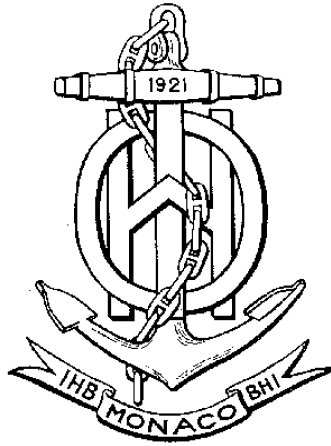


# INTERNATIONAL HYDROGRAPHIC ORGANIZATION

TSMAD26/DIPWG5-11.10A



## Maritime Boundary Exchange Specification

Draft 0.0.1 –May 2013

Maritime Boundary Exchange Specification

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## Background

Concurrent with the advent of electronic navigation, Geographical Information Systems (GIS) and the online delivery and exchange of information; the need arose for a high precision data format for the exchange of officially recognised maritime boundaries and zones.

Such an exchange format would enable States to exchange, lodge and distribute their maritime boundaries in a form that would be portable across a number of applications and platforms. The format's primary function is for States to exchange maritime boundary information in a recognised format, both between States and as the preferred format for lodgement to the United Nations.

Furthermore, the format would encourage the development of digital marine spatial data infrastructures to improve all aspects of ocean management. The format will be appropriate for MSDI, GIS and online utilisation.

Recognising the need for the development of a standard, at the request of States the General Assembly of the United Nations, in paragraph 6 of its resolution 59/24 of 17 November 2004, requested:

*"the Secretary-General to improve the existing Geographic Information System for the deposit by States of charts and geographical coordinates concerning maritime zones, including lines of delimitation, submitted in compliance with the Convention, and to give due publicity thereto, in particular by implementing, in cooperation with relevant international organizations, such as the International Hydrographic Organization, the technical standards for the collection, storage and dissemination of the information deposited, in order to ensure compatibility among the Geographic Information System, electronic nautical charts and other systems developed by these organizations."*

The specifications outlined in this publication should be considered as the technical standard for the collection, storage and dissemination of the charts and geographical coordinates concerning maritime zones, including lines of delimitation.

## Introduction

This product specification is intended to be used for encoding and exchanging maritime boundary information, including maritime limits as described under UNCLOS. It is based on the IHO S-100 standard and is intended to satisfy the requirements stipulated in paragraph 6 of the United Nations General Assembly Resolution A/RES/59/24 of 17 November 2004, for Geographical Information Systems (GIS) interoperability (see Background above).

The purpose of this product specification is to facilitate the encoding and exchange of information on maritime boundaries, limits and zones by States. A specific outcome was to develop a method of accurately representing the State's view of its maritime boundaries, not to form a prescriptive model of UNCLOS implementation. For this reason none of the feature classes or attributes are mandatory, however recommendations have been made and reasons given for these.

This document describes an S-100 compliant product specification for a maritime boundary exchange format.

This specification has been developed with two main objectives:

1. The standard must not be prescriptive in its interpretation of UNCLOS. Instead it is designed to be capable of accurately representing a State's view of its boundaries and zones.
2. The specification should contain the appropriate level of geometric precision and legally useful attribution that no abstract interpretation is required of the data. This facilitates its role as a lodgement standard and enhances its cross-platform capabilities (eg. MSDI, GIS and online applications).

Considering the nature of the standard and its role in providing an exchange format for maritime boundary information, much of the attribution is designed to maintain a record the legal origins of the data. A State may choose to populate these fields, and to the degree necessary to satisfy their requirements.

