and responsibilities associated with objects. A governance information object allows the legal text that normally accompanies a submission or treaty to be included.
4. The source component, which references administrative or spatial sources such as treaties, legal documents, charts and other sources.

In addition to these components the S-121 standard provides a versioning capability. Historical tracking (versioning) of an object’s evolution is required in legal or political disputes to justify the representation of a particular MLB object.

This document is structured as a Data Product Specification as defined in the ISO standard ISO 19131 Geographic Information – Data Product Specifications and IHO S-100 Part 11. One general product specification is defined, with several conformance classes. These conformance classes invoke different parts of the product specification allowing one to address different needs.

Associated with the S-121 Product Specification document are several support documents. These are:

An **Overview document** that outlines the purpose and approach of S-121.

A **Feature Model document** that describes all of the feature objects and attributes defined for Maritime Limits and Boundaries. This includes a complete Feature Catalogue giving the definition of each feature, attribute, code list and listed value.

A **Derivation of Classes document**. The Product Specification document contains the Application Schema data model; however, the classes used in this data model derive from IHO S-100, ISO 19152 LADM (Land Administrative Domain Model) and other ISO standards. The Derivation of Classes document details the relationships such as inheritance and realization between the S-121 data model and the source classes from these other standards. This document is of primary importance to developers who already have an S-100 or ISO GIS implementation.

An **Encoding Document** that describes the approach to encoding S-121 data including the definition of a record-oriented text format that can be easily read by humans and which supports deposition with the UN and legal review.