## 1.1 References

**S-100** – IHO Universal Hydrographic Data Model

Others

## 1.2 Terms, definitions and abbreviations

### 1.2.1 Terms and Definitions

**ASCII**            Simple text system file exchange standard, coded with 256 characters.

**UNCLOS**        United Nations Convention on the Law of the Sea

### 1.2.2 Abbreviations

- ASCII            American Standard Code Information Interchange
- ECDIS            Electronic Chart Display and Information System
- EPSG            European Petroleum Survey Group (now known as the Open Geospatial Committee Geomatics Committee)
- GIS              Geographic Information System
- GML             Geography Markup Language
- ISO              International Organization for Standardization
- ISO/TC         ISO Technical Committee
- OGC             Open Geospatial Consortium

- MSDI Marine Spatial Data Infrastructure
- TSMAD Transfer Standard Maintenance and Applications Development working group
- UML Unified Modelling Language
- UTF8 Unicode Transformation Format-8
- WGS84 World Geodetic System of 1984
- XML Extensible Markup Language

### 1.3 S-10X General Data Product Description

Note: This information contains general information about the data product.

**Title:** Maritime Boundary Exchange

**Abstract:** Data product containing information about a State's maritime boundaries, limits and zones.

**Content:** This data product contains points, curves and surfaces depicting a State's maritime boundaries and zones.

**Spatial Extent:**

**Description:** Global, marine areas only

**East Bounding Longitude:**180

**West Bounding Longitude:** -180

**North Bounding Latitude:**90

**South Bounding Latitude:** -90

**Temporal Extent:** Not Applicable

**Specific Purpose:** The purpose of the specification is to provide a digital format with the necessary geometry, precision, and attribution features to act as an exchange format for officially recognised maritime boundary, limits and zone data. The specification is customised to ensure the unique features and attributes of maritime boundary information can be exchanged between States. It conforms to the IHO S-100 standard and is intended to be suitable for lodging digital maritime boundary information with the United Nations for purposes related to UNCLOS.

## 1.4 Data specification metadata

Note: This information uniquely identifies this data specification and provides information about its creation and maintenance.

**Title:** Maritime Boundary Exchange Specification

**S-100 Version:** 1.0.0

**S-???Version:** 0.0.1

**Date:** 1 April 2013

**Language:** English

**Classification:** Unclassified

**Contact:** International Hydrographic Bureau (IHB)  
Producer  
4 quai Antoine 1<sup>er</sup>  
B.P. 445  
MC 98011 MONACO CEDEX  
Telephone: +377 93 10 81 00  
Fax: + 377 93 10 81 40

**URL:** <http://www.iho.int>

**Identifier:** TBD

**Maintenance:** This Product Specification is maintained as required by Subject Matter Experts from Member States of TSMAD.

## 2 Specification Scopes

**Scope ID:** General Scope

## 3 Data Product Identification

A data set that conforms to this product specification will be identifiable by the discovery metadata that supports it.

**Title:** Maritime Boundary Exchange

**Alternate Title:** S-10X

**Abstract:** Data product containing information about a State's maritime boundaries, limits and zones. The purpose of the specification is to provide a digital format with the necessary geometry, precision, and attribution features to act as format for the exchange of information between States and as a format for depositing electronic maritime boundary information with the United Nations for UNCLOS purposes.

**Topic Category:** Earth sciences > Human dimensions > Boundaries > Administrative divisions.  
Earth sciences > Human dimensions > Boundaries > Political divisions.  
Earth sciences > Human dimensions > Boundaries > Administrative boundaries.

**Geographic Description:** Areas specific to the marine jurisdiction.

**Spatial Extent:**

**Description:** Global, marine areas only.

**eastBoundLongitude:** 180

**westBoundLongitude:** -180

**northBoundLatitude:** 90

**southBoundLatitude:** -90

**Vertical Extent:**

**minimumValue:** Not Applicable

**maximumValue:** Not Applicable

**unitOfMeasure:** Not Applicable

**Temporal Extent:**

**TM\_Primitive:** Not Applicable

**Spatial Resolution:**

**Purpose:** This specification is designed to provide a suitable format for the exchange of digital vector data pertaining to maritime boundaries.



An indication of the scale and accuracy of source data can be documented in the appropriate metadata attributes. Coordinate resolution may be also specified.

**Language:** English  
**Classification:** Unclassified  
**Spatial Representation Type:** Vector  
**Point of Contact:** Producer  
**Use Limitation:** Not Applicable

## 4 Data Content and structure

An S-10X Maritime Boundary Exchange dataset is a feature-based product. This section contains the product application schema expressed in UML and an associated feature catalogue. The feature catalogue provides a full description of each feature type including its attributes and attribute values in the data product.

### 4.1 Application Schema

To be finalised

### 4.2 Feature Catalogue

This feature catalogue defines the features and attributes permitted in this product. The Feature Catalogue is supplied in XML form and as an HTML version accompanying this document.

**Name:** Maritime Boundary Feature Catalogue

**Scope:** Catalogue containing features supporting maritime boundary exchange.

**Field of application:** Maritime Boundaries

**Version Number:** 0.1

**Version Date:** April 2013

**Producer:** International Hydrographic Organization

**Functional Language:** English

## 4.3 Feature Types

### 4.3.1 Geographic Feature Types

Geographic feature types form the principle content of the data product and are fully defined in the Feature Catalogue.

The specification makes provision for 2 dimensional vector data expressed as geographic (latitude / longitude) coordinates. Coordinate values are to be expressed as Decimal Degrees, where the western and southern quadrants are negative. This methodology allows for the incorporation of the vector data into GIS datasets without the need for intermediate processing by the user.

For instances where the original source of the data was in another format, such as Degrees Minutes and Seconds, or Degrees Decimal Minutes, the State should perform the conversion to Decimal Degrees. An attribute has been included to allow for the recording of the coordinate in the source format. The purpose of this attribute is to cater for the recording of a point specified in a treaty or legislation in its original form, if required.

The precision of the coordinates, and its manifestation as the number of decimal points in a coordinate is a matter for the State, however when setting the number of decimal points it is recommended that States consider the statement made under Spatial Resolution.

## 4.4 Attributes

### 4.4.1 Numeric Attribute Values

Floating point or integer attribute values must not be padded by non-significant zeroes.

### 4.4.2 Text Attribute Values

Character strings must be encoded using the character set specified in UTF-8.

### 4.4.3 Mandatory Attribute Values

Where attributes determine the display of a Feature they that may be mandatory, all mandatory attributes are identified in the feature catalogue.

Mandatory attribution is purposefully kept to a minimum in this specification to give a State the maximum flexibility in applying this standard to its unique maritime boundary scenarios.

## 4.5 Geometry

This specification makes use of point, curve and surface geometries defined by coordinate strings. Curves and surfaces are formed by joining vertices, the geometry type of that curve, loxodrome or geodetic, should be defined by ensuring sufficient intermediate vertices to realise the desired geometry. States should be aware that defining curves as geodesics without realised vertices may result in the curve following a course determined by the GIS software, which may not agree with view of the of the State.

To maintain the most accurate portrayal of maritime boundaries it is recommended that States adopt a system of realised curves and surfaces. This can be achieved by increasing the number of defined vertices in curve and surface datasets, which will result in the geometry of the features being more rigorously defined. This method places less reliance on the GIS

software of the user, and will ensure the features are displayed correctly regardless of the projection used by the platform.

Geometries may be expressed as point, curve or surface datasets or a combination of any of those three. For instance, some features such as the normal baseline require both curves and points. Curves will be used to capture the low-water line, whereas rock features may be represented by points. In this standard States are given the option to represent limits and boundaries as points, curves, surfaces or a combination of these. A combination of feature types allows States to apply feature level attribution if required. Using points will ensure the dataset contains the highest density of attribution, whereas curves and surfaces have a lower density but are necessary to show how the points relate to each other. A combination of points, curves and surfaces can provide a strong link to a legal proclamation (by a point representing each position in the instrument), with the curves and surfaces (made by joining the points features) providing the geometry for GIS and MSDI platforms.

## **5 Coordinate Reference Systems (CRS)**

### **5.1 Introduction**

These coordinate reference systems are separated into the horizontal and vertical components.

### **5.2 Horizontal Geodetic Datum**

The coordinate reference system should be determined by the coastal State. It is strongly recommended that the coastal State provide the necessary parameters of the coordinate reference system used to allow conversion to another reference system possible by data users. It is recommended that States provide the EPSG (European Petroleum Survey Group, now known as the Open Geospatial Committee Geomatics Committee) code for the datum used.

## **6 Data Quality**

### **6.1 Quality, Reliability and Accuracy of Data**

It is recommended that States accompany data encoded in this standard with a statement on the quality, reliability and accuracy of the data if appropriate.

## **7 Data Capture and Classification**

### **7.1 Classification**

Classification of data shall adhere to Section 13

## **8 Data Maintenance**

### **8.1 Introduction**

Maintenance shall be defined in two parts for S-10X, maintenance of the product specification and maintenance of the data.

## 8.2 S-10X Product Specification Maintenance

This section specifies the procedures followed in maintaining and publishing the various parts of S-10X.

### 8.2.1 Maintenance Procedures

Changes to S-10X are coordinated by the "Transfer Standard Maintenance and Application Development Working Group" (TSMAD) of the IHO and shall be made available via the IHO web site. Organizations that wish to make changes to S-10X, must address their comments to the International Hydrographic Bureau.

There are three change proposal types to S-10X: clarification, correction and extension. Any change proposal must be one of these types.

All proposed changes shall be technically assessed before approval. All proposals shall be submitted using the S-10X maintenance proposal procedures.

## 8.3 Data Maintenance

Datasets defined in this specification are maintained by the producer on an as-required basis.

## 9 Data Product format (encoding)

formatName	S-100 GML
version	Undefined
characterSet	UTF-8
specification	S-100 GML Encoding

## 10 Data Product Delivery

Item Name	Description
unitsOfDelivery	Datasets
transferSize	Undefined
mediumName	Undefined
otherDeliveryInformation	Undefined

### 10.1 Feature and Portrayal Catalogue Delivery

A Feature Catalogue in XML format shall be supplied with an accompanying XSL Style sheet.

## 10.2 The standard encoding

### 10.2.1 Data Sets

The standard transfer format shall be encoding using the IHO S-100 GML Profile. Reference can be made to IHO S-100 GML Profile v1.2 document if more information is required.

## 11 Metadata

For the purposes of this specification, only product level metadata which gives specific information about each dataset has been specified. Dataset series metadata for collections of similar datasets may be defined at a later stage.

Metadata describing the geographic location and extent of each dataset should be provided. This may be in the form of a textual description of the area, or preferably as a geographic bounding box. The bounding box must encompass the full extent of the geographic area of the dataset. The actual data content within the bounding box area need not coincide with the boundaries.

Bounding extents should be provided as ISO 19115 <EX\_GeographicBoundingBox>element, where limits are encoded as geographical (latitude / longitude) coordinate values. (Coordinate values are to be expressed as degrees and decimals where the western and southern quadrants are negative).

Example:

- westBoundLongitude 129.0
- eastBoundLongitude 141.0
- southBoundLatitude -38.5
- northBoundLatitude -26.0

As part of the metadata, States may choose to include a text copy of the latest relevant legislative sources.

Other relevant information may be included as well.

Product level metadata is to be provided as a separate XML file.

### 11.1 Language

The exchange language must be English

## 12 Feature Types

### 13.1 Baseline

S-101 Attribute	Allowable Encoding Value	Type	Multiplicity
Object Name		TE	
Nation		TE	
Category of Baseline	1 : Normal baseline 2 : Straight baseline 3 : Archipelagic baseline 4 : River closing line 5 : Bay closing line	EN	
National Object Name		TE	
Point Type	1 : Defined 2 : Densification	EN	
Source Horizontal Reference System		TE	
Source Latitude Degrees Minutes Seconds		TE	
Source Latitude		RE	
Source Longitude Degrees Minutes Seconds		TE	
Source Longitude		RE	
Published Horizontal		TE	

Reference System			
Published Latitude		RE	
Published Longitude		RE	
Legal Source		TE	
Textual Description		TE	



### 13.2 Maritime Zones

S-101 Attribute	Allowable Encoding Value	Type	Multiplicity
Object Name		TE	
Category of Maritime Zone or Limit	1 : internal waters 2: archipelagic waters 3 : territorial sea 4 : contiguous zone 5 : exclusive economic zone 6 : continental shelf	EN	
Nation		TE	
National Object Name		TE	
Point Type	1 :Defined 2 : Densification	EN	
Source Horizontal Reference System		TE	
Source Latitude Degrees Minutes Seconds		TE	
Source Latitude		RE	
Source Longitude Degrees Minutes Seconds		TE	
Source Longitude		RE	
Published Horizontal Reference System		TE	

Published Latitude		RE	
Published Longitude		RE	
Legal Source		TE	
Textual Description		TE	

### 13.3 Maritime Boundary

S-101 Attribute	Allowable Encoding Value	Type	Multiplicity
Object Name		TE	
Category of Boundary	1 : Delimitation	EN	
Nation		TE	
National Object Name		TE	
States Party		TE	
Vertical Jurisdiction	1 : Air Space, Water Column, Seabed and Sub-soil 2 : Water Column 3 : Seabed and Sub-soil	EN	
Point Type	1 : Defined 2 : Densification	EN	
Source Horizontal Reference System		TE	
Source Latitude Degrees Minutes Seconds		TE	
Source Latitude		RE	
Source Longitude Degrees Minutes Seconds		TE	
Source Longitude		RE	
Published Horizontal Reference System		TE	

Published Latitude		RE	
Published Longitude		RE	
Legal Source		TE	
Textual Description		TE	

## 13 Feature Attributes and Enumerate Values

### 14.1 Object Name

**Object Name:**

Definition: : The unique identifier for an object

Example: AMB1234567

Remarks: This information is provided by the State for named features.

### 14.2 Nation

**Nation:**

Definition: Name of State

Example: Plurinational State of Bolivia, Kingdom of the Netherlands

Remarks: Should never be null, for a line or multi-State point feature the Nation is the name of the depositing State. States may use the ISO 3166-1 alpha-2 codes if desired.

### 14.3 Alternative Object Name

**Alternative Object Name :**

Definition: Alternative name of object.

Example: Point Z, Timor Sea Treaty between the Government of East Timor and the Government of Australia (Dili, 20 May 2002)

Remarks: This attribute may be used to declare the name of a point, for instance if the point is specifically assigned a name in a treaty or other legal instrument.

### 14.4 States Party

**States Party:**

**Definition:**Name of States Party.

**Example:**NL, GB, TV, Peoples Democratic Republic of North Korea.

**Remarks:**The field is used for defining the States Party to a multi-State point (e.g. "tri-point") delimited boundary or area (e.g. "Joint Development Area"). This field may contain multiple States, for example in the case of an area of joint jurisdiction.States may use the ISO 3166-1 alpha-2 codes if desired.

#### 14.5 Vertical Regime

##### **Vertical Regime:**

**Definition:** This attribute is used to designate the application of a boundary with respect to the water column, seabed and sub-soil.

**Example:**In an area State A may have Sovereign Rights over the water column; State B may have Sovereign Rights to the seabed and sub-soil. For example – "Agreement between the Government of Australia and the Government of the Republic of Indonesia Establishing an Exclusive Economic Zone Boundary and Certain Seabed Boundaries" divides jurisdiction of the seabed/sub-soil and Water Column between Australia and Indonesia.

**Remarks:**The attribute is applicable for both curves and surfaces. Many States have treaty arrangements with neighbouring States that result in an area of vertically separated jurisdiction. It is used to categorise areas or boundaries where water column and seabed/subsoil jurisdiction is shared between States.

#### 14.6 Point Type

##### **Point Type:**

**Definition:** This attribute is used to declare whether a point is derived from a treaty or calculated as part of a densification of a line. The attribute delimitates those points with a legal legacy from those inserted to ensure the geometry of a feature is correctly represented in the data.

**Example:**

**Remarks:**To portray a geodesic or loxodrome correctly, additional vertices may be included in the dataset. These vertices would not have formed part of the original instrument. This attribute can be used to differentiate between a declared vertex (e.g. declared in a treaty) with a vertex inserted to ensure correct GIS depiction.

#### 14.7 Category of Baseline

**Category of Baseline:**

Definition: The category of the baseline for measuring the breadth of the territorial sea.

Valid value	Definition
Normal baseline	A feature representing the low-water line of a State.
Straight baseline	A straight baseline
Archipelagic baseline	A feature enclosing the archipelagic waters of an Archipelagic State.
River closing	A river closing feature
Bay closing	A bay closing feature

Example:

Remarks:

**14.8 Category of Maritime Zone or Limit****Category of Maritime Zone or Limit:**

Definition: The category of the outer limits of the maritime zone.

Valid value	Definition
Internal waters	A surface of the internal waters, or a curve drawn to the limit of internal waters, and/or points defining such a curve.
Archipelagic waters	A surface of the archipelagic waters, or a curve drawn to the limit archipelagic waters, and/or points defining such a curve.
Territorial sea	A surface of the territorial sea, or a curve drawn to the limit of the territorial sea, and/or points defining such a curve.
Contiguous zone	A surface of the contiguous zone, or a curve drawn to the limit of the contiguous zone, and/or points defining such a curve.
Exclusive economic zone	A surface of the exclusive economic zone, or a curve drawn to the limit of the exclusive economic zone, and/or points defining such a curve.
Continental shelf	A surface of the continental shelf, or a curve drawn to the limit of the continental shelf, and/or points defining such a curve.

Example:

Remarks:

#### 14.9 Category of Maritime Boundary

##### **Category of Maritime Boundary:**

Definition: A curved area of delimitation between States.

Example:

Remarks: This attribute is to be used to indicate that there exists a delimitation agreement of some form between two or more States.

#### 14.10 Source Horizontal Reference System

##### **Source Horizontal Reference System:**

Definition: This attribute defines the horizontal reference system of the original source.

Example: EPSG:4202

Remarks: Reference to the original coordinate system preserves the legal and spatial links between the instrument (for example, legislation or treaty) and the digital data.

#### 14.11 Source Latitude Coordinate DMS

##### **Source Latitude Coordinate in Degrees Minutes Seconds**

Definition: Latitude coordinates in the original horizontal datum. Required to maintain consistency between positions declared as DMS in legal instruments and the decimal equivalent produced for the digital data.

Example: 33-02-00.0258S

Remarks: This is a text field; it is not intended to be referenced for geospatial purposes. Any text string may be used to suit user requirements.



#### 14.12 Source Latitude Coordinate

**Source Latitude Coordinate:**

Definition: Source latitude of the feature in decimal degrees.

Example:-10.0000000000

Remarks:North is positive, west is negative.

#### 14.13 Source Longitude Coordinate DMS

**Source Longitude Coordinate in Degrees Minutes Seconds**

Definition: Latitude coordinates in the original horizontal datum. Required to maintain consistency between positions declared as DMS in legal instruments and the decimal equivalent produced for the digital data.

Example: 133-02-00.0258W

Remarks:This is a text field, it is not intended to be referenced for geospatial purposes. Any text string may be used to suit user requirements.

#### 14.14 Source Longitude Coordinate

**Source Longitude Coordinate:**

Definition: Source longitude of the feature in decimal degrees.

Example:-103.1400000000

Remarks:North is positive, west is negative.

#### 14.15 Published Horizontal Reference System

**Published Horizontal ReferenceSystem:**

Definition: This attribute defines the horizontal reference system of the data.

Example: EPSG::4919

Remarks:

#### 14.16 Published Latitude Coordinate

**Published Latitude Coordinate:**

Definition: Published latitude of the feature in decimal degrees.

Example:-10.0000000000

Remarks:North is positive, west is negative.

#### 14.17 Published Longitude Coordinate

**Published Longitude Coordinate:**

Definition: Published longitude of the feature in decimal degrees.

Example:-103.1400000000

Remarks:North is positive, west is negative.

#### 14.18 Legal Source

**Legal Source:**

Definition: Name of object: string of national language characters. This attribute may also be used to declare the name of a point, for instance if the point is specifically assigned a name in a treaty or other legal instrument.

Example:

Remarks:

#### 14.19 Textual Description

**Textual Description:**

Definition: Name of object: string of national language characters. This attribute may also be used to declare the name of a point, for instance if the point is specifically assigned a name in a treaty or other legal instrument.

Example:

Remarks: