S-127

IHO Marine Traffic Management (MTM) - Annex A Data Classification and Encoding Guide

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IHO

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1 Overview

1.1 Introduction

The “Data Classification and Encoding Guide” has been developed to provide consistent, standardized instructions for encoding S-100 compliant Marine Traffic Management (MTM) (S-127) data.

The purpose of the Data Classification and Encoding Guide is to facilitate S-127 encoding to meet IHO standards for the proper display of Marine Traffic Management information in an ECDIS and other electronic charting displays. This document describes how to encode information that the modeller considers relevant to a Marine Traffic Management data product. The content of a dataset is at the discretion of the producing authority provided that the conventions described within this document are followed. A “producing authority” is a Hydrographic Office (HO) or other organization authorized by a government, to produce definitive nautical information. The entire S-100 Universal Hydrographic Data Model, including the S-127 MTM Product Specification, is available at the following web site, https://iho.int.

1.2 Document Metadata

NOTE: This information uniquely identifies this Data Classification and Encoding Guide to the Product Specification and provides information about its creation and maintenance.

Table 1-1 — Document metadata

Metadata	Content
Title:	Marine Traffic Management, Data Classification and Encoding Guide
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Language:	English
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Identifier:	S-127 Annex A Data Classification and Encoding Guide
Maintenance:	Changes to S-127 Annex A; Data Classification and Encoding Guide are coordinated by the IHO Nautical Information Provision Working Group (NIPWG) and must be made available via the IHO web site.

1.3 Terms and definitions

For terms and definitions, see the Marine Traffic Management Product Specification, Clause 1.4.2.

1.4 Abbreviated terms

For a list of abbreviations, see the Marine Traffic Management Product Specification, Clause 1.4.3.

1.5 Use of language

Within this document:

- “Must” indicates a mandatory requirement;
- “Should” indicates an optional requirement, that is the recommended process to be followed, but is not mandatory;
- “May” means “allowed to” or “could possibly”, and is not mandatory, or recommended.

1.6 Maintenance

Changes to the Data Classification and Encoding Guide must occur in accordance with the IHO Resolution 2/2007 as amended.

2 General

2.1 Introduction

This Data Classification and Encoding Guide (DCEG) contains rules and guidance for converting data describing the real world into data products that conform to the S-127 specification.

The S-127 specification contains an application schema (UML model) describing the conceptual domain model in terms of classes and relationships, and a Feature Catalogue (see S-127 Annex C) that specifies the data model, i.e., specifies the data model types and associations corresponding to the various classes and relationships in the application schema.

To simplify the DCEG text, the various data model types will be provided without the suffixes “class”, “type” or “instance”; e.g. the term “feature” should be understood as “feature class” or “feature type” or “feature instance” as best fits the immediate context in which it is used (and where there might be confusion, it is written out in full as feature class/type/instance).The model defines real world entities as a combination of descriptive and spatial characteristics (S-127 Product Specification clause 6).

This clause of the DCEG contains general information needed to understand the encoding rules and describes fundamental common rules and constraints. It also describes datasets and metadata. The data model object types used within S-127 and their encoding rules and guidelines are defined in detail in subsequent clauses of this document.

Within this document the features, information types, associations, and attributes appear in **bold text** or *italic text*, to distinguish them from surrounding words.

2.2 Descriptive characteristics

2.2.1 Feature

A feature contains descriptive attributes that characterize real world entities.

The word ‘feature’ as used in the ISO 191xx series and in S-100 based product specifications has two distinct but related senses – ‘feature type’ and ‘feature instance’. A feature instance is a single occurrence of the feature and is represented as an object in a dataset. The location of a feature instance on the Earth’s surface is indicated by a relationship to one or more spatial primitive instances. A feature instance may exist without referencing a spatial primitive instance.

2.2.1.1 Geographic feature class

Geographic (Geo) feature types carry the descriptive characteristics of a real world entity which is provided by a spatial primitive instance.

2.2.1.2 Meta feature class

Meta feature type contains information about other features.

2.2.1.3 Charted background feature

The data product would mostly be visualized as an overlay of an ENC or other GIS applications. Consequently, all necessary descriptive and spatial characteristics to provide a charted background should be provided by the underlying application.

2.2.1.4 Information type

An information type has no geometry and therefore is not associated to any spatial primitives to indicate its location.

An information type may have attributes and can be associated with features or other information types in order to carry information particular to these associated features or information types.

2.3 Spatial characteristics

2.3.1 Spatial primitives

The allowable spatial primitive for each feature is defined in the Feature Catalogue. Allowable spatial primitives are point, curve, and surface.

Within this document, allowable spatial primitives are included in the description of each feature. For easy reference, Table 2-1 below summarises the allowable spatial primitives for each feature. In the table, abbreviations are as follows: point (P), curve (C), surface (S), and none (N). Abstract features are excluded from this table since they cannot have feature instances in datasets.

Table 2-1 — Features and their spatial primitives

Feature	P	C	S	N
CautionArea	P		S	
ConcentrationOfShippingHazardArea			S	
ISPSCodeSecurityLevel		C	S	
LocalPortBroadcastServiceArea			S	
MilitaryPracticeArea	P		S	
PilotBoardingPlace	P		S	
PilotService			S	
PilotageDistrict			S	
PiracyRiskArea	P		S	
PlaceOfRefuge	P		S	
RadarRange			S	
RadioCallingInPoint	P	C		
RestrictedArea			S	
RouteingMeasure		C	S	
ShipReportingServiceArea			S	
SignalStationWarning	P		S	
SignalStationTraffic	P		S	
UnderKeelClearanceAllowanceArea			S	
UnderKeelClearanceManagementArea			S	

Feature	P	C	S	N
VesselTrafficServiceArea			S	
WaterwayArea			S	
DataCoverage			S	
QualityOfNonBathymetricData			S	
TextPlacement	P			

2.3.2 Capture density guideline

Coordinate density can have a significant impact on file size and system performance. A rule of thumb is to limit the coordinate density to 0.3 mm at maximum permitted display scale. For a scaleless product, the producer should keep in mind the expected scale range for typical use and the density of coordinates needed to suit the needs of the product.

The capture density will follow the recommendation of the S-101 (ENC) DCEG, which states curves and surface boundaries should not be encoded at a point density greater than 0.3 mm at permitted display scale.

A curve consists of one or more curve segments. Each curve segment is defined as a loxodromic line on WGS84, or as an arc or circle. Long lines may need to have additional coordinates inserted to cater for the effects of projection change.

The presentation of line styles may be affected by curve length. Therefore, the encoder must be aware that splitting a curve into numerous small curves may result in poor symbolization.

2.4 Attributes

Attributes may be simple type or complex type. Complex © attributes are aggregates of other attributes that can be simple type or complex type attributes. Simple (S) attributes are assigned to one of the types collected in clause 2.4.1.

The binding of attributes to a feature, the binding of attributes to attributes to construct complex attributes, and attribute multiplicity are all defined in the Feature Catalogue.

Within this document, the allowable attributes are included in the description of each feature, as well as the allowable values for enumeration type attributes.

2.4.1 Simple attribute types

Each simple attribute is assigned one of the attribute datatypes in Table 2-2:

Table 2-2 — Simple attribute types

Abbreviation	Attribute type	Description
BO	Boolean	A value representing binary logic. The value can be either *true* or *false*. The default state for Boolean type attributes (i.e. where the attribute is not populated for the feature) is *false*. NB: The XML schema specification states that a boolean data type can have the following legal literals: true, false, 1, 0.
CL	Code List	A type of flexible enumeration (see “EN” below). A code list type is a list of literals which may be extended only in conformance with specified rules. Attributes of a code list type may take values from the list or other values which are defined according to the rules. The rules should be part of the specification of the individual codelist type. A code list could either be closed (fixed) or open (extensible). A code list type has the following properties: 1. A description of the code list type,

Abbreviation	Attribute type	Description
		2. The URI where the list could be found, and 3. An encoding instruction.
DA	Date	A date provides values for year, month and day according to the Gregorian Calendar. Example (XML/GML): 1998-09-18 (YYYY-MM-DD) S-127 uses only XML-based formats (including GML) and therefore the ISO “basic” format described in S-100 is not used.
DT	Date and Time	A DateTime is a combination of a date and a time type. Example (XML/GML): 1985-04-12T10:15:30 (YYYY-MM-DDThh:mm:ss) S-127 uses only XML-based formats (including GML) and therefore the ISO “basic” format described in S-100 is not used.
EN	Enumeration	A fixed list of valid identifiers of named literal values. Attributes of an enumerated type may only take values from this list.
IN	Integer	A signed integer number. The representation of an integer is encapsulation and usage dependent. Integer attribute values must not be padded by non-significant zeroes. For example, for a number of 19, the value populated for the attribute must be 19 and not 019. Examples: 29, -65547
RE	Real	A signed real (floating point) number consisting of a mantissa and an exponent. The representation of a real is encapsulation and usage dependent. Real attribute values must not be padded by non-significant zeroes. For example, for a signal period of 2.5 seconds, the value populated for the attribute signal period must be 2.5 and not 02.50. Examples: 23.501, -0.0001234, -23.0, 3.141296
TD	Truncated Date	One or more significant components of the modelling date are omitted. Example: A GML dataset would use a GML built-in type and encode it as `<gMonth>--02<gMonth>` S-127 uses only XML-based formats (including GML) and therefore the ISO “basic” format described in S-100 is not used.
TE	Free text	An arbitrary-length sequence of characters including accents and special characters from a repertoire of one of the adopted character sets.
TI	Time	A time is given by an hour, minute, and second. Time zone according to UTC is optional. Character encoding of a time is a string that follows the local time. Examples (XML/GML): 18:30:59Z; 18:30:59+01:00; 18:30:59
URL	URL	A uniform resource locator (URL) is a URI that provides a means of locating the resource by describing its primary access mechanism (RFC 3986). Example: https://registry.iho.int
URN	URN	A persistent, location-independent, resource identifier that follows the syntax and semantics for URNs specified in RFC 2141. Example: urn:mrn:iho:S-127:1:0:0:Regulations

2.4.2 Mandatory attributes

Some attributes are mandatory and must be populated for a given feature. There are some reasons why attribute values may be considered mandatory:

- They are fundamental to the definition of a feature;
- They are required to support the correct portrayal of a feature instance;
- Certain features make no logical sense without specific attributes;
- Some attributes are required for safety of navigation.

Within this document, mandatory attributes are those with a multiplicity of 1,1 or 1,n (n>1) or 1,*. The attribute multiplicity is identified in the description of each feature class.

2.4.3 Conditional attributes

The feature classes or information types do not contain conditional attributes.

Complex attributes which are assigned to feature classes or information types have at least one sub-attribute which is mandatory (or conditionally mandatory). Where the sub-attribute of a complex attribute is conditional, this is indicated in the Remarks sub-clause for the relevant feature class entries.

2.4.4 Missing attribute values

Where a value of a mandatory attribute is not known, the attribute must be populated with an empty (null) value.

Where the value of a non-mandatory attribute is not known, the attribute must not be included in the dataset.

2.4.5 Multiplicity

In order to control the number of allowed attribute values or sub-attribute instances within a complex attribute, S-100 uses the concept of multiplicity. This defines lower and upper limits for the number of values, whether the order of the instances is significant, and if an attribute is mandatory. Common examples are shown in Table 2-3:

Format: MinOccurs, MaxOccurs (a * indicates that infinite instances are possible, the term (ordered) indicates that the order of the provided instances is significant)

Table 2-3 — Multiplicity of attributes

Multiplicity	Explanation
0,1	An instance is not required; if provided there must only be one instance.
1,1	An instance is required and there must only be one instance.
0,*	An instance is not required and there can be an infinite number of instances.
1,*	An instance is required and there can be an infinite number of instances.
1,* (ordered)	An instance is required and there can be an infinite number of instances, the order of which is significant.
2,2	Two instances are required and there must be no more than two.

2.4.6 Spatial attribute types

Spatial attribute types must contain a referenced geometry and may be associated with spatial quality attributes. Each spatial attribute instance must be referenced by a feature instance or another spatial attribute instance.

2.4.6.1 Quality of spatial attributes

The quality of spatial attributes in S-127 is described in a Quality of Non-Bathymetric Data meta-feature (clause 4.4). This meta-feature defines areas within which uniform assessment exists for the quality. It is described in detail later in this document.

If the spatial quality attributes for an individual instance of a spatial primitive differ from the quality indicated in the overlying Quality of Non-Bathymetric Data meta-feature, the quality attributes for that instance are carried in an information class called spatial quality. Only points and curves can be associated with spatial quality. S-127 does not use multi-points. Currently, no use case for associating surfaces with spatial quality attributes is known, therefore this is prohibited. Vertical uncertainty is prohibited for curves as this dimension is not supported by curves.

NOTE: S-127 does not make use of the S-101 Quality of Bathymetric Data meta-feature since depth range uncertainties are not needed. The Quality of Non-Bathymetric Data meta-feature has all the quality attributes needed by S-127.

The spatial quality of individual spatial primitives can be indicated using the SpatialQuality information type (clause 18.2) associated to the individual spatial primitive. Figure 2-1 depicts the conceptual

model. This should only be used when it is necessary to override the quality indicated in a covering QualityOfNonBathymetricData feature.

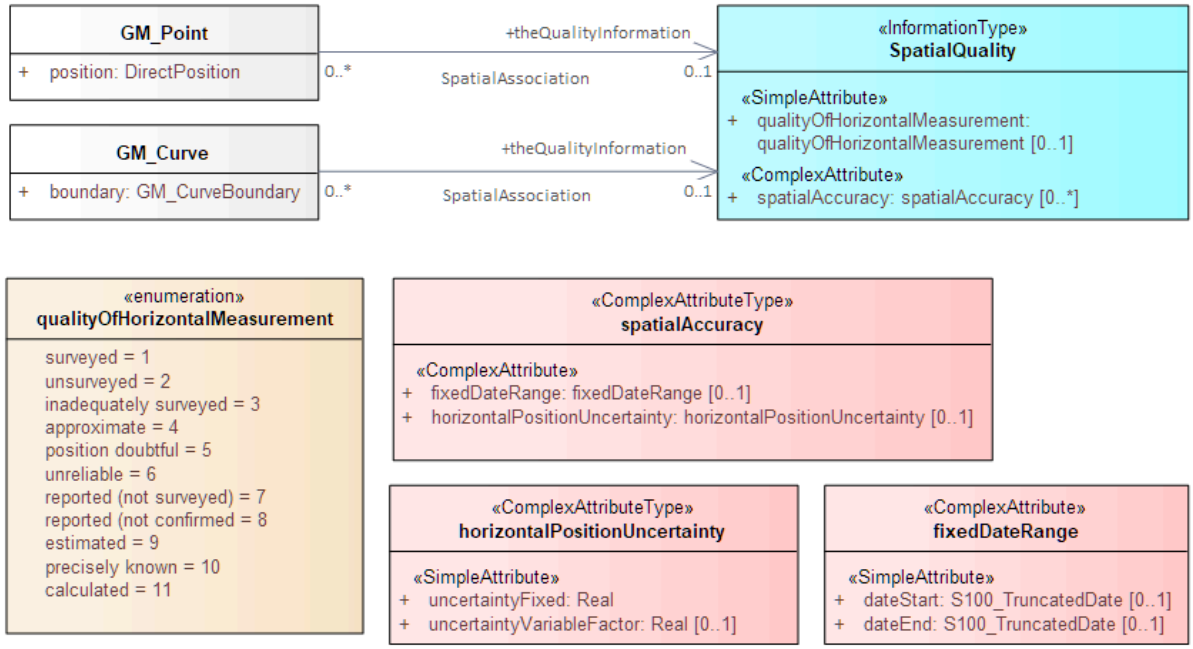

Figure 2-1 — Spatial quality for spatial primitives

2.4.7 Portrayal feature attributes

Marine Traffic Management data products will be used within ECDIS where ENC data is displayed based on the rules defined within the S-101 Portrayal Catalogue. While most ECDIS portrayal is based on attributes describing the instance of a particular feature in the real world, certain feature attributes are used in portrayal rules to provide additional functionality in the ECDIS. Table 2-4 provides a list of attributes which have specific influence on portrayal.

Table 2-4 — Attributes which have effects on portrayal

Attribute	Effects on portrayal
fixedDateRange; periodicDateRange	Population of these complex attributes determines when the feature will be added (sub-attribute dateStart) and/or removed (sub-attribute dateEnd) from the display in some ECDIS display settings.
information	Population of this complex attribute will result in the display of the magenta information symbol to highlight additional information to the user.
nameUsage	This sub-attribute determines the priority and level of display (full display or Pick Report only) where multiple instances of the complex attribute feature name are encoded for a single feature instance, based on Mariner's selected ECDIS display settings.
pictorialRepresentation	The population of this Text attribute will result in the display of the magenta information symbol to highlight additional information to the user.
textContent	The population of this complex attribute will result in the display of the magenta information symbol to highlight additional information to the user.

2.4.8 Textual information

Textual information may provide additional information essential to understand the presence of the Marine Traffic Management and other features of an S-127 product. This information may also provide legal information pertaining to the S-127 product features.

The methods to provide textual information vary from the simple provision of short text, to the more structured provision of extensive text. The length of the text determines the method and the attribute selection, see clause 2.4.8.2.

2.4.8.1 Specialized information types for common kinds of textual information

The information types Restrictions, Recommendations, Regulations, or NauticalInformation must be used to encode text information when the DCEG allows them to be associated to the feature or information type and the information is of the appropriate kind (a restriction, regulation, etc.).

In exceptional circumstances and only if the use of the information types Restrictions, Recommendations, or Regulations is not sufficient, NauticalInformation can be used to encode additional textual information associated to a feature or a group of features.

In some cases, there may be a specialized attribute that is specifically intended for the data in question. If an appropriate specialized attribute is available, it must be used in preference to information or *textContent*. For example, feature names will generally be encoded in the name sub-attribute of complex attribute featureName, instead of information→text.

2.4.8.2 Textual information attributes

Textual information which is not appropriate for any of the Text-type attribute (or sub-attribute) allowed for the feature/information type should be encoded using either information or *textContent* complex attributes. Generally, either information or *textContent* is allowed, but not both.

2.4.8.3 Languages

Both information and *textContent* define a language sub-attribute for specifying the language in which the text is encoded.

The exchange language for textual information should be English; therefore it is not required to populate the sub-attribute language for an English version of textual information.

Languages other than English may be used as a supplementary option, for which language must be populated with an appropriate value to indicate the language.

When a national language is used in the textual attributes, the English translation must also exist.

The specification of the language attribute in the IHO GI registry states “The language is encoded by a 3 character code following ISO 639-2/T.” These codes and the corresponding language names may be obtained from the codelist S100_MD_LanguageCode in the S-100 codelists file, which is part of the S-100 schemas distribution, at the URLs below:

- XML file: https://schemas.s100dev.net/schemas/S100/5.2.0/resources/Codelists/cat/codelists.xml
- Web list: https://schemas.s100dev.net/schemas/S100/5.2.0/resources/Codelists/cat/codelists.html

2.4.8.4 Minimal use of generalized text attributes

The complex attributes information and *textContent* must not be used when it is possible to encode the information by means of any other attribute. The population of these attributes provides symbols on an ECDIS screen. Therefore producers should carefully consider use of these attributes as the symbol may contribute significantly to ECDIS screen clutter and text attributes should be populated only when the content conveys useful information.

2.4.8.5 Short textual information

The *text* sub-attribute of complex attribute *information* should generally be used for short notes or to transfer information which cannot be encoded by other attributes, or to give brief information about a feature. The use of the complex attribute *information* as a stand-alone complex attribute is intentionally limited to the information types **ContactDetails**, **Applicability**, **NonStandardWorkingDay**, and **ServiceHours**, which do not need the additional attributes defined in *textContent*. The reason for the limited use of *information* as a stand-alone complex attribute is to provide a structured and harmonised approach to textual information within the S-127 product data sets.

The text populated in *text* attributes must not exceed 300 characters. Character strings contained in *text* attributes must be UTF-8 character encoding.

If the *text* sub-attribute of *information* is populated, the *fileReference* and *fileLocator* sub-attributes must not be populated.

2.4.8.6 Complex or lengthy textual information

More complex encodings of text may use either *information* or *textContent*. The feature catalogue and the feature/information type definitions in this DCEG indicate whether *information* or *textContent* is allowed.

The complex attribute *textContent* also has *information* as a complex sub-attribute. If a short note must be encoded in a feature or information type which has only *textContent* as an attribute, it should be encoded as *textContent→information→text*.

Complex text information, such as text longer than 300 characters, formatted text, or HTML extracts from shipping regulations, must be encoded in a file named in either information→fileReference or *textContent→information→fileReference*. The construction *textContent→information→fileReference* should be used if the feature/information type provides *textContent* as complex attribute.

The complex attribute *information* defines an optional sub-attribute *headline* which may be used for a short title not exceeding 60 characters. The content should be short but informative – if the textual information is divided into sections, the most relevant section header from the referenced content may be a good choice for *headline*.

Multiple levels of headings are permitted when the upper bound of *headline* multiplicity is > 1. Multi-level headings must be encoded according to the heading level structure, that is, the highest level heading must be first, then the second level, then the third, and so on.

The complex attribute *textContent* defines an optional sub-attribute *categoryOfText* for indicating whether the text is the full text from the source, an extract from the source, or a summary prepared by the encoder. Populating *categoryOfText* is recommended whenever the textual information is taken or summarised from a law or regulation.

If it is considered necessary to include a description of the source of the textual information, the sub-attribute *sourceIndication* of *textContent* must be used. Encoding a description of the source is strongly recommended for textual information whose source is considered as information the end-user must have, e.g., because the date of issue must be conveyed or because it cites official regulations which are frequently updated.

NOTE: Some government documents are frequently updated, e.g., the U.S. Electronic Code of Federal Regulations, which is currently updated every working day even though a particular section may be stable for years.

2.4.9 Attributes referencing external files

2.4.9.1 Predefined derived types

Table 2-5 presents the following predefined derived types which are described in S-100 (clause 1-4.6):

Table 2-5 — Predefined derived types

Name	Description	Derived from
URI	A uniform resource identifier which character encoding shall follow the syntax rules as defined in RFC 3986. EXAMPLE https://registry.iho.int	CharacterString
URL	A uniform resource locator (URL) is a URI that provides a means of locating the resource by describing its primary access mechanism (RFC 3986). EXAMPLE https://registry.iho.int	URI
URN	A persistent, location-independent, resource identifier that follows the syntax and semantics for URNs specified in RFC 2141. EXAMPLE urn:iho:s101:1:0:0:AnchorageArea	URI

2.4.9.2 Reference to textual files

The files referenced by complex attribute *information* and its sub-attribute *fileReference* must be *.TXT or .HTM files, and may contain formatted text. It is up to the Producing Authority to determine the most suitable means of encoding a particular piece of text (as text or HTML). The format of the reference to the file should be a “file URI” (S-100 1-4.6).

Besides being bound to certain types, the complex attribute information is also a sub-attribute of the complex attribute *textContent*. This means that any type that binds *textContent* as an attribute can also contain a reference to a textual file via an *information* sub-attribute. In S-127, there are several features, information types, and complex attributes that bind either *textContent* or *information*.

The exchange language for textual information should be English. The sub-attribute language must be populated with an appropriate value to indicate the language used. Languages other than English may be used as a supplementary option. Generally this means, when a national language is used in the textual attributes, the English translation must also exist.

Files must only use UTF-8 character encoding even when the sub-attribute language is populated with a language other than English.

If it is necessary to indicate a specific section within a large text file, this may be done by encoding the location in the fileLocator sub-attribute of *information*, as described in Table 2-6.

Producers and application developers should note that the use of the fileLocator attribute enables a single support file to contain separate chunks of text referenced from different features, information types, or complex attribute. Adopting this practice enables producers to reduce the number of external files needed with a dataset.

Table 2-6 — Locators for external files

Format	File extension	Content of fileLocator
Text	TXT	Locators to text files are not permitted; the file should be split into separate text files or an HTML file used instead.
HTML	HTM	The HTML fragment identifier, i.e., the value of the HTML name or id attribute of the target (as defined in the relevant HTML specification).

2.4.9.3 Reference to external sources

References to Internet sources should be encoded using the onlineResource sub-attribute of *textContent*. Encoders should be aware that systems may not be able to access the Internet, so onlineResource should be used only for non-essential information. Only sources that can be certified as secure and free from malicious downloads should be provided.

2.4.9.4 Reference to graphics

If it is required to indicate a graphic, the complex attribute graphic must be used. The sub-attribute *pictorialRepresentation* must be used to indicate the file name (without the path) of the external graphical file. Graphic files that form part of the data product must be content with the characteristics collected in Table 2-7.

Table 2-7 — Graphics characteristics

Characteristics	Values
Recommended Resolution	96 DPI
Minimum Size x,y	200,200 pixels
Maximum Size x,y	800,800 pixels
Bit Depth	8 Bit Indexed Colour
Compression	LZW
Format	Tiff 6.0

File sizes should consider the maximum permitted sizes of datasets and exchange sets.

Additional information about the graphic file may be encoded in other sub-attributes of attribute graphic, as described in clause 2.4.12.

2.4.10 Dates

Dates may be need to be encoded as complete or truncated values, depending on available information and allowed format for the particular attribute. The definition of the attribute will indicate if it must take a complete value (type Date or DA) or is allowed to take a truncated value (type S100_TruncatedDate or TD). Complete and truncated dates are different value types (see S-100 1-4.5.2 Table 1-2).

For attributes that use the complete date type (type Date or DA), all their components (year, month, and day) must be specified.

For attributes that use the truncated date type (type S100_TruncatedDate or TD), zero, one, or two of the year/month/day components may be omitted. If the year component is included, it must be specified using exactly 4 digits.

2.4.10.1 Complete dates

Dates (except truncated dates, see the following clause) must be encoded in conformance with the Date format as specified in S-100 Clause 1-4.5.2 which is the same as the DA format in Table 2-2 in this document. The data values have to be provided in accordance with the Gregorian Calendar starting with four digits for the year, two digits for the month and two digits for the day.

Example: The date 18 September 2010 is encoded as follows:

In the GML format: <date>2010-09-18</date>

Note that since both discovery metadata and GML datasets are XML files, both will use the “GML format” above.

2.4.10.2 Truncated dates

In Truncated Dates one or more components (year, month, or day) of the date is not specified. Truncated date values must be encoded in conformance with the S100_TruncatedDate format or equivalent as specified in S-100 (clauses 1-4.5.2 and 3-9) which is the same as the TD format in Table 2-2 in this document. If encoding attributes which can take truncated date values (e.g., fixedDateRange, periodicDateRange, reportedDate) and no specific year, month, or day is required, the values must be encoded in conformance with the truncated date format as specified in S-100 (clauses 1-4.5.2 and 3-9), using the format-specific type for XML/GML.

To encode partial dates in the XML/GML data format:

Table 2-8 — Date encoding format in XML and GML

Description	ISO 8211	GML
No specific year, same day each year	`----MMDD`	`<gMonthDay>--MM-DD</gMonthDay>`
No specific year, same month each year	`----MM--`	`<gMonth>--MM</gMonth>`
No specific day	`YYYYMM--`	`<gYearMonth>YYYY-MM</gYearMonth>`
No specific month and no specific day	`YYYY----`	`<gYear>YYYY</gYear>`
NOTE: YYYY = calendar year; MM = month; DD = day.		

The dashes (-) indicating that the year, month, or date which is not specified must be included in the encoding (with no space between the dashes).

2.4.10.3 Start and end of ranges

In accordance with S-100 clause 3-8, the start and end instants of a range or period are included in the range or period.

EXAMPLE 1: If the beginning of a date range is encoded as the complete date 01 January 2016, the period begins at 00:00:00 on 1 January 2016, and the whole of New Year’s Day is included in the period. If the end of the date range is encoded as 01 January 2016, the period ends at 24:00:00 on 1 January 2016, i.e., again the whole of New Year’s Day is included in the period.

EXAMPLE 2: If the beginning of a period is encoded in truncated date format as `----01--` (i.e., year and day not specified), the period begins at 00:00:00 on 1 January each year. If the end of the period is encoded as `----01--`, the period ends at 24:00:00 on 31 January each year.

NOTE (1): Particular care should be taken if the start or end date is 28 or 29 February. S-100 3-8.3 explains the implications for end of February. For example, the truncated date `----02--` will be interpreted as 29 February in leap years and 28 February in non-leap years, while `----0228` will be interpreted as 28 February in every year.

NOTE (2): In accordance with ISO practice at the time S-100 date and time formats were defined, the time `00:00:00` means midnight at the start of a day and `24:00:00` means midnight at the end of a day. This continues to be S-100 usage.

2.4.10.4 Schedules

Weekly service schedules of a feature can be comprehensively described by using the information types ServiceHours and NonStandardWorkingDay.

EXAMPLE: A feature service is available under normal operation status 24 hours/day on Monday and Wednesday and from 08:00 to 16:00 LT from Thursday to Saturday. The service is available by pre-arrangement on public holidays and the 5th of August of each year when they fall on days which would otherwise be normal working days.

```
ServiceHours
 scheduleByDayOfWeek
  categoryOfSchedule =1 (normal operation)
  timeIntervalsByDayofWeek
   dayOfWeek = 2(Monday), 4(Wednesday)
   dayOfWeekIsRange = 0 (false)
  timeIntervalsByDayofWeek
   dayOfWeek = 5(Thursday), 7(Saturday)
   dayOfWeekIsRange = 1 (true)
   timeOfDayStart = 08:00:00
   timeOfDayEnd = 16:00:00
NonStandardWorkingDay
 dateFixed = ---08-05 (5 August)
 dateVariable = public holidays
 information.text = “By pre-arrangement”
```

The above example can be encoded as follows:

```
    <S127:ServiceHours gml:id="(GML ID of ServiceHours)">
        <scheduleByDayOfWeek>
            <categoryOfSchedule code=”1”>Normal Operation</categoryOfSchedule>
            <timeIntervalsByDayOfWeek>
                <dayOfWeek code=”2”>Monday</dayOfWeek>
                <dayOfWeek code=”4”>Wednesday</dayOfWeek>
                <dayOfWeekIsRange>0</dayOfWeekIsRange>
                <timeOfDayStart>00:00:00</timeOfDayStart>
                <timeOfDayEnd>24:00:00</timeOfDayEnd>
            </timeIntervalsByDayOfWeek>
            <timeIntervalsByDayOfWeek>
                <dayOfWeek code=”5”>Thursday</dayOfWeek>
                <dayOfWeek code=”7”>Saturday</dayOfWeek>
                <dayOfWeekIsRange>1</dayOfWeekIsRange>
                <timeOfDayStart>08:00:00</timeOfDayStart>
                <timeOfDayEnd>16:00:00</timeOfDayEnd>
            </timeIntervalsByDayOfWeek>
        </scheduleByDayOfWeek>
        <partialWorkingDay xlink:href="(reference to NonStandardWorkingDay)"/>
    </S27:ServiceHours>

    <S127:NonStandardWorkingDay gml:id="(GML ID of NonStandardWorkingDay)">
        <dateFixed><gMonthDay>--08-05</gMonthDay></dateFixed>
        <dateVariable>public holidays</dateVariable>
        <information><text>By pre-arrangement</text</information>
        <theServiceHours_nsdy xlink:href="(reference to ServiceHours)"/>
```

```
</S127:NonStandardWorkingDay>
```

If the days of week are known but the hours of availability are unknown, there is no time attribute. Twenty-four availability is indicated by encoding the availability period as 000000-240000. Special cases such as unknown can be explained in the *textContent* or *information* attribute of ServiceHours. To encode two or more periods within the same day, repeat the timeOfDayStart and timeOfDayEnd attributes. If one of the times is not known, it may be nilled as described in clause 2.4.4.

For example, to encode open hours of 8 a.m. to 12 noon and 1 p.m. to 5 p.m. on Thursdays and Saturdays:

```
timeIntervalsByDayofWeek
 dayOfWeek =5(Thursday), 7(Saturday)
 dayOfWeekIsRange =1 (true)
 timeOfDayStart = 08:00:00
 timeOfDayStart = 13:00:00
 timeOfDayEnd = 12:00:00
 timeOfDayEnd = 17:00:00
```

The order of repeated timeOfDayStart and timeOfDayEnd attributes is significant, since intervals are specified by matching them pairwise in order.

UTC is indicated by the Z suffix. The absence of the Z suffix indicates local time.

The absence of any additional information other than date (fixed or variable) in NonStandardWorkingDay should be interpreted as closure on the specified days. Non-standard working days do not need to be associated with ServiceHours instances categorized as “closure” (categoryOfSchedule=Closure) because the closure is already indicated in the ServiceHours instance.

2.4.10.5 Times

If it is required to provide information of the start time and end time of an active period of a feature, it must be encoded using the attributes timeOfDayStart and timeOfDayEnd. The order has significance.

2.4.11 Combination of date schedules and times

Schedule information can also include time of day. The complex attribute timeIntervalsByDayofWeek also includes timeOfDayStart and timeOfDayEnd attributes to encode the daily start and end times of service. Complete instructions on how to encode schedules are described in clause 2.4.10.4.

2.4.12 Graphic information

A graphic file should be appropriate for the purpose and should supplement the information in terms of navigational relevance. Preferably, the graphic should provide perspective relevant to the view of the mariner. Graphics should be such that all the information in the graphic is legible in the application display. Graphic information must be encoded using the complex attribute graphic. The simple sub-attribute pictureInformation should be used to provide credits to the picture creator, copyright owner etc. Assuming that graphic information provides a coastal view, mariners are interested in knowing from which point on sea that graphic has been taken. The complex attribute bearingInformation (see clause 2.4.12.1) provides all necessary information.

2.4.12.1 Bearing information

The most accurate information should be provided if it is necessary to indicate a position from where a picture has been taken. *information* is a sub-complex attribute of bearingInformation and should be used to specify that no bearing information can be provided whenever such is the case. The sub-attributes sectorBearing and orientation can be used to describe a certain level of inaccuracy in the position determination.

2.5 Associations

2.5.1 Introduction

An association expresses a relationship between two classes — features, information types, or a feature and an information type. Objects in the dataset (instances of feature/information types) are related only if the link between them is encoded in the dataset. An association end may have a multiplicity which describes how many instances the feature or information type instance at the other end is allowed to link to.

EXAMPLE: An Authority information type provides the responsible authority information to the abstract SupervisedArea feature. An association named Service Control (srvControl) is used to relate the two classes; roles are used to convey the meaning of the relationship. The association is inherited by subclasses of SupervisedArea and is thereby available to its subclass MilitaryPracticeArea.

Figure 2-2 — Information association relating a feature to an information type

2.5.2 Association names

The association name is normally provided by the UML diagram at the middle of the connection line/ arrow between the two involved classes and can be obtained from the feature and information type tables provided in this document). Association names may be omitted in the UML diagrams for the following reasons: a) the association is defined by an association class, see 2.5.4 (the name of the association class is used); b) to avoid cluttering the diagram – however, the name is always documented in the feature/information type tables.

2.5.3 Association roles

Either or both association ends can have a name (role). Roles may be also omitted from the diagram to reduce clutter – again, the role name is documented in the feature/information type tables.

NOTE: Instead of documenting every single role, Product Specifications may describe rules for defining default roles.

2.5.4 Association classes

Association classes allow relationships to be characterized by one or more attributes. The attributes of the association class belong to the association itself, not to any of the features or information types it connects. An association class is both an association and a class. Within an S-127 product the association classes Permission Type and Inclusion Type may be used for relating vessel classes to feature and information types.

2.5.4.1 Permission Type

This association class specifies the relationship of the vessel class to a feature, e.g., whether access to a feature (or use of a facility) is prohibited or permitted for a specified class of vessel. The class of vessel is described by the simple and complex attributes of the information type Applicability such as length, cargo, etc. The attributes of the association class describe the nature of the relationship, i.e., whether access to an area is permitted or prohibited, or whether use of a service is required or recommended.

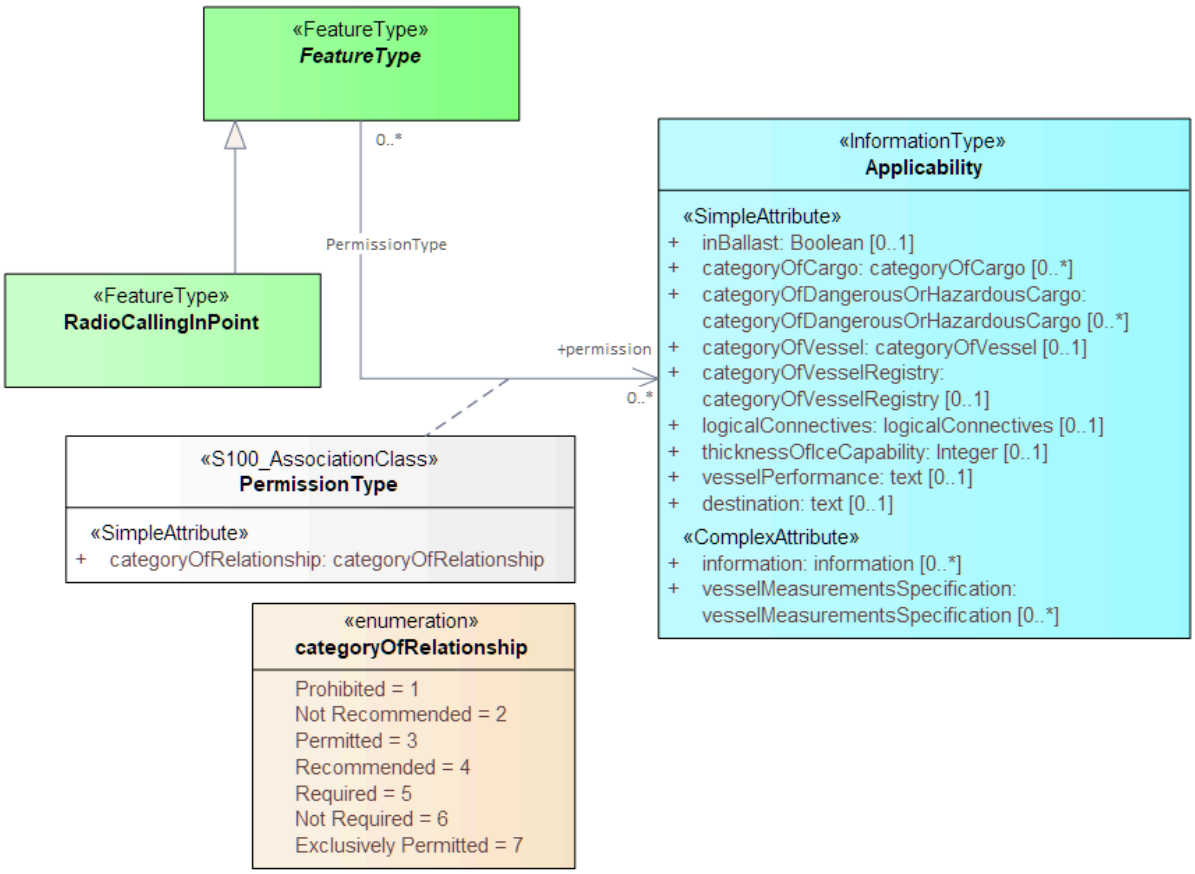

Figure 2-3 — Association class for hypothetical requirement for use of a radio calling-in point by a vessel carrying hazardous cargo

EXAMPLE: An association between an **Applicability** instance with attribute *categoryOfDangerousOrHazardousCargo* = IMDG Code Class 3 and an instance of feature **RadioCallingInPoint**, with Permission Type's attribute *categoryOfRelationship* = *Required*, means that vessels carrying flammable liquids (hazardous cargo type class 3 in the IMDG Code) must call in at the specified calling-in point. Note that in this case the relationship is inherited by the **RadioCallingInPoint**) instance from the abstract class **FeatureType**.

2.5.4.2 Inclusion Type

This association class defines whether a specified customer (class of vessels, as described by Applicability) is excluded or included from a particular regulation, recommendation, etc. Again, the attributes of the association class describe the nature of the relationship; in this case whether the vessel is included or excluded from the regulation, etc.

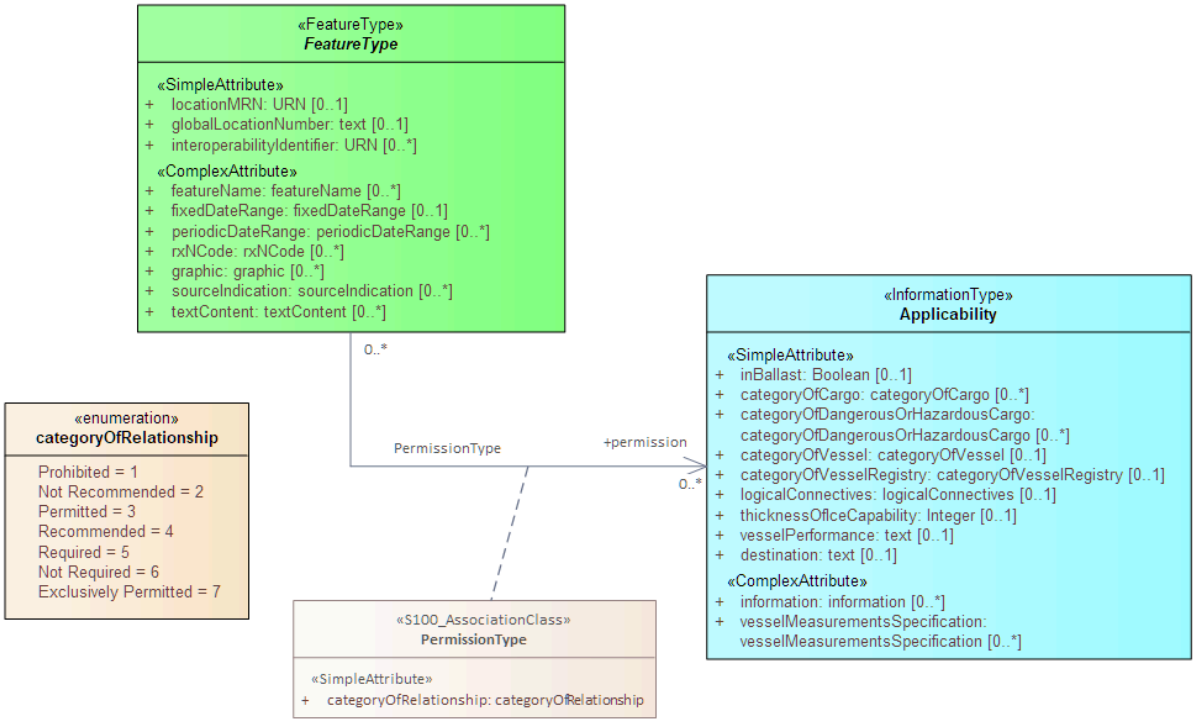

Figure 2-4 — Association class for inclusion of vessel types in regulations

EXAMPLE: An association between an Applicability instance with attribute categoryOfDangerousOrHazardousCargo = IMDG Code Class 3, with Inclusion Type's attribute membership = included, and an association of a Regulation instance to the same Inclusion Type, means that the information provided by the Regulation (a sub-type of AbstractRXN) applies to vessels carrying flammable liquids (hazardous cargo type class 3 in the IMDG Code).

NOTE (1): Since AbstractRXN is an abstract type, it cannot have direct instances in the dataset. Only instances of its (non-abstract) sub-types can be used.

NOTE (2): Specific tools may use different presentations in their user interfaces, e.g., as two associations (as described in the text of the example), or one association with an association class also shown (as shown in Figure 2-4).

2.5.5 Use of various associations

2.5.5.1 General

In general, associations must be encoded whenever the relationship is useful for navigation, monitoring, voyage or route planning, or reporting purposes, or any other purpose for which the dataset is intended. The multiplicity lower bound of "0" at an association end means only that the absence of a link to the relevant instance does not invalidate the dataset. The encoding instructions for individual feature and information types describe what associations are allowed and whether they are required or optional.

2.5.5.2 Generic association for uncategorized additional information

Unless other associations are specified, information types are associated to the relevant features using the association name AdditionalInformation and the role *theInformation*.

2.5.5.3 Associations to Restrictions, Recommendation, Regulations, and Nautical Information

The Restrictions, Recommendation, Regulations, Nautical Information are associated to the relevant features using the association named AssociatedRxN (inherited from their common abstract super-type). The roles at the ends of this association are appliesInLocation and theRxN (the Restriction, Regulation etc.). If the regulation applies only to a specific class, or if it mentions an exempt class, an additional association to an Applicability object is encoded using the InclusionType association class.

2.5.5.4 Conventional Association

Certain features and information types may be permitted or required to have associations to other feature or information types. The allowed or mandatory associations for a feature/information type are shown in the application schema (clause 4 of the Product Specification) and listed in the documentation for individual types in this Annex (clauses 4 — 18). Definitions of the associations and roles are also given in the DCEG.

2.5.5.5 Where to Encode Associations

The presentation and management of associations will be determined by the user interface of the encoding software tools. Since S-100 permits feature-information associations to be encoded only from the geographic feature to the information type and not vice versa, the information-to-feature link might be unavailable or treated differently from the feature-to-information link.

2.5.5.6 Required Encoding for Associations

Associations must be encoded with the *gml:id* of the target feature or information instance in an *xlink:href* attribute and the alpha code of the association (as given in the Feature Catalogue) of the association in an *xlink:title* attribute.

For example:

```
<S127:theCollection          xlink:href="#PILDST.0018"          xlink:title=
"PilotageDistrictAssociation"/>
```

to encode a PilotageDistrictAssociation link from a PilotBoadingPlace instance to a PilotDistrict instance where the *gml:id* of the target PilotDistrict instance is *PILDST.0018*.

For InclusionType and PermissionType associations (which are association classes and have association attributes) the attribute must also be included. For example, to link to the Regulations instance with *gml:id = R01*:

```
<S127:theApplicableRxN xlink:href="#R01" xlink:title="InclusionType">
    <S127:InclusionType>
        <S127:membership code="1">Included</S127:membership>
    </S127:InclusionType>
</S127:theApplicableRxN>
```

2.6 Datasets

2.6.1 Types of Datasets

A dataset is a grouping of features, attributes, geometry and metadata which comprises a specific coverage. Table 2-9 shows the types of datasets which may be produced and contained within an exchange set:

Table 2-9 — Dataset types

Dataset	Explanations
New dataset	Data for an area different (in coverage and/or extent) to existing datasets.
New Edition of a dataset	A re-issue plus new information which has not been previously distributed by Updates. Each New Edition of a dataset must have the same name as the dataset that it replaces and should have the same spatial extents.
Update dataset	Updated or new information. Contains information about objects being added, modified, or deleted.

2.6.2 Overlay data sets

S-127 datasets are intended to be used together with S-101 ENC (or similar data products) which will act as a base layer. The base layer is expected to provide navigational and visual context. Generally, an overlay dataset like S-127 does not provide “skin of the earth” coverage and there will be large areas with no data coverage because the S-127 application schema does not include any feature for

designating a region as “other”, or “not an S-127 area” (i.e., there is no S-127 feature equivalent to the S-101 Unsurveyed Area). Further, an overlay dataset does not include features that provide auxiliary information such as bathymetry within a routeing measure area.

2.6.3 Data coverage

A Marine Traffic Management dataset can contain one or more DataCoverage features (see clause 4.3). The data boundary is defined by the extent of the DataCoverage meta features. Data must only be present within DataCoverage meta features. When a feature extends across datasets of overlapping scale ranges, its geometry must be split at the boundaries of the DataCoverage features and its complete attribute description must be repeated in each dataset. An Update dataset must not extend the data coverage for the base dataset to which it applies. Where the extent of the data coverage for a base dataset is to be changed, this must be done by issuing a New Edition of the dataset.

2.6.4 Discovery metadata

Discovery metadata is intended to allow applications to find out important information about datasets and accompanying support files to be examined without accessing the data itself (or without reading the support file). Discovery metadata includes, but is not limited to:

- information identifying the product specification and encoding format;
- edition and version numbers, production/release date, and other details of data creation and updating;
- data coverage of the dataset;
- summary descriptions of content, purpose, use, and limitations;
- identification and contact information for the producer and distributor of the dataset.

Discovery metadata is encoded in the exchange catalogue. S-127 uses the same classes and attributes for discovery metadata as S-100, but adds certain product-specific restrictions. The classes and attributes for generic discovery metadata are defined in S-100 Part 17. Constraints and restrictions specific to S-127 are defined in the S-127 Product Specification. The schema for the exchange catalogue file (CATALOG.XML) for S-127 is available from the schema server (https://schemas.s100dev.net).

2.6.5 Dataset header metadata

Dataset header metadata contains structural and discovery metadata that apply to the whole dataset and are encoded in the dataset file. The elements are described in S-100 Part 10b.

2.6.6 Dataset units

The depth, height and positional uncertainty units in a dataset must be metres.

2.6.7 Dataset Coverage

Marine Traffic Management datasets are spatially limited.

In areas which include neighbouring producer nations, producing agencies should co-operate to agree on dataset boundaries and ensure no data overlap. Where possible, adjoining nations should agree on common data boundaries within a technical arrangement based on cartographic convenience and benefit to the mariner.

If an MTM feature extends outside the product coverage and the adjoining object does not exist, e.g. due to delay in the production of the neighbouring HO product, an indication should be placed at the outer edge of the product.

2.6.8 Overlaps

The DataCoverage features within a dataset must not overlap, however DataCoverage features from different datasets may overlap if they have differing maximum display scales or the datasets are for different ports.

MTM does not envisage multiple datasets for the same port, and does not anticipate overlapping datasets for a single port.

Overlapping datasets are possible in the case where there are two or more ports in close proximity (which may, for example, have overlapping approaches). In the latter case, consideration should be given to creating a single dataset that covers all the ports in the region in question, but overlapping datasets may

be created as necessary. In case of overlapping datasets, the ECDIS should display an indicator and allow the user to select one dataset for display.

2.6.9 Feature Object Identifiers

Each feature and information instance within a dataset must have a unique universal Feature Object Identifier [FOID]. This is mapped to the gml:id attribute of the feature in the dataset (FOID and gml:id may not be identical due to XML restrictions on the format of gml:id attributes). Where a real-world feature has multiple geometric elements within a single dataset due to the dataset scheme, the same FOID may be used to identify multiple instances of the same feature. Since gml:id attributes in the same file must be unique, the mapping between FOID and gml:id must allow for a one-to-many mapping if needed. Features within a dataset may carry multiple geometries. Features split across multiple datasets may be identified by the same FOID. Features repeated in different scale ranges may be identified by the same FOID. FOID must not be reused, even when a feature has been deleted. However, the same feature can be deleted and added again later using the same FOID.

NOTE (1) (informative): The current format of FOID is defined in S-101 as a concatenation of subfields Producing Agency, Feature Identification Number and Feature Identification Subdivision. The identifier is currently formatted as a string value. The identifier may eventually be replaced with an identifier adhering to the scheme for Maritime Resource Names (MRN) which is based on the format of URNs.

NOTE (2): S-127 uses gml:id as a proxy representing FOID. S-127 does not define a rule for the structure or generation of gml:id values or their relation to identifiers in S-57, S-101 or other sources. Producers may generate gml:id values according to any desired scheme or schemes

2.6.10 180° Meridian of Longitude

Datasets must not cross the 180° meridian of longitude.

2.7 Geographic names

2.7.1 Feature names

If it is required to encode an international or national geographic name, it must be done using complex attribute featureName.

If it is required to encode a geographic name for which there is no existing feature, an appropriate area feature must be created. In order to minimise the data volume, these features should, where possible, use the geometry of existing features.

Geographic names should be encoded with the complex attribute featureName. The complex attribute featureName consists of the simple sub-attributes language, name and a Boolean type to indicate whether that particular name is the displayName or not.

National geographic names can be left in their original national language in a non-English iteration of the complex attribute featureName (but only if the national language can be expressed using lexical level 0 or 1), or transliterated or transcribed and used in an English iteration of the complex attribute featureName, in which case the national name should be populated in an additional iteration of the featureName with sub-attribute language populated with the relevant national language value in accordance with ISO 639-2/T.

All area and point features within a Marine Traffic Management product should be encoded using featureName if a name is available.

A group of features, associated with a particular geographic name, should have the name encoded using featureName on an aggregation feature (of type surface or point, or no geometry, as appropriate). The name should not be encoded on the individual hydrographic features.

A group of service or forecast areas with the same attribute values associated with the same name should be encoded as spatial attributes of the same feature (so there would be only one feature with multiple spatial attributes for location).

Named features listed in Hydrographic Office's Sailing Directions or other documents that may assist in locating service information should be encoded using feature name on the relevant feature (e.g. WaterwayArea). In all instances, if the exact extent of the feature to be named is known, a feature must

be created. If the exact extent is not known, or the area is too small, an existing or specifically encoded point feature should be used to encode the geographic name.

2.7.2 Text placement

The cartographic feature TextPlacement (see clause 12.1) is used specifically to place text cartographically. The properties of the TextPlacement feature are described as follows:

- Geometry (point) – the spatial point location of the text string.
- text type – the classification of the text being placed based on attribution of the target feature(s) (mandatory).
- text offset bearing and text offset distance – the bearing and distance (in millimetres in the ECDIS display) used to position the text relative to the feature.

The TextPlacement feature is associated to the feature which carries the text being placed. The mandatory attribute text type identifies the text string(s) to be placed. The TextPlacement feature may provide functionality such that, as an ECDIS screen rotates from its optimum position in “north up” display mode (for example, if display is set to “course up”) text can remain readable, or clear other important charted information.

The TextPlacement feature is associated to the feature which carries the text being placed. The attribute textType determines which text string is to be displayed if more than one is present. The TextPlacement feature ensures that as the screen rotates from “north up” (e.g. if display is set to “course up”) text can remain readable, or clear other important charted information.

2.8 Scale policy

2.8.1 General policy

Marine Traffic Management data must be compiled in the best applicable scale.

2.8.2 Usage of scale attributes in displays (informative)

The attributes scaleMinimum and scaleMaximum define the range of display scales within which features will be portrayed on the display if these scale minimum/maximum functions are enabled in the ECDIS or another GIS device. A geo feature with one or more spatial attributes can utilize the scaleMinimum and scaleMaximum attributes on the link to the spatial object (see the S-100 General Feature Model, S-100 Part 3, Figure 3-1 and 3-5.3.5). There are essentially two ways in which these attributes may be used.

- A producer may decide to use only a *scaleMinimum* value. This option is employed when the data producer wishes to turn off the display of a feature above certain scales. This is particularly useful in areas with high data density, and when it is expected that the data will be used a larger scale where data clutter might become an issue. Features are therefore encoded with an applicable value, which represents the scale at which the producer wishes to turn off the feature.
- A producer may decide to provide several pairs of *scaleMinimum* and *scaleMaximum* values. This decision may be based on the fact that for one particular feature different spatial instances in different scale ranges should be provided to supply this particular feature with more detailed geographic representation at larger scales.

An example can be a building which has two spatial objects associated, first one with only scale minimum value encoded at 21999, and the second spatial object encoded with scaleMaximum at 22000 and scaleMinimum encoded with 999999. These values would enable the use of a highly-detailed geometry at larger scales than 22000, and a less detailed geometry at scales of 22000 and less, while the building would be turned off at scales of 999999 and less.

A similar strategy can be followed to enable boundaries to conform to a scale-dependent geometry such as a coastline. Conformance at different scales can achieved by using minimum/maximum scales on spatial attributes to indicate which particular geometry should be used at a given scale.

The meta feature DataCoverage (clause 4.3) is used to provide ECDIS with the scale information needed for the determination of dataset loading and unloading in relation to the user-selected viewing scale of the ECDIS. The mandatory attribute maximumDisplayScale is used to indicate the largest intended viewing scale for the data. The mandatory attribute minimumDisplayScale is used to indicate the smallest intended viewing scale for the data.

S-127 does not prescribe specific values for maximumDisplayScale and minimumDisplayScale. Instead, producers should refer to the S-101 DCEG for values, and use values appropriate to the S-101 ENCs underlying the S-127 dataset.

2.8.3 Scale minimum values

Scale minimum values must be chosen from the list in S-101 to ensure visual compatibility between comparable underlying S-101 ENCs and S-127 data products. The scale minimum values used in the actual comparable underlying ENCs should be used, and in case of differences with the list below, the values in the actual ENCs prevail. “Comparable” ENCs for the purpose of this requirement means ENCs of scales large enough to distinguish berths, terminals, and other features that are part of a port. These will generally have navigationPurpose=port in discovery metadata (see S-100 Part 17) and have maximum and minimum display scales values in the lower end of the scale ranges (i.e., be the larger scale ENCs).

Table 2-10 — Scale minimum values

Scale
19999999
9999999
4999999
3499999
1499999
999999
699999
499999
349999
259999
179999
119999
89999
59999
44999
29999
21999
17999
11999
7999
3999
2999
1999
999

All data within a dataset must have the same minimum display scale, but portions of a dataset can have a different maximum display scale, depending on the best scale required in an area for the operational purpose of the data.

2.8.4 Scale policy for feature types

Unlike S-101, S-127 does not define scale minimum values or steps for individual feature types.

2.9 Masking

In order to best determine the appropriate level of masking required for an dataset, it is recommended that the dataset be viewed in an ECDIS. The masking policy in S-127 is the same as for ENC features, described in the S-101 DCEG (clause 2.5.10) and is summarised below.

The following sub-clauses describe scenarios where masking is recommended should be considered by compilers.

2.9.1 Surface features crossing ENC cell boundaries

When a single feature of type surface crosses the boundaries of adjoining datasets, mask the edge where it shares the geometry of the boundary in each dataset:

This allows the features to be displayed as a single feature of type surface rather than being divided at the cell boundary and having the representation of two separate features. Note that some production software will automatically truncate (mask) features at the cell boundary.

NOTE: Occasionally an edge of the boundary of an area actually coincides with the dataset boundary. Where this occurs and the production system applies automatic truncation (masking) of this edge, the compiler must “unmask” that edge so as to avoid the appearance of the area to be “open ended”.

Where features of type surface extend beyond the entire limit of data coverage for the dataset, all edges of these area features should be masked:

Where a cell contains an area of no data coverage and the production software applies automatic truncation (masking) of features extending beyond the limit of data coverage of the dataset, edges of area features extending beyond the internal limit of the area of no data coverage may need to be masked manually.

Table 2-11 lists those features of type surface that should have edges masked where the boundary of the area crosses or extends beyond the dataset limit or the area of data coverage of the dataset.

Table 2-11 — Features of which edges have to be masked when crossing the dataset boundary

Feature Type	Comment
ConcentrationOfShippingHazardArea	
PilotageDistrict	
CautionArea	
RouteingMeasure	
UnderkeelClearanceAllowanceArea	
PilotBoardingPlace	
WaterwayArea	
RestrictedArea	
MilitaryPracticeArea	
VesselTrafficServiceArea	
LocalPortBroadcastServiceArea	

Feature Type	Comment
ShipReportingServiceArea	
PlaceOfRefuge	
PiracyRiskArea	
PilotService	
UnderkeelClearanceManagementArea	

2.9.2 Surface features having ECDIS symbol pattern fill

Surfaces symbolised in ECDIS with a patterned fill, and for which the outer edge of the surface has no significance (or is subject to change or intermittent), may have the boundary of the surface masked to reduce screen clutter.

Compilers must take care that the surface is large enough at the optimum display scale of the data (and at smaller optimum display scales at which it is intended that the feature should be displayed) so that at least one pattern symbol is displayed in the area. If this is not the case, the boundary of the surface should not be masked. Alternatively, a point feature may be encoded instead of the surface feature. It may be useful to load and display the data in an ECDIS in order to assist with making decisions as to the best encoding option to adopt in individual circumstances.

2.9.3 Routeing measures – entrance and exit edges

The S-101 DCEG clause 2.5.10 describes the masking policy for routeing measures such as Traffic Separation Schemes (TSS), Two-Way Routes and Deep Water Routes. In S-127 these are all represented by the single feature RouteingMeasure and the S-101 policy is adapted accordingly, below.

Routeing measures have defined “ends” through which vessels enter and exit the route. Most routeing measures also consist of multiple components having different orientations. Where encoded, many of the features comprising the routeing measure symbolise along the edges of the area. Where the edges corresponding to the entry/exit points and between individual components of the route have not been masked, the impression of the route as a single routeing measure may not be apparent to the Mariner, and cause confusion. Compilers should therefore mask the entry/exit edges, and all edges between components within the routeing measure.

The S-101 DCEG should be consulted for further details.

2.10 Linear surface features

If it is required to encode a linear feature when the only allowable primitive for the relevant feature type is surface (e.g. a service area along a track, or channel), a very narrow surface should be encoded. The suggested extent is 0.3mm wide at viewing scales (keeping in mind that S-100 permits different spatial attributes at different scales.) An edge of this surface should correspond to the position of the line. All other edges should be masked.

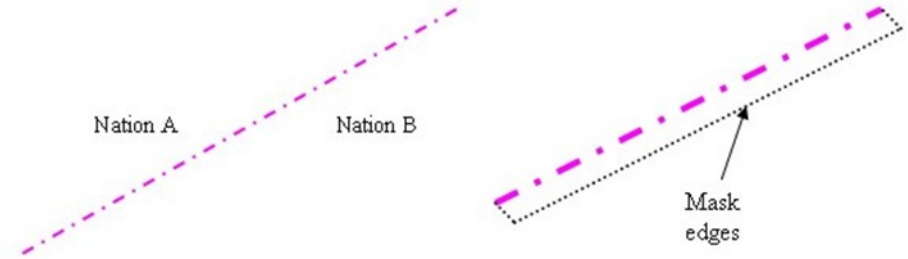

Figure 2-5 — Linear features

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3 Description of table format for feature and information types

The tables describing feature and information types are based on the template below.

X.X Feature Name

IHO Definition: (Definition) (followed by Remarks if any)				
S-127 [Geo Feature/Information Type]: S-1XX Feature or Information Type (followed by (Abstract) if abstract type)				
Super Type: (supertype)				
Primitives: (allowed spatial primitives)				
Real World	*Paper Chart Symbol*	*ECDIS Symbol*		
(Reserved)	*(Reserved)*	*(Reserved)*		
S-1XX Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
(This section lists the allowabe **local** attributes)		(Allowed values for enumeration and codelist attributes)		
Inherited Attributes				
S-1XX Attribute	**Inherited From**		**Type**	**Multiplicity**
(attribute)	(supertype where defined)			

Feature/information associations (permitted associations)				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
Role of target class	Name of the Association if inherited, "(Inherited from …)"	Name of the target (the feature or information type referenced by the link)	aggregation / composition / aggregation	(How many target instances a single source instance can link to.)
If the association is listed in only one of the feature or information types in the asspciation, it means the association is unidirectional, that is, the binding for the association is only in one of the participating features or information types. This is sometimes the case for information associations that link a feature to an information type — the feature type has a binding to the information type, but not vice versa. Associations to or from any type are inherited by all sub-types of the type at any level unless explicitly prohibited in the relevant encoding instructions. Hyphens in roles and association names (camel-case codes) are only for document formatting and should be ignored for production purposes.				

INT 1 Reference (optional): The INT 1 location(s) of the Feature – by INT1 Section and Section Number.

(Encoding instructions are provided in sub-clauses following the table.)

X.X.X General

General guidance for encoding.

Introductory remarks. Includes information regarding the real world entity/situation requiring the encoding of the Feature in the product, and where required nautical cartographic principles relevant to the Feature to aid the compiler in determining encoding requirements.

X.X.X.X Sub-clause heading(s) (if needed) If applicable — S-4 reference

Additional encoding guidance relevant to the feature.

Clauses related to specific encoding scenarios for the Feature (if required).

X.X.X Remarks

Guidance for encoding specific attributes.

Remarks:

S-127 Attribute: Indentation of attributes indicates sub-attributes of complex attributes. Complex attributes may also be sub-attributes of complex attributes. Complex sub-attributes are generally not expanded to show their own sub-attributes, because expanding sub-attributes produces tables of inordinate length, but if expansion is done, further levels of indentation are applied to the sub-attributes. Inherited attributes are shown separately from locally defined attributes. Inherited complex attributes are not expanded to show their sub-attributes.

Allowable Encoding Value: For (EN) type attributes, the enumerates listed are only those allowable for the particular occurrence of the attribute relevant to the feature. Allowable values may vary for the attribute depending on the feature to which the attribute is bound. Such bindings are defined in the S-127 Feature Catalogue. The full list of enumerates that may be assigned to an attribute in S-127 can be found in the Simple Attributes section of the printed feature catalogue document.

Type: The prefix **C** indicates that the attribute is a complex attribute. Complex attributes are aggregates of other attributes that can be simple type or complex type. The prefix **S** indicates that the attribute is a sub-attribute of a complex attribute. Complex attributes that are sub-attributes of a complex attribute, and their sub-attributes, are indicated by indentation of the attribute name in the S-127 Attribute column.

Introductory clauses may depict associations using a UML diagram showing the relationships that apply to the class and its super-classes (generalizations). Relationships which are inherited from super-classes are shown by including the super-classes and their associations in the diagram.

The usual UML conventions apply. For explanations of standard UML notations, see S-100 Part 1.

Association ends and multiplicities: A lower bound of 0 in the multiplicity at any end of an association indicates only that the association is not mandatory for any particular instance of the feature at the other end (i.e., it is not mandatory for an instance of “that” feature type to have an association to a feature of “this” type). A lower bound of “1” means that if an instance of “that” type exists, it must be associated to an instance of “this” type. If the association is actually encoded then it amounts to saying that “this relationship exists between these two instances” and there must be an appropriate feature instance at both ends. Associations that are not mandatory should be encoded if and only if they convey useful information.

4 Meta-Features

4.1 Introduction

Meta-features are used to reduce the need to code quality and datum attributes in individual features, as well as to delimit the extent of data in the dataset. In a base dataset, some meta-features are mandatory (clause 4.2.

Horizontal and vertical uncertainties that apply to the majority of features are encoded as attributes of one or more **QualityOfNonBathymetricData** features together covering the same extent as the spatial union of the **DataCoverage** features in the dataset. (Typically, there would be one **DataCoverage** feature and one **QualityOfNonBathymetricData** feature, having the same spatial extent.) Exceptional horizontal and vertical uncertainties are encoded in a **SpatialQuality** information type associated to particular spatial primitives.

4.2 Mandatory meta features

The mandatory meta features are:

- DataCoverage
- QualityOfNonBathymetricData

4.3 Data Coverage

IHO Definition: A geographical area that describes the coverage and extent of spatial objects.				
S-127 Geo Feature: DataCoverage				
Super Type:				
Primitives: surface				
Real World	*Paper Chart Symbol*	*ECDIS Symbol*		
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Interoperability Identifier			URN	0,*
Maximum Display Scale			IN	1,1
Minimum Display Scale			IN	1,1
Optimum Display Scale			IN	0,1

Inherited Attributes			
S-127Attribute	**Inherited From**	**Type**	**Multiplicity**
No inherited attributes			

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**

Feature associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**

4.3.1 General

The meta feature **DataCoverage** encodes the area covered by the dataset. This feature is also used to provide the ECDIS with the scale information necessary for the determination of dataset loading and unloading in relation to the user selected viewing scale in the ECDIS.

There must be a minimum of one **DataCoverage** feature in a dataset.

DataCoverage features must cover at least the extent of the spatial types in the dataset, and must not overlap.

4.3.2 Scale attributes

The use of S-127 data is scale-independent and minimum display scale will normally be (null) and maximum display scale 1000 (the extreme values in the table of scales in the S-101 ENC, see Table 2-10). Should a producer need to encode different maximum and minimum display scales from the extreme (i.e., create scale-dependent datasets), the values of maximum and minimum display scales should be harmonized with base layer S-101 datasets (see the S-101 DCEG).

The attribute *optimumDisplayScale* is used to indicate the intended viewing scale for the data. The value populated for *optimumDisplayScale*, therefore, provides a reference for the user selected viewing scale in the ECDIS at which the overscale warning will be displayed as the Mariner continues to zoom in if there is no larger optimum display scale MTM dataset available.

The mandatory attribute *minimumDisplayScale* is used to indicate the smallest intended viewing scale for the data. Where an empty (null) value is populated for *minimumDisplayScale*, the ECDIS will continue to display the data regardless of how small the user selected viewing scale becomes. The value populated for *minimumDisplayScale*, therefore, is intended to be used in a series of datasets covering a geographic area to determine the dataset rendering (display) priority as the user selected viewing scale becomes larger.

The attribute *maximumDisplayScale* is used to indicate the scale at which the data producer considers that the “grossly overscaled” warning is to be triggered based on the user selected viewing scale.

The values of maximum and minimum display scales should be harmonized with comparable base layer S-101 datasets (Table 4-1[1]). This serves to harmonize the loading strategy of information with that for the underlying ENCs. However, use of the same values as S-101 datasets is not mandatory in S-127.

Table 4-1 — Maximum, optimum and minimum display scale values (from S-101 Ed. 2.0.0 DCEG)

maximum display scale	optimum display scale	minimum display scale
Any value	10,000,000	empty (null)

[1] The current S-101 DCEG should be consulted to take into account any revisions to S-101 since the preparation of this Product Specification.

	3,500,000	10,000,000
	1,500,000	3,500,000
	700,000	1,500,000
	350,000	700,000
	180,000	350,000
	90,000	180,000
	45,000	90,000
	22,000	45,000
	12,000	22,000
	8,000	12,000
	4,000	8,000
	3,000	4,000
	2,000	3,000
	1,000	2,000

NOTE: The selection of values for *maximumDisplayScale* and *minimumDisplayScale* for any selected *optimumDisplayScale* are at the discretion of the Data Producer. That is, any value listed for *maximumDisplayScale* and *minimumDisplayScale* above may be selected from any of the listed values, with the only restriction being that *maximumDisplayScale* must be a smaller value than/equal to *optimumDisplayScale* which must be a smaller value than *minimumDisplayScale* (or any value if *minimumDisplayScale* is populated with an empty (null) value).

4.3.3 Number of feature instances

Typically, only a single **DataCoverage** feature should be used in a dataset. However, if the *optimumDisplayScale* is different for discrete areas within a single ENC dataset, this must be indicated by encoding separate, non-overlapping **DataCoverage** features, each having a different value populated for *optimumDisplayScale*. Producing Authorities are to note, however, that excessive use of multiple **DataCoverage** features having different values of *optimumDisplayScale* within a single dataset should be avoided. Where different values of *optimumDisplayScale* are used, this should be restricted only to data compiled in order to achieve the intended navigational usage for the entire dataset.

4.3.4 Compatibility of scale values

Datasets must have the same value for *minimumDisplayScale* for all **DataCoverage** features in the dataset. Datasets may have different values populated for *maximumDisplayScale* for the **DataCoverage** features in the dataset; these values are typically populated as the value corresponding to 2 x the scale (or half the denominator) value populated for *optimumDisplayScale*, but are at the discretion of the data producer. For example, the value for *maximumDisplayScale* may be set to the same value as *optimumDisplayScale* to have the “grossly overscaled” warning appear at any larger user selected viewing scale than *optimumDisplayScale*; or populated as the value corresponding to the *minimumDisplayScale* value for the next largest scale dataset(s) in the ENC portfolio.

Where a series of differing *optimumDisplayScale* datasets are compiled covering the same geographic area, the smallest scale value populated for *optimumDisplayScale* for **DataCoverage** feature(s) in the dataset should correspond to the *minimumDisplayScale*, where populated, for the next largest *optimumDisplayScale* dataset. The largest scale value populated for *optimumDisplayScale* for **DataCoverage** feature(s) in the dataset must not be a larger scale value than the *optimumDisplayScale* for the next largest *optimumDisplayScale* dataset, where such a dataset exists.

4.3.5 Remarks

- This meta feature is intended to support an indication of coverage and facilitate the loading and rendering (display) of datasets in the end-user system.
- Where more than one **DataCoverage** feature exists for a dataset, the dataset, when initially loaded, will be displayed in the ECDIS at a display scale corresponding to the largest scale value populated for *optimumDisplayScale*.
- Where a dataset consists of only one **DataCoverage** feature, the value for the *maximumDisplayScale* populated in the dataset discovery metadata must be the same as the value populated for *maximumDisplayScale* on the **DataCoverage**.
- For any **DataCoverage** feature, *maximumDisplayScale* < *minimumDisplayScale*.
- Except for the largest scale dataset coverage, datasets with multiple **DataCoverage** features must not have excessive differences in the values populated for *optimumDisplayScale* between the Data Coverage features. Typically, this should be interpreted as there being no more than one scale step value as defined in Table 4-1 above between the optimum display scale values in a single dataset.

4.4 Quality of Non-Bathymetric Data

IHO Definition: An area within which a uniform assessment of the quality of the non-bathymetric data exists.				
S-127 Geo Feature: QualityOfNonBathymetricData				
Super Type:				
Primitives: surface				
Real World	*Paper Chart Symbol*		*ECDIS Symbol*	
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Category of Temporal Variation		1: Extreme Event 4: Likely to Change 5: Unlikely to Change 6: Unassessed	EN	0,1
Horizontal Distance Uncertainty			RE	0,1
Orientation Uncertainty			RE	0,1
Horizontal Position Uncertainty			C	0,1
Uncertainty Fixed			(S) RE	1,1
Uncertainty Variable Factor			(S) RE	0,1
Interoperability Identifier			URN	0,*
Source Indication			C	0,1
Category of Authority			(S) EN	0,1
Country Name			(S) TE	0,1
Source			(S) TE	0,1
Source Type		1: Law or Regulation 2: Official Publication 7: Mariner Report, Confirmed 8: Mariner Report, Not Confirmed 9: Industry Publications and Reports 10: Remotely Sensed Images	(S) EN	0,1

		11: Photographs 12: Products Issued by HO Services 13: News Media 14: Traffic Data		
Reported Date			(S) TD	0,1
Feature Name			(S) C	0,*
Survey Date Range			C	0,1
Date Start			(S) TD	0,1
Date End			(S) TD	1,1
Information			C	0,*
File Locator			(S) TE	0,1
File Reference			(S) TE	0,1
Headline			(S) TE	0,* (ordered)
Language			(S) TE	0,1
Text			(S) TE	0,1
Inherited Attributes				
S-127Attribute	**Inherited From**		**Type**	**Multiplicity**
No inherited attributes				

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**

Feature associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**

4.4.1 General

The meta feature Quality of Non-bathymetric Data may be used to provide an indication of the overall uncertainty of position for all non-bathymetric features. It must not be used to provide the uncertainty of bathymetric information.

The attribute horizontal position uncertainty may be applied to any spatial type, in order to qualify the location of a feature.

Horizontal distance uncertainty and horizontal position uncertainty must not be applied to the spatial type of any geo feature if they are identical to the horizontal distance uncertainty and position uncertainty values of the underlying meta feature.

Position uncertainty on the Quality of Non-bathymetric Data applies to non-bathymetric data situated within the area, while position uncertainty on the associated spatial types qualifies the location of the Quality of Non-bathymetric Data feature itself.

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5 Abstract Geo Features

5.1 Introduction

This clause describes abstract feature types. The abstract types cannot be used directly, but define attributes and associations inherited by their sub-types. The encoding remarks in the description of each abstract feature apply to its sub-types but may be overridden by remarks in the sub-type.

The abstract feature types are depicted in Figure 5-1. At the root is the type named **FeatureType**, from which all feature types except cartographic and meta-features inherit several attributes. This means that any Geo feature in S-127 can have any of the several attributes in the **FeatureType** box. This type also has information associations to three information types, and a feature association to **TextPlacement** which, as for attributes, allows any S-127 Geo feature to have the same associations. The feature types **OrganizationContactArea**, **SupervisedArea**, and **ReportableServiceArea** define no local attributes but inherit the attributes of **FeatureType**, however each adds an additional information association which is inherited by their respective sub-types.

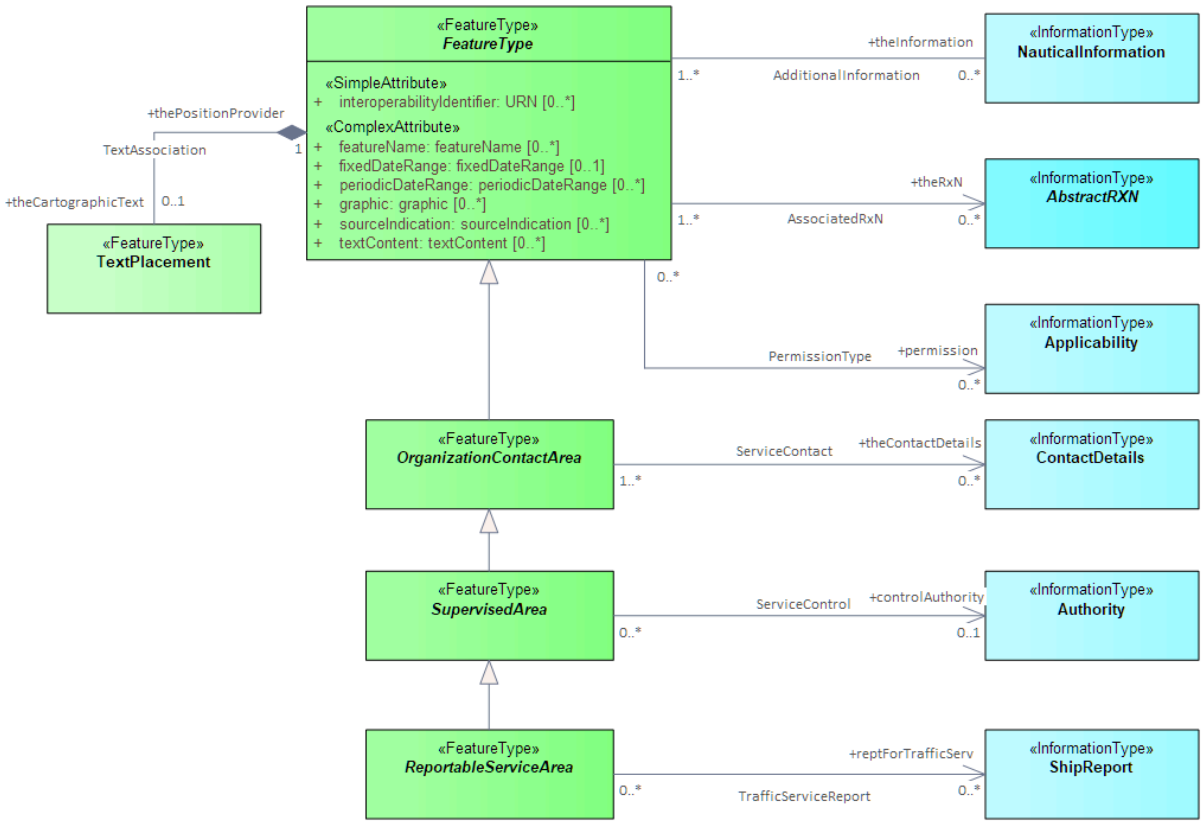

Figure 5-1 — Abstract feature hierarchy

The abstract feature hierarchies in S-131 and S-127 are intentionally harmonised by re-using types and relationships, except that if there are no non-abstract subtypes of an abstract type the abstract type is omitted.

Cartographic and meta-features are not derived from this abstract hierarchy and do not inherit these attributes and associations.

5.2 Feature Type

IHO Definition: Generalized feature type which carries all the common attributes.

S-127 Geo Feature: FeatureType (Abstract)				
Super Type:				
Primitives: noGeometry				
Real World	*Paper Chart Symbol*		*ECDIS Symbol*	
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Fixed Date Range			C	0,1
Date Start			(S) TD	0,1
Date End			(S) TD	0,1
Periodic Date Range			C	0,*
Date Start			(S) TD	1,1
Date End			(S) TD	1,1
Feature Name			C	0,*
Language			(S) TE	1,1
Name			(S) TE	1,1
Name Usage		1: Default Name Display 2: Alternate Name Display 3: No Chart Display	(S) EN	0,1
Source Indication			C	0,1
Category of Authority			(S) EN	0,1
Country Name			(S) TE	0,1
Source			(S) TE	0,1
Source Type		1: Law or Regulation 2: Official Publication 7: Mariner Report, Confirmed 8: Mariner Report, Not Confirmed 9: Industry Publications and Reports 10: Remotely Sensed Images 11: Photographs 12: Products Issued by HO Services 13: News Media 14: Traffic Data	(S) EN	0,1
Reported Date			(S) TD	0,1
Feature Name			(S) C	0,*
Text Content			C	0,1
Category of Text		1: Abstract or Summary 2: Extract 3: Full Text	(S) EN	0,1
Information			(S) C	0,*
Online Resource			(S) C	0,1

Source Indication			(S) C	0,*
Interoperability Identifier			URN	0,*
Inherited Attributes				
S-127Attribute	**Inherited From**		**Type**	**Multiplicity**
No inherited attributes				

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
permission	PermissionType	Applicability	association	0,*
theRxN	AssociatedRxN	AbstractRxN	association	0,*
theInformation	AdditionalInformation	NauticalInformation	association	0,*

Feature associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
theCartographicText	TextAssociation	TextPlacement	association	0,1

5.2.1 General

Where a complex attribute has all its sub-attributes optional (e.g., multiplicity 0..1 or 0..*), at least one of the sub-attributes must be populated if the complex attribute is present.

The *featureName* attribute in complex attribute *sourceIndication* is intended for the name of the source.

The **AdditionalInformation** association to a **NauticalInformation** object can be used to attach an additional chunk of information to an information type, and there is no applicable specific information type or association. This should be used sparingly if at all.

The **PermissionType** association is used to encode permission information (e.g., whether use or entry is prohibited, etc) for vessels with different characteristics, if such permissions or requirements exist for a feature.

The **AssociatedRxN** association allows (mostly) textual information pertaining to regulations, etc., to be associated to features.

As an abstract type, instances of **FeatureType** cannot be directly encoded in datasets. However, the encoding instructions for this type apply to all its sub-types unless explicitly overriden in the encoding instructions for any particular sub-type.

5.2.2 Remarks

- The complex attribute *rxNCode* when bound to a feature allows features to be tagged with keywords that make it easier for software queries to search for features relevant to particular subjects or to particular kinds of vessel operations. See clause 13 for guidance on encoding values of *rxNCode* sub-attributes.
- Regulations, recommendations, restrictions, or general nautical information must be encoded in the appropriate associated information type (see clauses 13.2 and Section 14). The ability to encode *rxNCode* and *textContent* as attributes of features must not be used to avoid encoding instances of **Regulations**, **Restrictions**, **Recommendations**, or **NauticalInformation**, because encoding the same type of information using different methods or different structures in the same dataset or data product makes it more difficult for the mariner to find information.
- When encoding text information in the complex attribute *textContent*, it is not necessary to encode the entire content in a single instance of the information sub-attribute. Instead, the information should

be organized so that each instance of information deals with a distinct topic or sub-topic, each with an appropriate heading in the headline attribute. This will make it easier for readers to find a topic. Part, chapter, section and sub-section headings in the source material may be used in either verbatim or condensed form, ordered according to the hierarchy in the source.

- Multiple instances of *textContent* should be used when the encoded material bears different relationships to the source (abstract/extract vs. summary vs. full text).
- Multiple instances of *textContent* may be used to distinguish information available purely as an external reference (in the *onlineResource* sub-attribute) from information encoded within the dataset (in the *information.text* sub-attribute or in a support file).
- In general, encoders may use the multiplicities of *textContent* and its sub-attributes to organize textual information so as to facilitate structuring text by topic, avoid flooding end-user screens with large blocks of unorganized text, and improve its accessibility to the mariner.

5.3 Organization Contact Area

IHO Definition: A feature often associated with contact information for an organization that exercises a management role or offers a service in the location. Remarks: It is not a requirement that every instance of the feature be associated with a management, reporting, or service organization.				
S-127 Geo Feature: OrganizationContactArea (Abstract)				
Super Type: FeatureType				
Primitives: noGeometry				
Real World	*Paper Chart Symbol*	*ECDIS Symbol*		
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Inherited Attributes				
S-127Attribute	**Inherited From**		**Type**	**Multiplicity**
Fixed Date Range	FeatureType		C	0,1
Periodic Date Range	FeatureType		C	0,*
Feature Name	FeatureType		C	0,*
Source Indication	FeatureType		C	0,1
Text Content	FeatureType		C	0,1
Interoperability Identifier	FeatureType		URN	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
theContactDetails	ServiceContact	ContactDetails	association	0,*
permission	PermissionType (inherited from FeatureType)	Applicability	association	0,*
theRxN	AssociatedRxN (inherited from FeatureType)	AbstractRxN	association	0,*
theInformation	AdditionalInformation (inherited from FeatureType)	NauticalInformation	association	0,*

Feature associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
theCartographicText	TextAssociation (inherited from FeatureType)	TextPlacement	association	0,1

5.3.1 General

This type adds the **ServiceContact** association to **ContactDetails** for any sub feature class.

If it is necessary to encode contact information related to a particular feature, without encoding information about a supervising or controlling authority, it should be done using an associated **ContactDetails** information type. This can be used when:-

- information about the supervising authority is unavailable, or,
- when the contact information pertains to a particular feature, but not to all features supervised by the authority. For example, if contact details for different terminals are different though they are operated by the same operator, the **ServiceContact** association can be used to link particular contact information to particular terminal features.

As an abstract type, instances of **OrganizationContactArea** cannot be directly encoded in datasets. However, the encoding instructions for this type apply to all its sub-types unless explicitly overriden in the encoding instructions for any particular sub-type.

5.3.2 Remarks

No remarks.

5.4 Supervised Area

IHO Definition: A location which may be supervised by a responsible or controlling authority. Remarks: It is not a requirement that every feature instance be associated with an authority. Note that having AbstractService as well as SupervisedArea allows the subclasses to link to CONDET both directly and via AUTORI, which may not be desirable because it gives encoders two ways to reach almost the same result.				
S-127 Geo Feature: SupervisedArea (Abstract)				
Super Type: OrganizationContactArea				
Primitives: noGeometry				
Real World	*Paper Chart Symbol*	*ECDIS Symbol*		
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Inherited Attributes				
S-127Attribute	**Inherited From**		**Type**	**Multiplicity**
Fixed Date Range	FeatureType		C	0,1
Periodic Date Range	FeatureType		C	0,*
Feature Name	FeatureType		C	0,*
Source Indication	FeatureType		C	0,1
Text Content	FeatureType		C	0,1
Interoperability Identifier	FeatureType		URN	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
controlAuthority	ServiceControl	Authority	association	0,1
theContactDetails	ServiceContact (inherited from OrganizationContactArea)	ContactDetails	association	0,*
permission	PermissionType (inherited from FeatureType)	Applicability	association	0,*
theRxN	AssociatedRxN (inherited from FeatureType)	AbstractRxN	association	0,*
theInformation	AdditionalInformation (inherited from FeatureType)	NauticalInformation	association	0,*

Feature associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
theCartographicText	TextAssociation (inherited from FeatureType)	TextPlacement	association	0,1

5.4.1 General

This type adds the **ServiceControl** association to **Authority** for any sub feature class.

If it is necessary to encode information a controlling authority or organization for a particular location, it should be done using an associated **Authority** information type. Contact details for the organization should be encoded in a **ContactDetails** associated to the **Authority**.

As an abstract type, instances of **SupervisedArea** cannot be directly encoded in datasets. However, the encoding instructions for this type apply to all its sub-types unless explicitly overriden in the encoding instructions for any particular sub-type.

5.4.2 Remarks

No remarks

5.5 Reportable Service Area

IHO Definition: A service feature generally involving one or more reports from the requester, including communications not strictly considered “reporting”. Remarks: It is not a requirement for every instance to require a report.				
S-127 Geo Feature: ReportableServiceArea (Abstract)				
Super Type: SupervisedArea				
Primitives: noGeometry				
Real World	*Paper Chart Symbol*	*ECDIS Symbol*		
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Inherited Attributes				
S-127Attribute	**Inherited From**		**Type**	**Multiplicity**
Fixed Date Range	FeatureType		C	0,1

Periodic Date Range	FeatureType	C	0,*
Feature Name	FeatureType	C	0,*
Source Indication	FeatureType	C	0,1
Text Content	FeatureType	C	0,1
Interoperability Identifier	FeatureType	URN	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
reptForTrafficServ	TrafficServiceReport	ShipReport	association	0,*
controlAuthority	ServiceControl (inherited from SupervisedArea)	Authority	association	0,1
theContactDetails	ServiceContact (inherited from OrganizationContactArea)	ContactDetails	association	0,*
permission	PermissionType (inherited from FeatureType)	Applicability	association	0,*
theRxN	AssociatedRxN (inherited from FeatureType)	AbstractRxN	association	0,*
theInformation	AdditionalInformation (inherited from FeatureType)	NauticalInformation	association	0,*

Feature associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
theCartographicText	TextAssociation (inherited from FeatureType)	TextPlacement	association	0,1

5.5.1 General

Adds the **TrafficServiceReport** association to **ShipReport** for any sub feature class. This type is used as a super-type for non-abstract areas where reporting by a vessel is required or recommended. As a sub-type of **SupervisedArea** it inherits the attributes and associations of **SupervisedArea** and its super-types.

As an abstract type, instances of **ReportableServiceArea** cannot be directly encoded in datasets. However, the encoding instructions for this type apply to all its sub-types unless explicitly overriden in the encoding instructions for any particular sub-type.

6 Remarks

No remarks

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7 Routeing Measures

7.1 Introduction

Routeing measures in S-127 are an abstraction of S-101 features describing traffic separation schemes, traffic routes, and navigation lines (or “transits” as they are called in some publications). In S-127 there is a single **RouteingMeasure** feature which serves to indicate the presence of a defined route, derived directly from the top-level abstract feature type (Figure 7-1).

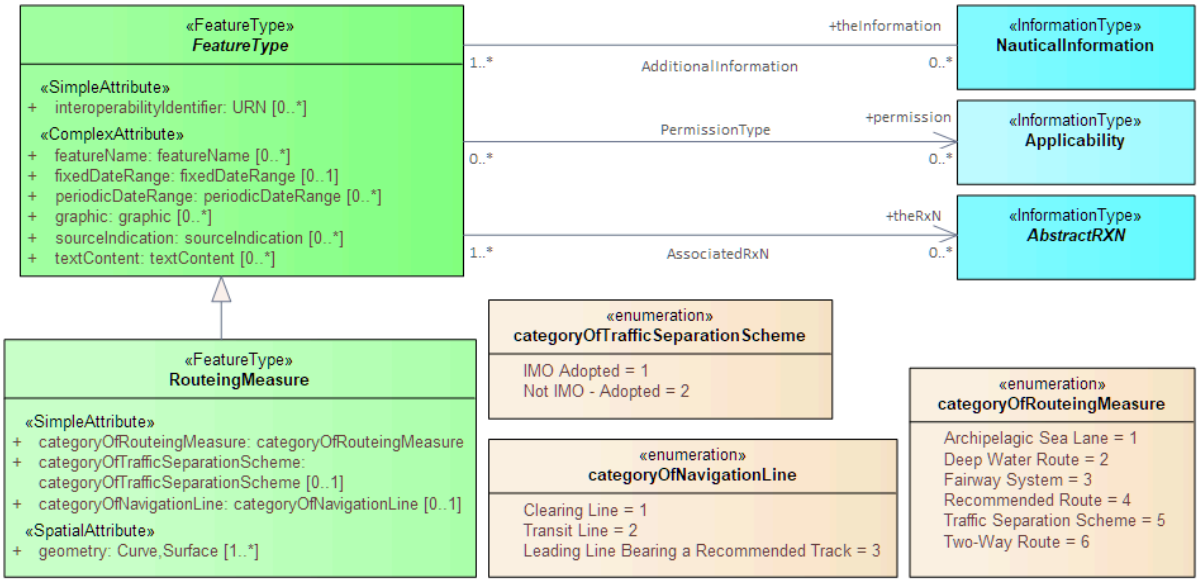

Figure 7-1 — Routeing measures model

7.2 Routeing Measure

IHO Definition: An area or line designating the limits or central line of a routeing measure (or part of a routeing measure). Routeing measures include traffic separation schemes, deep-water routes, two-way routes, archipelagic sea lanes, and fairway systems. Remarks: (1) categoryOfNavigationLine permitted only if categoryOfRouteingMeasure is 4 (recommended route). (2) categoryOfTrafficSeparationScheme permitted only if categoryOfRouteingMeasure = 5 (traffic separation scheme)				
S-127 Geo Feature: RouteingMeasure				
Super Type: FeatureType				
Primitives: surface curve				
Real World	*Paper Chart Symbol*	*ECDIS Symbol*		
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Category of Routeing Measure		1: Archipelagic Sea Lane 2: Deep Water Route 3: Fairway System 4: Recommended Route 5: Traffic Separation Scheme 6: Two-Way Route	EN	1,1

Category of Traffic Separation Scheme		1: IMO Adopted 2: Not IMO — Adopted	EN	0,1
Category of Navigation Line		1: Clearing Line 2: Transit Line 3: Leading Line Bearing a Recommended Track	EN	0,1
Inherited Attributes				
S-127Attribute	**Inherited From**		**Type**	**Multiplicity**
Fixed Date Range	FeatureType		C	0,1
Periodic Date Range	FeatureType		C	0,*
Feature Name	FeatureType		C	0,*
Source Indication	FeatureType		C	0,1
Text Content	FeatureType		C	0,1
Interoperability Identifier	FeatureType		URN	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
permission	PermissionType (inherited from FeatureType)	Applicability	association	0,*
theRxN	AssociatedRxN (inherited from FeatureType)	AbstractRxN	association	0,*
theInformation	AdditionalInformation (inherited from FeatureType)	NauticalInformation	association	0,*

Feature associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
theCartographicText	TextAssociation (inherited from FeatureType)	TextPlacement	association	0,1

7.2.1 General

The **RouteingMeasure** feature is a simplification of the tracks and routes features in the ENC. A **RouteingMeasure** feature is created by combining the spatial extents of the tracks and routes feature instances which together make up a specific track or route. The purpose of this feature in S-127 is to provide an indication of the existence of a route or track, as well as physical locations to which specific information can be associated in the form of information types. In S-127, each **RouteingMeasure** feature has only a category attribute that indicates the type of track or route.

In S-101 Edition 2.0.0, Traffic Separation Scheme is an aggregate feature that may or may not have its own geometry. If an aggregate geometry is available in an S-101 dataset it may be re-used in S-127 instead of combining the geometry of the traffic separation scheme components.

The table below indicates which S-101 features can be combined to create **RouteingMeasure** features of each category. Note that line features are used if not covered by an appropriate track/route feature, or if information must be associated to the line that cannot be associated to an area feature.

A suggested guide for deciding whether component S-101 features should be combined is whether they are aggregated to the same (or related) aggregate track/route features. E.g., combine TSS Lane Part

and TSS Roundabout features that are associated with the same Traffic Separation Scheme feature in the ENC via a “Traffic Separation Scheme Aggregation” association.

Table 7-1 — Guide to mapping ENC routeing measure features to S-127 routeing measure categories

Category of routeing measure (S-127)	S-101 features used
recommended route	Navigation line Recommended track Recommended route centreline (only if not covered by an area track/route feature) Recommended traffic lane part
fairway system	Fairways
two-way route	Two-way route part Two-way route Recommended traffic lane part (when adjoining a two-way route)
deep-water route	Deep water route centreline (only if not covered by an area track/route feature) Deep water route part Deep water route Recommended traffic lane part (when adjoining a deep-water route)
traffic separation scheme	Inshore traffic zone Precautionary area Traffic separation scheme lane part Traffic separation zone Traffic separation line (only if not covered by an area track/route feature) Traffic separation scheme boundary (only if not covered by an area track/route feature) Traffic separation scheme crossing Traffic separation scheme roundabout
archipelagic sea lane	Archipelagic sea lane area Archipelagic sea lane axis (only if not covered by an area track/route feature)

7.2.2 Remarks

- If different information must be associated to different parts of the track/route, create different **RouteingMeasure** features.
- If it is required to define the IMO status of a **RouteingMeasure** with *categoryOfRouteingMeasure* set to 5: traffic separation, this must be done using the attribute *categoryOfTrafficSeparationScheme*.
- If it is required to define a clearing line or a transit line (such as a measured distance) this must be done using the attribute *categoryOfNavigationLine*.

8 Vessel Traffic Service Areas and Related Features

8.1 Introduction

These are a collection of features for VTS, ship reporting services, and local port broadcast sevices, with supporting features for calling-in points, signal stations and radar ranges. Figure 8-1 depicts the features and information types which may be associated to them.

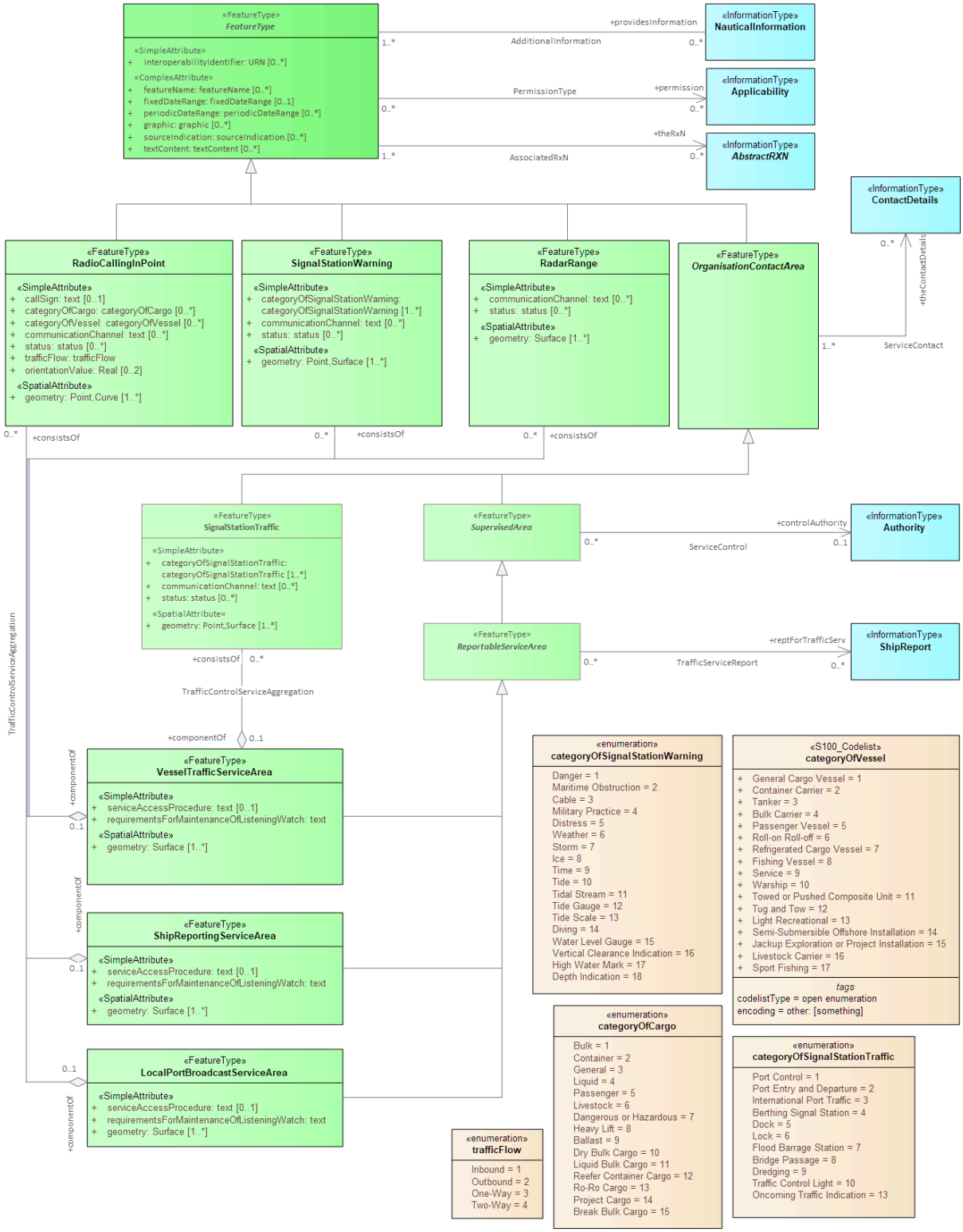

Figure 8-1 — VTS areas and related features

8.2 Local Port Broadcast Service Area

IHO Definition: A broadcast service established to provide port information without interaction between the customer and the service provider. This information could be inter alia berthing information, availability of port services, shipping schedules, meteorological and hydrological data.

S-127 Geo Feature: LocalPortBroadcastServiceArea				
Super Type: ReportableServiceArea				
Primitives: surface				
Real World	*Paper Chart Symbol*		*ECDIS Symbol*	
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Service Access Procedure			TE	0,1
Requirements for Maintenance of Listening Watch			TE	1,1
Inherited Attributes				
S-127Attribute	**Inherited From**		**Type**	**Multiplicity**
Fixed Date Range	FeatureType		C	0,1
Periodic Date Range	FeatureType		C	0,*
Feature Name	FeatureType		C	0,*
Source Indication	FeatureType		C	0,1
Text Content	FeatureType		C	0,1
Interoperability Identifier	FeatureType		URN	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
reptForTrafficServ	TrafficServiceReport (inherited from ReportableServiceArea)	ShipReport	association	0,*
controlAuthority	ServiceControl (inherited from SupervisedArea)	Authority	association	0,1
theContactDetails	ServiceContact (inherited from OrganizationContactArea)	ContactDetails	association	0,*
permission	PermissionType (inherited from FeatureType)	Applicability	association	0,*
theRxN	AssociatedRxN (inherited from FeatureType)	AbstractRxN	association	0,*
theInformation	AdditionalInformation (inherited from FeatureType)	NauticalInformation	association	0,*

Feature associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
consistsOf	TrafficControlServiceAggregation	RadioCallingInPoint RadarRange SignalStationWarning SignalStationTraffic	association	0,*
theCartographicText	TextAssociation (inherited from FeatureType)	TextPlacement	association	0,1

8.2.1 General

A local port broadcast service aims facilitating the exchange of information and coordination among key stakeholders during each phase of a ship transit. To promote an optimal coordination and efficient operations all along the transportation chain, the exchange of information must be done in a timely manner. This allows all actors involved to take specific actions at the right moment either to respond or to adapt to new situations, such as delay, premature departure/arrival, incident, and so forth.

A **LocalPortBroadcastServiceArea** covers an individual port and may provide services to vessels in the outer approaches to the port or that are transiting through the region. It may be difficult for the mariner to always be aware which area is applicable. Therefore, wherever the information is available, limits of **LocalPortBroadcastServiceArea** areas should be charted, at least on the largest scale chart and on appropriate smaller scales where navigation is practicable and/or to assist passage planning.

If it is required to encode a local port nroadcast service area, it must be done using the feature class **LocalPortBroadcastServiceArea**. If it is required to associate related Radio Calling-In Points, Signal Stations (Warning or Traffic), or Radar Ranges this must be done using the association **TrafficControlServiceAggregation**.

8.2.2 Remarks

- If it is required to describe the procedures for accessing the port services, this must be done using the *serviceAccessProcedure* attribute.
- The requirements for maintaining listening watch within the area must be encoded using the *requirementsForMaintenanceOfListeningWatch* attribute. As a text attribute, this can be populated with the text “not specified”, “unknown”, etc., if the requirements are unknown.

8.3 Radar Range

IHO Definition: Indicates the coverage of a sea area by a radar surveillance station. Inside this area a vessel may request shore-based radar assistance, particularly in poor visibility. Remarks: Many large ports have a radar surveillance system covering their approaches to provide guidance for vessels, particularly in poor visibility. The maximum range of the system forms an arc or series of overlapping arcs (IHO Chart Specifications, M-4).				
S-127 Geo Feature: RadarRange				
Super Type: FeatureType				
Primitives: surface				
Real World	*Paper Chart Symbol*		*ECDIS Symbol*	
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Communication Channel			TE	0,*
Status		1: Permanent 2: Occasional 4: Not in Use 7: Temporary	EN	0,*
Inherited Attributes				
S-127Attribute	**Inherited From**		**Type**	**Multiplicity**
Fixed Date Range	FeatureType		C	0,1
Periodic Date Range	FeatureType		C	0,*
Feature Name	FeatureType		C	0,*
Source Indication	FeatureType		C	0,1

Text Content	FeatureType	C	0,1
Interoperability Identifier	FeatureType	URN	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
permission	PermissionType (inherited from FeatureType)	Applicability	association	0,*
theRxN	AssociatedRxN (inherited from FeatureType)	AbstractRxN	association	0,*
theInformation	AdditionalInformation (inherited from FeatureType)	NauticalInformation	association	0,*

Feature associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
componentOf	TrafficControlServiceAggregation	VesselTrafficServiceArea LocalPortBroadcastServiceArea ShipReportingServiceArea	aggregation	0,1
theCartographicText	TextAssociation (inherited from FeatureType)	TextPlacement	association	0,1

8.3.1 General

Many large ports have a radar surveillance system covering their approaches to provide guidance for vessels, particularly in poor visibility. The maximum range of the system forms an arc or series of overlapping arcs. If it is required to encode a radar range, it must be done using the feature **RadarRange**.

8.3.2 Remarks

- Each VHF-channel should be indicated, using the attribute *communicationChannel* (clause 22.28).

8.4 Radio Calling-In Point

IHO Definition: A designated position at which vessels are required to report to a traffic control centre. Also called reporting point or radio reporting point. Remarks: Radio calling-in points are established in certain busy waterways and port approaches to assist traffic control.				
S-127 Geo Feature: RadioCallingInPoint				
Super Type: FeatureType				
Primitives: point curve				
Real World	*Paper Chart Symbol*	*ECDIS Symbol*		
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Call Sign			TE	0,1
Communication Channel			TE	0,*
Category of Cargo		1: Bulk 2: Container	EN	0,*

		3: General 4: Liquid 5: Passenger 6: Livestock 7: Dangerous or Hazardous 8: Heavy Lift 9: Ballast		
Category of Vessel		1: General Cargo Vessel 2: Container Carrier 3: Tanker 4: Bulk Carrier 5: Passenger Vessel 6: Roll-On Roll-Off 7: Refrigerated Cargo Vessel 8: Fishing Vessel 9: Service 10: Warship 11: Towed or Pushed Composite Unit 12: Tug and Tow 13: Light Recreational 14: Semi-Submersible Offshore Installation 15: Jack-Up Exploration or Project Installation 16: Livestock Carrier 17: Sport Fishing	CL	0,*
Orientation Value			RE	0,2
Status		1: Permanent 3: Recommended 4: Not in Use 5: Periodic/Intermittent 6: Reserved 7: Temporary 9: Mandatory	EN	0,*
Traffic Flow		1: Inbound 2: Outbound 3: One-Way 4: Two-Way	EN	1,1
Inherited Attributes				
S-127Attribute	**Inherited From**		**Type**	**Multiplicity**
Fixed Date Range	FeatureType		C	0,1
Periodic Date Range	FeatureType		C	0,*
Feature Name	FeatureType		C	0,*
Source Indication	FeatureType		C	0,1
Text Content	FeatureType		C	0,1
Interoperability Identifier	FeatureType		URN	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
permission	PermissionType	Applicability	association	0,*

Information associations				
	(inherited from FeatureType)			
theRxN	AssociatedRxN (inherited from FeatureType)	AbstractRxN	association	0,*
theInformation	AdditionalInformation (inherited from FeatureType)	NauticalInformation	association	0,*

Feature associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
componentOf	TrafficControlServiceAggregation	VesselTrafficServiceArea LocalPortBroadcastServiceArea ShipReportingServiceArea	aggregation	0,1
theCartographicText	TextAssociation (inherited from FeatureType)	TextPlacement	association	0,1

8.4.1 General

Radio reporting points, also called radio calling-in points, have been established in certain busy waterways and port approaches to assist traffic control. On passing these points or crossing a defined line, vessels are required to report on VHF to a Traffic Control Centre. If it is required to encode a radio reporting point or line, it must be done using the feature **RadioCallingInPoint**.

8.4.2 Remarks

- Each **RadioCallingInPoint** feature of type point must carry at least one orientation. If it is required to encode the reciprocal orientation, to indicate that a bearing and its opposite apply to a **RadioCallingInPoint** feature, it must be done using attribute trafficFlow = 4 (two-way). If the same position is used for another orientation (not opposite) of traffic flow, a second *orientationValue* attribute must be encoded.
- The complex attribute *featureName*, sub-attribute *name* is used to encode the name and/or alphanumeric designator of the **RadioCallingInPoint**.
- Regulations, restrictions, and recommendations are encoded using one or more instances of the information classes **Regulations**, **Restrictions**, or **Recommendations**. For example, if the requirement to report by radio relates to certain classes of vessels only.
- An associated instance of the information class **NauticalInformation** (see clause 14.7), complex attribute *information* is used to provide additional information, when **Regulations**, **Restrictions**, or **Recommendations** are not appropriate.
- **RadioCallingInPoint** features of type curve must be encoded such that resultant direction of the line (accounting for the direction of digitising and any subsequent reversal of the curve) is related such that the direction of traffic that is required to report is to the right. For curve features, it is not required to populate *orientation*.
- If it is required to encode the area of a Vessel Traffic Service (VTS) containing radio reporting points or requiring periodic position reporting, this should be done using the feature **VesselTrafficServiceArea** (see clause 8.8).
- Each VHF-channel should be indicated, using the attribute *communicationChannel* (clause 22.28).
- If it is required to encode the cargo of a vessel required to report when passing the radio calling-in point, this must be done using the *categoryOfCargo* attribute.
- If it is required to encode a specific type of vessel that is required to report when passing the radio calling-in point, this must be done using the *categoryOfVessel* attribute.

8.5 Ship Reporting Service Area

IHO Definition: A service established by a relevant authority consisting of one or more reporting points or lines at which ships are required to report their identity, course, speed and other data to the monitoring authority.				
S-127 Geo Feature: ShipReportingServiceArea				
Super Type: ReportableServiceArea				
Primitives: surface				
Real World	*Paper Chart Symbol*		*ECDIS Symbol*	
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Service Access Procedure			TE	0,1
Requirements for Maintenance of Listening Watch			TE	1,1
Inherited Attributes				
S-127Attribute	**Inherited From**		**Type**	**Multiplicity**
Fixed Date Range	FeatureType		C	0,1
Periodic Date Range	FeatureType		C	0,*
Feature Name	FeatureType		C	0,*
Source Indication	FeatureType		C	0,1
Text Content	FeatureType		C	0,1
Interoperability Identifier	FeatureType		URN	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
reptForTrafficServ	TrafficServiceReport (inherited from ReportableServiceArea)	ShipReport	association	0,*
controlAuthority	ServiceControl (inherited from SupervisedArea)	Authority	association	0,1
theContactDetails	ServiceContact (inherited from OrganizationContactArea)	ContactDetails	association	0,*
permission	PermissionType (inherited from FeatureType)	Applicability	association	0,*
theRxN	AssociatedRxN (inherited from FeatureType)	AbstractRxN	association	0,*
theInformation	AdditionalInformation (inherited from FeatureType)	NauticalInformation	association	0,*

Feature associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
consistsOf	TrafficControlServiceAggregation	RadioCallingInPoint RadarRange	association	0,*

Feature associations				
		SignalStationWarning SignalStationTraffic		
theCartographicText	TextAssociation (inherited from FeatureType)	TextPlacement	association	0,1

8.5.1 General

IMO MSC 43(64) states that the objectives of a ship reporting system should be based upon:
“the improvement of the safety of life at sea, the safety and efficiency of navigation and/or to increase the protection of the marine environment. They may or may not be operated as part of a vessel traffic service.”

As such, the Ship Reporting Service (SRS) contributes to the traffic situational awareness of a Coastal administration either by being informed of the ships heading into its waters or the ones already transiting it. Based on the information collected, a Coastal administration can initiate an intervention plan if required.

An SRS is generally regional in scale and may provide services to vessels in the outer approaches to ports or transiting through the region. Therefore, wherever the information is available, limits of SRS areas should be charted, at least on the largest scale chart and on appropriate smaller scales where navigation is practicable and/or to assist passage planning. The service can range from providing information and guidelines on reporting formalities and when, what and how to report in a specific port to a full exchange of information in a Single Window ship reporting system. A reportable area may also be encoded as an Ship Reporting Service area.

If it is required to encode a Ship Reporting Service, it must be done using the feature class Ship Reporting Service Area. If it is required to associate related Radio Calling-In Points or VTS this must be done using the association TrafficControlServiceAggregation.

If it is required to encode a Ship Reporting Service that is operated by a VTS, this must be done by encoding coincident Ship Reporting Service and VTS areas.

Ship reporting services may be indicated on ENCs, small scale charts, or routeing guides, as depicted in Figure 8-2.

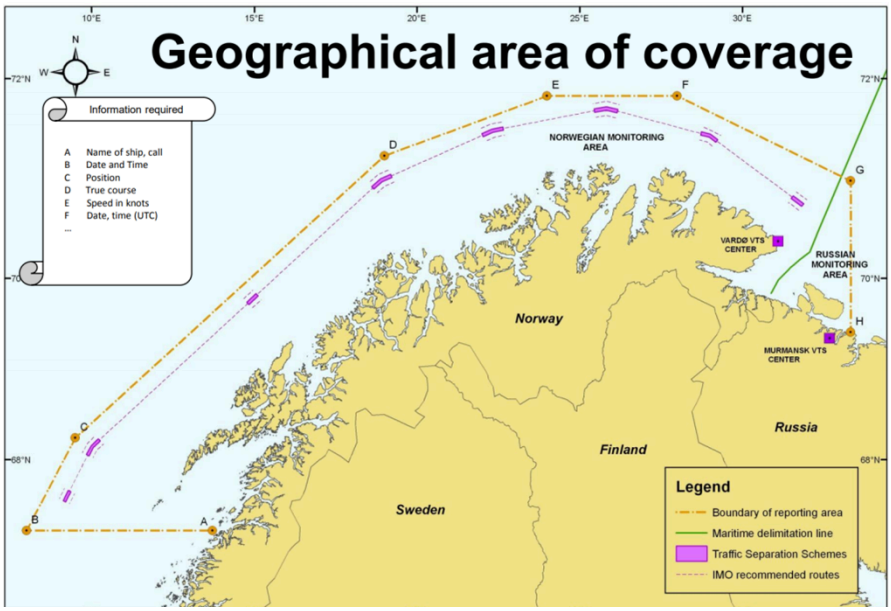

Figure 8-2 — Ship reporting service area

8.5.2 Remarks

- If it is required to describe the procedures for accessing the SRS services, this must be done using the serviceAccessProcedure attribute.
- The requirements for maintaining listening watch within the VTS area must be encoded in a summarized form using the requirementsForMaintenanceOfListeningWatch attribute. Any detailed

elaborations should be encoded in the textContent attribute. As a text attribute, this can be populated with the text “not specified”, “unknown”, etc., if the requirements are unknown. If it is known that there are no listening watch requirements, the attribute must be encoded with “not applicable”.

8.6 Signal Station Traffic

IHO Definition: A traffic signal station is a place on shore from which signals are made to regulate the movement of traffic. Remarks: A signal station is a place on shore from which signals are made to ships at sea (IHO Dictionary, S-32, 5th Edition).				
S-127 Geo Feature: SignalStationTraffic				
Super Type: OrganizationContactArea				
Primitives: point surface				
Real World	*Paper Chart Symbol*		*ECDIS Symbol*	
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Category of Signal Station, Traffic		1: Port Control 2: Port Entry and Departure 3: International Port Traffic 4: Berthing 5: Dock 6: Lock 7: Flood Barrage Station 8: Bridge Passage 9: Dredging 10: Traffic Control Light 13: Oncoming Traffic Indication	EN	1,*
Communication Channel			TE	0,*
Status		1: Permanent 2: Occasional 4: Not in Use 5: Periodic/Intermittent 7: Temporary 8: Private 12: Illuminated 14: Public 15: Synchronized 16: Watched 17: Unwatched	EN	0,*
Inherited Attributes				
S-127Attribute	**Inherited From**		**Type**	**Multiplicity**
Fixed Date Range	FeatureType		C	0,1
Periodic Date Range	FeatureType		C	0,*
Feature Name	FeatureType		C	0,*
Source Indication	FeatureType		C	0,1
Text Content	FeatureType		C	0,1
Interoperability Identifier	FeatureType		URN	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
theContactDetails	ServiceContact (inherited from OrganizationContactArea)	ContactDetails	association	0,*
permission	PermissionType (inherited from FeatureType)	Applicability	association	0,*
theRxN	AssociatedRxN (inherited from FeatureType)	AbstractRxN	association	0,*
theInformation	AdditionalInformation (inherited from FeatureType)	NauticalInformation	association	0,*

Feature associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
componentOf	TrafficControlServiceAggregation	VesselTrafficServiceArea LocalPortBroadcastServiceArea ShipReportingServiceArea	aggregation	0,1
theCartographicText	TextAssociation (inherited from FeatureType)	TextPlacement	association	0,1

8.6.1 General

Signal stations communicating visually have declined in importance. They are encoded on the largest maximum display scale ENC data not only for their main role of signalling information and instructions but also as a form of landmark. The signals generally exhibit lights by day and night but may display shapes or flags by day.

The nature of traffic signals varies from country to country and even from port to port. For charting purposes traffic signals can be considered to include, for instance:

- Port entry and departure signals;
- Lock, docking, and berthing signals;
- Bridge signals;
- International traffic signals.

If it is required to encode a traffic signal station, it must be done using the feature **SignalStationTraffic**.

8.6.2 Remarks

- **SignalStationTraffic** should not be used to encode a bridge light marking the centre of a navigable span.
- The **SignalStationTraffic** must only be used to describe the function of the signal station, independent of any building or structure that the **SignalStationTraffic** is associated with.
- Each VHF-channel should be indicated, using the attribute *communicationChannel* (see clause 22.28).

8.7 Signal Station Warning

IHO Definition: A warning signal station is a place on shore from which warning signals are made to ships at sea.

S-127 Geo Feature: SignalStationWarning				
Super Type: FeatureType				
Primitives: point surface				
Real World	*Paper Chart Symbol*		*ECDIS Symbol*	
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Category of Signal Station, Warning		1: Danger 2: Maritime Obstruction 3: Cable 4: Military Practice 5: Distress 6: Weather 7: Storm 8: Ice Warning 9: Time 10: Tide 11: Tidal Stream 12: Tide Gauge 13: Tide Scale 14: Diving 15: Water Level Gauge 16: Vertical Clearance Indication 17: High Water Mark 18: Depth Indication	EN	1,*
Communication Channel			TE	0,*
Status		1: Permanent 2: Occasional 4: Not in Use 5: Periodic/Intermittent 7: Temporary 8: Private 12: Illuminated 14: Public 15: Synchronized 16: Watched 17: Unwatched	EN	0,*
Inherited Attributes				
S-127Attribute	**Inherited From**		**Type**	**Multiplicity**
Fixed Date Range	FeatureType		C	0,1
Periodic Date Range	FeatureType		C	0,*
Feature Name	FeatureType		C	0,*
Source Indication	FeatureType		C	0,1
Text Content	FeatureType		C	0,1
Interoperability Identifier	FeatureType		URN	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
permission	PermissionType	Applicability	association	0,*

Information associations				
	(inherited from FeatureType)			
theRxN	AssociatedRxN (inherited from FeatureType)	AbstractRxN	association	0,*
theInformation	AdditionalInformation (inherited from FeatureType)	NauticalInformation	association	0,*

Feature associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
componentOf	TrafficControlServiceAggregation	VesselTrafficServiceArea LocalPortBroadcastServiceArea ShipReportingServiceArea	aggregation	0,1
theCartographicText	TextAssociation (inherited from FeatureType)	TextPlacement	association	0,1

8.7.1 General

Signal stations communicating visually have declined in importance. They are encoded for their main role of signalling information and instructions, and also as a form of landmark. The signals generally exhibit lights by day and night but may display shapes or flags by day.

If it is required to encode a warning signal station, it must be done using the feature **SignalStationWarning**.

8.7.2 Remarks

- The **SignalStationWarning** must only be used to describe the function of the signal station, independent of any building or structure that the **SignalStationWarning** is associated with.
- Each VHF-channel should be indicated, using the attribute *communicationChannel* (clause 22.28).

8.8 Vessel Traffic Service Area

IHO Definition: The area of any service implemented by a relevant authority primarily designed to improve safety and efficiency of traffic flow and the protection of the environment. It may range from simple information messages, to extensive organisation of the traffic involving national or regional schemes.				
S-127 Geo Feature: VesselTrafficServiceArea				
Super Type: ReportableServiceArea				
Primitives: surface				
Real World	*Paper Chart Symbol*	*ECDIS Symbol*		
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Service Access Procedure			TE	0,1
Requirements for Maintenance of Listening Watch			TE	1,1
Inherited Attributes				
S-127Attribute	**Inherited From**		**Type**	**Multiplicity**
Fixed Date Range	FeatureType		C	0,1

Periodic Date Range	FeatureType	C	0,*
Feature Name	FeatureType	C	0,*
Source Indication	FeatureType	C	0,1
Text Content	FeatureType	C	0,1
Interoperability Identifier	FeatureType	URN	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
reptForTrafficServ	TrafficServiceReport (inherited from ReportableServiceArea)	ShipReport	association	0,*
controlAuthority	ServiceControl (inherited from SupervisedArea)	Authority	association	0,1
theContactDetails	ServiceContact (inherited from OrganizationContactArea)	ContactDetails	association	0,*
permission	PermissionType (inherited from FeatureType)	Applicability	association	0,*
theRxN	AssociatedRxN (inherited from FeatureType)	AbstractRxN	association	0,*
theInformation	AdditionalInformation (inherited from FeatureType)	NauticalInformation	association	0,*

Feature associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
consistsOf	TrafficControlServiceAggregation	RadioCallingInPoint RadarRange SignalStationWarning SignalStationTraffic	association	0,*
theCartographicText	TextAssociation (inherited from FeatureType)	TextPlacement	association	0,1

8.8.1 General

A Vessel Traffic Service (VTS) is a service implemented by a competent authority to improve the safety and efficiency of vessel traffic operations and to protect the environment. A VTS provides, from one or more traffic control centres, a number of services which may include:

- Traffic management for the safe and efficient movement of vessels within the area, usually including mandatory reporting;
- Navigational assistance to support onboard decision making, usually on request (see also S-4 B-487.2 for radar reference lines);
- Information for vessels operating in the area, for example: on arrival, berthing, anchoring, and departure from ports; about movements of other vessels; on navigational hazards; regarding weather. These may be regularly broadcast or be available on request.

A VTS service area may range from supporting entry and departure to an individual port to a much larger regional VTS (possibly containing local VTS) that may provide services to vessels in the outer approaches to ports or transiting through the region. Consequently, there may be VTS within VTS and also overlapping VTS, making it difficult for the mariner to always be aware which VTS area is applicable. Therefore, wherever the information is available, limits of VTS areas should be charted, at least on the

largest scale chart and on appropriate smaller scales where navigation is practicable and/or to assist passage planning.

If it is required to encode a Vessel Traffic Service Area, it must be done using the feature class Vessel Traffic Service Area. The type of VTS is encoded in the categoryOfVesselTrafficService attribute. If it is required to associate related Radio Calling-In Points, Signal Stations (Warning or Traffic), or Radar Ranges this must be done using the association TrafficControlServiceAggregation.

A ship reporting service may be operated by the VTS, and if it is required to encoding an associated ship reporting service, this must be done by encoding a Ship Reporting Service Area (see clause 8.5).

8.8.2 Remarks

- If it is required to describe the procedures for accessing the VTS services, this must be done using the serviceAccessProcedure attribute.
- The requirements for maintaining listening watch within the VTS area must be encoded in a summarized form using the requirementsForMaintenanceOfListeningWatch attribute. Any detailed elaborations should be encoded in the textContent attribute. As a text attribute, this can be populated with the text “not specified”, “unknown”, etc., if the requirements are unknown. If it is known that there are no listening watch requirements, the attribute must be encoded with “not applicable”. (There may be a general requirement in the applicable national shipping regulations instead of or in addition to a specific requirement.)

9 Water Levels and Underkeel Clearance

9.1 Introduction

S-127 representations of areas where special provisions are made for underkeel clearance are limited to indicating the areas where such provisions may apply. The S-127 features should not be used as a substitute for S-129 underkeel clearance information where S-129 data is available.

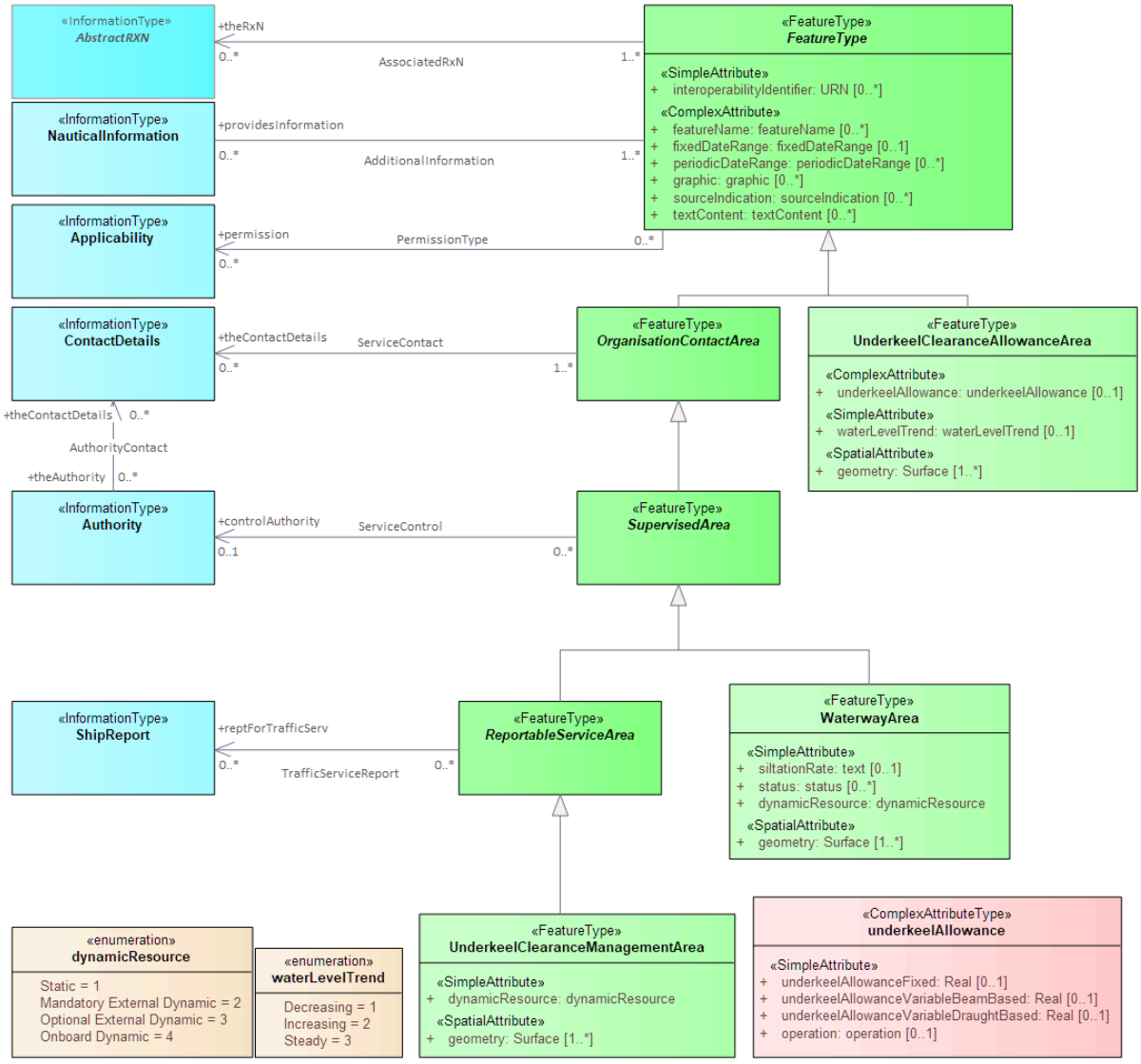

Figure 9-1 — Underkeel clearances

9.2 Under Keel Clearance Allowance Area

IHO Definition: An area for which an authority has stated under keel allowance requirements.				
S-127 Geo Feature: UnderKeelClearanceAllowanceArea				
Super Type: FeatureType				
Primitives: surface				
Real World	*Paper Chart Symbol*	*ECDIS Symbol*		
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Under Keel Allowance			C	0,1
Under Keel Allowance Fixed			(S) RE	0,1
Under Keel Allowance Variable Beam Based			(S) RE	0,1

Under Keel Allowance Variable Draught Based			(S) RE	0,1
Operation		1: Largest Value 2: Smallest Value	(S) EN	0,1
Water Level Trend		1: Decreasing 2: Increasing 3: Steady	EN	0,1
Inherited Attributes				
S-127Attribute	**Inherited From**		**Type**	**Multiplicity**
Fixed Date Range	FeatureType		C	0,1
Periodic Date Range	FeatureType		C	0,*
Feature Name	FeatureType		C	0,*
Source Indication	FeatureType		C	0,1
Text Content	FeatureType		C	0,1
Interoperability Identifier	FeatureType		URN	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
permission	PermissionType (inherited from FeatureType)	Applicability	association	0,*
theRxN	AssociatedRxN (inherited from FeatureType)	AbstractRxN	association	0,*
theInformation	AdditionalInformation (inherited from FeatureType)	NauticalInformation	association	0,*

Feature associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
theCartographicText	TextAssociation (inherited from FeatureType)	TextPlacement	association	0,1

9.2.1 General

If it is required to encode an area with underkeel allowance requirements, it must be done using the feature **UnderkeelClearanceAllowanceArea**. This feature class has the options to encode a fixed allowance value or a variable allowance value as a percentage of either the draught or the beam of the vessel.

This feature should not be used as a substitute for potentially more accurate information available in S-129 data, where that is available.

9.2.2 Remarks

- If it is required to encode a fixed underkeel allowance, this must be done using the attribute *underkeelAllowanceFixed*. The fixed underkeel allowance value must be encoded as metres, in a resolution of 0.1m.
- If it is required to encode a variable underkeel allowance as a factor of the ship's draught, this must be done using the attributes *underkeelAllowanceVariableDraughtBased* and *operation*. The

percentage of the draught is encoded in the *underkeelAllowanceVariableDraughtBased*, and the *operation* attribute is used to indicate is it is the largest value of the draught that is used.

- If it is required to encode a variable underkeel allowance as a factor of the ship's beam, this must be done using the attributes *underkeelAllowanceVariableBeamBased* and *operation*. The percentage of the beam is encoded in the *underkeelAllowanceVariableBeamBased*, and the *operation* attribute is used to indicate is it is the largest width of the beam that is used.
- If it is required to encode a water level trend that is a condition of the underkeel allowance, this must be done using the attribute *waterLevelTrend*.
- If there are different underkeel allowance conditions depending on the water level trend, several overlapping instances of **UnderkeelClearanceAllowanceArea** must be encoded to capture all conditions.

9.3 Under Keel Clearance Management Area

IHO Definition: An area for which an authority permits use of dynamic under keel clearance information or provides dynamic information related to under keel clearances.				
S-127 Geo Feature: UnderKeelClearanceManagementArea				
Super Type: ReportableServiceArea				
Primitives: surface				
Real World	*Paper Chart Symbol*	*ECDIS Symbol*		
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Dynamic Resource		1: Static 2: Mandatory External Dynamic 3: Optional External Dynamic 4: Onboard Dynamic	EN	1,1
Inherited Attributes				
S-127Attribute	**Inherited From**		**Type**	**Multiplicity**
Fixed Date Range	FeatureType		C	0,1
Periodic Date Range	FeatureType		C	0,*
Feature Name	FeatureType		C	0,*
Source Indication	FeatureType		C	0,1
Text Content	FeatureType		C	0,1
Interoperability Identifier	FeatureType		URN	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
reptForTrafficServ	TrafficServiceReport (inherited from ReportableServiceArea)	ShipReport	association	0,*
controlAuthority	ServiceControl (inherited from SupervisedArea)	Authority	association	0,1
theContactDetails	ServiceContact (inherited from OrganizationContactArea)	ContactDetails	association	0,*

Information associations				
permission	PermissionType (inherited from FeatureType)	Applicability	association	0,*
theRxN	AssociatedRxN (inherited from FeatureType)	AbstractRxN	association	0,*
theInformation	AdditionalInformation (inherited from FeatureType)	NauticalInformation	association	0,*

Feature associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
theCartographicText	TextAssociation (inherited from FeatureType)	TextPlacement	association	0,1

9.3.1 General

If it is required to encode an underkeel clearance management area where an appropriate authority has permitted the use of dynamic underkeel clearance information, it must be done using **UnderkeelClearanceManagementArea**. The attribute *dynamicResource* is used to indicate what kind of dynamic underkeel clearance information is provided.

If the value of *dynamicResource* is either 2:mandatory external dynamic or 3:optional external dynamic, the external source must be encoded in an associated **ContactDetails** instance.

Note that the *textContent* complex attribute provides the *onlineResource* attribute which may be used to encode the Internet location where dynamic information can be obtained.

This feature should not be used as a substitute for potentially more accurate information available in S-129 data, where that is available.

9.3.2 Remarks

- The *textContent* complex attribute is available by inheritance as well as in **ContactDetails** but the same information about how and where to obtain dynamic underkeel clearance information should not be encoded in both places (that is, though *onlineResource* is available both via **ContactDetails** and as a local complex attribute, it should not be populated in both places. It is recommended that network details for obtaining dynamic underkeel clearance information be encoded in *UnderkeelClearanceManagementArea**.*textContent.onlineResource*.

9.4 Waterway Area

IHO Definition: An area in which uniform general information of the waterway exists.				
S-127 Geo Feature: WaterwayArea				
Super Type: SupervisedArea				
Primitives: surface				
Real World	*Paper Chart Symbol*	*ECDIS Symbol*		
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Dynamic Resource		1: Static 2: Mandatory External Dynamic 3: Optional External Dynamic 4: Onboard Dynamic	EN	1,1
Siltation Rate			TE	0,1

Status		1: Permanent 2: Occasional 3: Recommended 4: Not in Use 5: Periodic/Intermittent 6: Reserved 7: Temporary 8: Private 9: Mandatory 28: Buoyed	EN	0,*

Inherited Attributes			
S-127Attribute	**Inherited From**	**Type**	**Multiplicity**
Fixed Date Range	FeatureType	C	0,1
Periodic Date Range	FeatureType	C	0,*
Feature Name	FeatureType	C	0,*
Source Indication	FeatureType	C	0,1
Text Content	FeatureType	C	0,1
Interoperability Identifier	FeatureType	URN	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
controlAuthority	ServiceControl (inherited from SupervisedArea)	Authority	association	0,1
theContactDetails	ServiceContact (inherited from OrganizationContactArea)	ContactDetails	association	0,*
permission	PermissionType (inherited from FeatureType)	Applicability	association	0,*
theRxN	AssociatedRxN (inherited from FeatureType)	AbstractRxN	association	0,*
theInformation	AdditionalInformation (inherited from FeatureType)	NauticalInformation	association	0,*

Feature associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
theCartographicText	TextAssociation (inherited from FeatureType)	TextPlacement	association	0,1

9.4.1 General

Waterways can be encoded to indicate how specific sections of water have been divided for various administrative purposes such as for organizing traffic and managing the available water column.

When it is required to encode a section of water as a waterway, this must be done using the feature **WaterwayArea**.

A waterway area must declare how a vessel must used either a shore-based or other resource to obtain up-to-date information about the waterway, by using the attribute *dynamicResource*.

9.4.2 Remarks

- When it is required to encode the siltation rate of a waterway, this must be done using the attribute *siltationRate*.
- The *textContent* complex attribute is available by inheritance as well as in **ContactDetails** but the same information about how and where to obtain dynamic information should not be encoded in both places (that is, though *onlineResource* is available both via **ContactDetails** and as a local complex attribute, it should not be populated in both places. It is recommended that network details for obtaining dynamic information be encoded in *WaterwayArea**.*textContent.onlineResource*.

10 Pilot Services

10.1 Introduction

The S-127 model of pilotage, depicted in Figure 10-1 is capable of representing:

- information about boarding places, districts, services, contacts and hours of availability
- notice times and formats for pilot requests
- regulations, recommendations, restrictions and general information pertaining to pilotage rules, requirements, and pilotage-related information

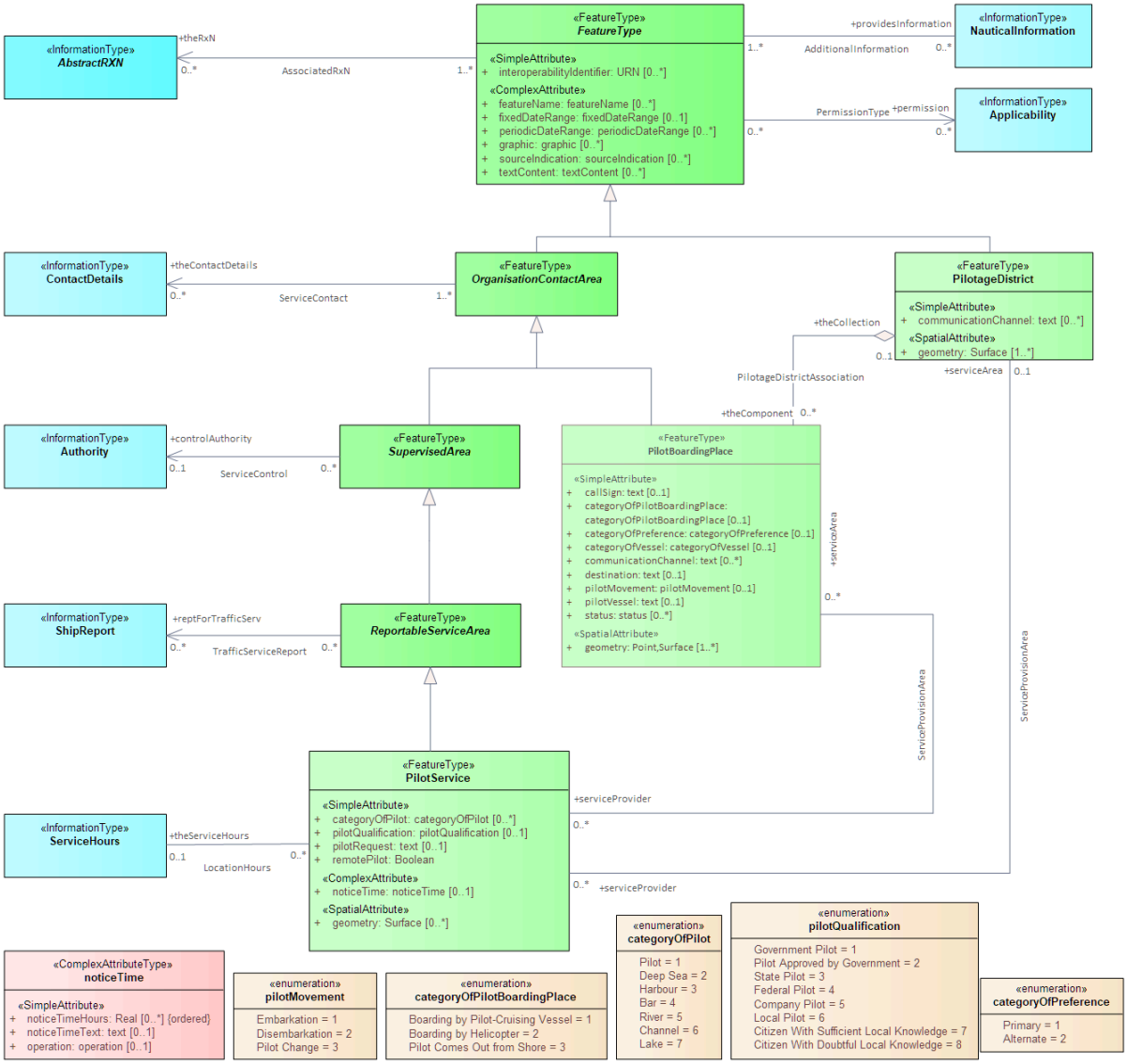

Figure 10-1 — Pilot services

10.2 Pilotage District

IHO Definition: An area within which a pilotage direction exists. Such directions are regulated by a competent harbour authority which dictates circumstances under which they apply.				
S-127 Geo Feature: PilotageDistrict				
Super Type: FeatureType				
Primitives: surface				
Real World	*Paper Chart Symbol*		*ECDIS Symbol*	
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Communication Channel			TE	0,*

Inherited Attributes			
S-127Attribute	**Inherited From**	**Type**	**Multiplicity**
Fixed Date Range	FeatureType	C	0,1
Periodic Date Range	FeatureType	C	0,*
Feature Name	FeatureType	C	0,*
Source Indication	FeatureType	C	0,1
Text Content	FeatureType	C	0,1
Interoperability Identifier	FeatureType	URN	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
permission	PermissionType (inherited from FeatureType)	Applicability	association	0,*
theRxN	AssociatedRxN (inherited from FeatureType)	AbstractRxN	association	0,*
theInformation	AdditionalInformation (inherited from FeatureType)	NauticalInformation	association	0,*

Feature associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
theComponent	PilotageDistrictAssociation	PilotBoardingPlace	aggregation	0,*
serviceProvider	ServiceProvisionArea	PilotService	association	0,*
theCartographicText	TextAssociation (inherited from FeatureType)	TextPlacement	association	0,1

10.2.1 General

If it is required to encode the area within which regulations regarding pilotage apply it should be done using the feature Pilotage District.

10.2.2 Remarks

- To encode the relevant regulations, an instance of the information class Regulations, Recommendations, Restrictions, or Nautical Information (see clauses 14.4, 14.6, 14.5, and 14.7) must be associated to the Pilotage District. The Nautical Information class should be used only if none of the other three are suitable.
- Where the limit of pilotage regulations are coincident with harbour or port limits it is not required to encode a Pilotage District feature.
- The relationship between the pilotage district and any associated pilot boarding places should be encoded using the feature association PilotageDistrictAssociation (see clause 19.2).

10.3 Pilot Boarding Place

IHO Definition: A location offshore where a pilot may board a vessel in preparation to piloting it through local waters.

S-127 Geo Feature: PilotBoardingPlace				
Super Type: OrganizationContactArea				
Primitives: point surface				
Real World	*Paper Chart Symbol*		*ECDIS Symbol*	
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Call Sign			TE	0,1
Category of Pilot Boarding Place		1: Boarding by Pilot-Cruising Vessel 2: Boarding by Helicopter 3: Pilot Comes Out from Shore	EN	0,1
Category of Preference		1: Primary 2: Alternate	EN	0,1
Category of Vessel		1: General Cargo Vessel 2: Container Carrier 3: Tanker 4: Bulk Carrier 5: Passenger Vessel 6: Roll-On Roll-Off 7: Refrigerated Cargo Vessel 8: Fishing Vessel 9: Service 10: Warship 11: Towed or Pushed Composite Unit 12: Tug and Tow 13: Light Recreational 14: Semi-Submersible Offshore Installation 15: Jack-Up Exploration or Project Installation 16: Livestock Carrier 17: Sport Fishing	CL	0,1
Communication Channel			TE	0,*
Destination			TE	0,1
Pilot Movement		1: Embarkation 2: Disembarkation 3: Pilot Change	EN	0,1
Pilot Vessel			TE	0,1
Status		1: Permanent 2: Occasional 5: Periodic/Intermittent 6: Reserved 9: Mandatory 16: Watched 17: Unwatched 28: Buoyed	EN	0,*
Inherited Attributes				
S-127Attribute	**Inherited From**		**Type**	**Multiplicity**
Fixed Date Range	FeatureType		C	0,1
Periodic Date Range	FeatureType		C	0,*

Feature Name	FeatureType	C	0,*
Source Indication	FeatureType	C	0,1
Text Content	FeatureType	C	0,1
Interoperability Identifier	FeatureType	URN	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
theContactDetails	ServiceContact (inherited from OrganizationContactArea)	ContactDetails	association	0,*
permission	PermissionType (inherited from FeatureType)	Applicability	association	0,*
theRxN	AssociatedRxN (inherited from FeatureType)	AbstractRxN	association	0,*
theInformation	AdditionalInformation (inherited from FeatureType)	NauticalInformation	association	0,*

Feature associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
theCollection	PilotageDistrictAssociation	PilotageDistrict	aggregation	0,1
serviceProvider	ServiceProvisionArea	PilotService	association	0,*
theCartographicText	TextAssociation (inherited from FeatureType)	TextPlacement	association	0,1

10.3.1 General

For a pilot boarding place, the pilot vessel may either cruise in the area or come out on request. Off some large ports pilots on outgoing ships may be disembarked at a different location. Pilots may board from a helicopter; it is then less important for a ship to reach the exact position of the boarding place but an approximate position should still be encoded. Some pilot stations are used solely for long-distance (deep-sea) pilots. Pilots may be in constant attendance, in regular attendance at certain limited times, or available by previous arrangement only. The primary purpose of encoded pilotage information is to show the position of the facility. Because of the many variations in the service provided, the main source of information on pilotage must be in an associated publication or product.

If it is required to encode a pilot boarding place, it must be done using the feature Pilot Boarding Place.

10.3.2 Remarks

- If it is required to encode the ship to shore or shore to ship contact information, it must be done using the information class Contact Details (see clause 15.4). The Contact Details must be associated to the Pilot Boarding Place feature using the association AdditionalInformation.
- If it is required to encode the area in which pilotage regulations apply, it should be done using the feature Pilotage District (see clause 10.2). The relationship between the pilotage district and any associated pilot boarding places should be encoded using the feature association PilotageDistrictAssociation (see clause 19.2).
- If a pilot boarding place has one or more communication channels designated for use in connection with pilotage activities at that particular boarding place, the channel(s) should be encoded using the communicationChannel attribute. Such a situation may arise if there are multiple boarding places in a pilotage district.

10.4 Pilot Service

IHO Definition: The service provided by a person who directs the movements of a vessel through pilot waters, usually a person who has demonstrated extensive knowledge of channels, aids to navigation, dangers to navigation, etc., in a particular area and is licensed for that area.				
S-127 Geo Feature: PilotService				
Super Type: ReportableServiceArea				
Primitives: surface				
Real World	*Paper Chart Symbol*	*ECDIS Symbol*		
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Category of Pilot		1: Pilot 2: Deep Sea 3: Harbour 4: Bar 5: River 6: Channel 7: Lake	EN	0,*
Pilot Qualification		1: Government Pilot 2: Pilot Approved by Government 3: State Pilot 4: Federal Pilot 5: Company Pilot 6: Local Pilot 7: Citizen With Sufficient Local Knowledge 8: Citizen With Doubtful Local Knowledge	EN	0,1
Pilot Request			TE	0,1
Remote Pilot			BO	1,1
Notice Time			C	0,1
Notice Time Hours			(S) RE	0,* (ordered)
Notice Time Text			(S) TE	0,1
Operation		1: Largest Value 2: Smallest Value	(S) EN	0,1
Inherited Attributes				
S-127Attribute	**Inherited From**		**Type**	**Multiplicity**
Fixed Date Range	FeatureType		C	0,1
Periodic Date Range	FeatureType		C	0,*
Feature Name	FeatureType		C	0,*
Source Indication	FeatureType		C	0,1
Text Content	FeatureType		C	0,1
Interoperability Identifier	FeatureType		URN	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
theServiceHours	LocationHours	ServiceHours	association	0,1
reptForTrafficServ	TrafficServiceReport (inherited from ReportableServiceArea)	ShipReport	association	0,*
controlAuthority	ServiceControl (inherited from SupervisedArea)	Authority	association	0,1
theContactDetails	ServiceContact (inherited from OrganizationContactArea)	ContactDetails	association	0,*
permission	PermissionType (inherited from FeatureType)	Applicability	association	0,*
theRxN	AssociatedRxN (inherited from FeatureType)	AbstractRxN	association	0,*
theInformation	AdditionalInformation (inherited from FeatureType)	NauticalInformation	association	0,*

Feature associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
serviceArea	ServiceProvisionArea	PilotageDistrict	association	0,1
serviceArea	ServiceProvisionArea	PilotBoardingPlace	association	0,*
theCartographicText	TextAssociation (inherited from FeatureType)	TextPlacement	association	0,1

10.4.1 General

When it is required to encode individual pilot services within a pilot district, this must be done using the feature Pilot Service.

10.4.2 Remarks

- If it is required to encode the ship to shore or shore to ship contact information, it must be done using the information class Contact Details (see clause 15.4). The Contact Details must be associated to the Pilot Service feature using the association AdditionalInformation.

11 Other Areas

11.1 Introduction

S-127 provides additional geographic features for encoding information relevant to traffic and routeing, not classified under the preceding heads. Figure 11-1 depicts these features. The functions and encodings of these features are described in their respective clauses following.

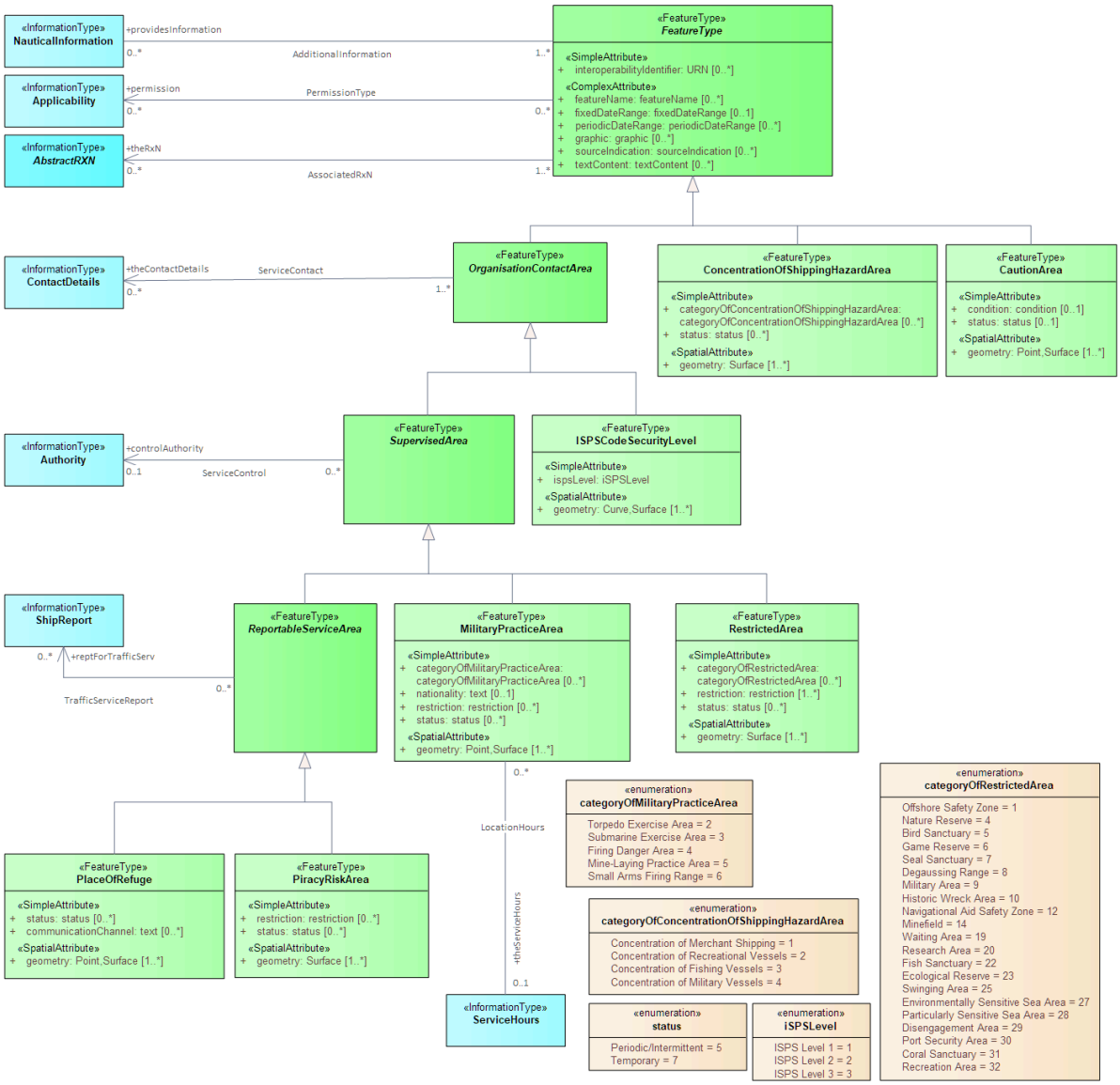

Figure 11-1 — Miscellaneous features

11.2 Caution Area

IHO Definition: Generally, an area where the mariner has to be made aware of circumstances influencing the safety of navigation. Remarks: This may be required to identify: a danger, a risk, a rule, or advice — which is not directly related to a specific object.
S-127 Geo Feature: CautionArea
Super Type: FeatureType
Primitives: point surface

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-127 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Condition		1: Under Construction 3: Under Reclamation	EN	0,1

		5: Planned Construction		
Status		5: Periodic/Intermittent 7: Temporary	EN	0,1
Inherited Attributes				
S-127Attribute	**Inherited From**		**Type**	**Multiplicity**
Fixed Date Range	FeatureType		C	0,1
Periodic Date Range	FeatureType		C	0,*
Feature Name	FeatureType		C	0,*
Source Indication	FeatureType		C	0,1
Text Content	FeatureType		C	0,1
Interoperability Identifier	FeatureType		URN	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
permission	PermissionType (inherited from FeatureType)	Applicability	association	0,*
theRxN	AssociatedRxN (inherited from FeatureType)	AbstractRxN	association	0,*
theInformation	AdditionalInformation (inherited from FeatureType)	NauticalInformation	association	0,*

Feature associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
theCartographicText	TextAssociation (inherited from FeatureType)	TextPlacement	association	0,1

11.2.1 General

If it is required to identify an area in which the mariner must be aware of circumstances influencing the safety of navigation (for example an area of continually changing depths), and which cannot be encoded using other feature types, it must be done using the feature CautionArea. This feature may be required to identify a danger, a risk, a rule or advice that is not directly related to a particular feature.

11.2.2 Remarks

- To encode the relevant cautionary information, an instance of the information type NauticalInformation (see clause 14.7) must be associated to the Caution Area.
- If the information applies to a specific area the Caution Area feature should cover only that area.
- If the information to be encoded is spatially linear, this should be encoded using a “very narrow” Caution Area feature of type area (approximately 0.3mm wide at the maximum display scale of the ENC data) similar to the method for encoding linear maritime jurisdiction areas (see the S-101 DCEG Caution Area encoding instructions).
- Information which may be of use to the mariner, but is not significant to safe navigation and cannot be encoded using other feature types, should be encoded using a different feature type and an associated instance of the information type Nautical Information (see clause 14.7), complex attribute information (see clause 23.8). This encoding is intended to reduce the number of alarms or indications generated in the ECDIS due to the overuse of Caution Area features.

- Notes should be kept to a minimum and be as concise as is compatible with accuracy and intelligibility. Hydrographic terminology (jargon) should be avoided, giving preference to easily understood words, for example “depths” rather than “bathymetry”.
- In order to ensure correct ECDIS display, Caution Area features of type surface should not share the geometry of features such as Depth Contour (S-101) and other features with higher ECDIS display priorities, as the Caution Area will appear to be “open ended”, which may confuse the mariner. Where this occurs, the edge of the Caution Area should be extended outward to clear the “shared” edge, sufficient to avoid “duplicate geometry” validation errors (that is, at least 0.3 mm at the maximum display scale for the ENC data).

11.3 Concentration of Shipping Hazard Area

IHO Definition: An area where hazards, caused by concentrations of shipping, may occur. Hazards are risks to shipping, which stem from sources other than shoal water or obstructions.				
S-127 Geo Feature: ConcentrationOfShippingHazardArea				
Super Type: FeatureType				
Primitives: surface				
Real World	*Paper Chart Symbol*	*ECDIS Symbol*		
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Category of Concentration of Shipping Hazard Area		1: Concentration of Merchant Shipping 2: Concentration of Recreational Vessels 3: Concentration of Fishing Vessels 4: Concentration of Military Vessels	EN	0,*
Status		1: Permanent 2: Occasional 5: Periodic/Intermittent 7: Temporary 16: Watched 17: Unwatched	EN	0,*
Inherited Attributes				
S-127Attribute	**Inherited From**		**Type**	**Multiplicity**
Fixed Date Range	FeatureType		C	0,1
Periodic Date Range	FeatureType		C	0,*
Feature Name	FeatureType		C	0,*
Source Indication	FeatureType		C	0,1
Text Content	FeatureType		C	0,1
Interoperability Identifier	FeatureType		URN	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
permission	PermissionType	Applicability	association	0,*

Information associations				
	(inherited from FeatureType)			
theRxN	AssociatedRxN (inherited from FeatureType)	AbstractRxN	association	0,*
theInformation	AdditionalInformation (inherited from FeatureType)	NauticalInformation	association	0,*

Feature associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
theCartographicText	TextAssociation (inherited from FeatureType)	TextPlacement	association	0,1

11.3.1 General

In many waterways the amount of regular occurring ship traffic, fishing activities and similar frequent or infrequent concentrations of vessels of various size can impose a hazard to safe navigation. If it is required to encode such an area of concentrations of shipping, it must be done using the feature Concentration Of Shipping Hazard Area.

11.3.2 Remarks

- To encode the relevant regulations or notes, an instance of the information class Regulations, Recommendations, Restrictions, or Nautical Information (see clause 14.7) must be associated to the Concentration of shipping hazard area. The Nautical Information class should be used only if none of the other three are suitable.

11.4 ISPS Code Security Level

IHO Definition: The area to which an International Ship and Port Facility Security (ISPS) level applies. The ISPS Code is a comprehensive set of measures to enhance the security of ships and port facilities, developed in response to the perceived threats to ships and port facilities in the wake of the 9/11 attacks in the United States.				
S-127 Geo Feature: ISPSCodeSecurityLevel				
Super Type: OrganizationContactArea				
Primitives: curve surface				
Real World	*Paper Chart Symbol*	*ECDIS Symbol*		
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
ISPS level		1: ISPS Level 1 2: ISPS Level 2 3: ISPS Level 3	EN	1,1
Inherited Attributes				
S-127Attribute	**Inherited From**		**Type**	**Multiplicity**
Fixed Date Range	FeatureType		C	0,1
Periodic Date Range	FeatureType		C	0,*
Feature Name	FeatureType		C	0,*
Source Indication	FeatureType		C	0,1

Text Content	FeatureType	C	0,1
Interoperability Identifier	FeatureType	URN	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
theContactDetails	ServiceContact (inherited from OrganizationContactArea)	ContactDetails	association	0,*
permission	PermissionType (inherited from FeatureType)	Applicability	association	0,*
theRxN	AssociatedRxN (inherited from FeatureType)	AbstractRxN	association	0,*
theInformation	AdditionalInformation (inherited from FeatureType)	NauticalInformation	association	0,*

Feature associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
theCartographicText	TextAssociation (inherited from FeatureType)	TextPlacement	association	0,1

11.4.1 General

When it is required to encode the security level of an area, such as a port or area of a port, this must be done using the feature ISPS Code Security Level. The specific ISPS level is encoded in the attribute ispsLevel.

11.4.2 Remarks

- When it is required to encode the ISPS Code Security Level but exact level is unknown, a null value can be given and any clarifying remarks added to an associated Nautical Information.
- The International Ship and Port Facility Security (ISPS) Code is an amendment to the Safety of Life at Sea (SOLAS) Convention (1974/1988) on minimum security arrangements for ships, ports and government agencies. Having come into force in 2004, it prescribes responsibilities to governments, shipping companies, shipboard personnel, and port/facility personnel to “detect security threats and take preventative measures against security incidents affecting ships or port facilities used in international trade

11.5 Military Practice Area

IHO Definition: An area within which naval, military or aerial exercises are carried out. Also called an ‘exercise area’.		
S-127 Geo Feature: MilitaryPracticeArea		
Super Type: SupervisedArea		
Primitives: point surface		
Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-127 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of Military Practice Area		2: Torpedo Exercise Area 3: Submarine Exercise Area 4: Firing Danger Area 5: Mine-Laying Practice Area 6: Small Arms Firing Range	EN	0,*
Nationality			TE	0,1
Restriction		1: Anchoring Prohibited 2: Anchoring Restricted 3: Fishing Prohibited 4: Fishing Restricted 5: Trawling Prohibited 6: Trawling Restricted 7: Entry Prohibited 8: Entry Restricted 9: Dredging Prohibited 10: Dredging Restricted 11: Diving Prohibited 12: Diving Restricted 13: No Wake 15: Construction Prohibited 16: Discharging Prohibited 17: Discharging Restricted 18: Industrial or Mineral Exploration/ Development Prohibited 19: Industrial or Mineral Exploration/ Development Restricted 20: Drilling Prohibited 21: Drilling Restricted 22: Removal of Historical Artefacts Prohibited 23: Cargo Transhipment (Lightening) Prohibited 24: Dragging Prohibited 25: Stopping Prohibited 26: Landing Prohibited 27: Speed Restricted 39: Swimming Prohibited	EN	0,*
Status		1: Permanent 2: Occasional 5: Periodic/Intermittent 6: Reserved 7: Temporary 16: Watched 17: Unwatched	EN	0,*
Inherited Attributes				
S-127Attribute	**Inherited From**		**Type**	**Multiplicity**
Fixed Date Range	FeatureType		C	0,1
Periodic Date Range	FeatureType		C	0,*
Feature Name	FeatureType		C	0,*
Source Indication	FeatureType		C	0,1
Text Content	FeatureType		C	0,1
Interoperability Identifier	FeatureType		URN	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
theServiceHours	LocationHours	ServiceHours	association	0,1
controlAuthority	ServiceControl (inherited from SupervisedArea)	Authority	association	0,1
theContactDetails	ServiceContact (inherited from OrganizationContactArea)	ContactDetails	association	0,*
permission	PermissionType (inherited from FeatureType)	Applicability	association	0,*
theRxN	AssociatedRxN (inherited from FeatureType)	AbstractRxN	association	0,*
theInformation	AdditionalInformation (inherited from FeatureType)	NauticalInformation	association	0,*

Feature associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
theCartographicText	TextAssociation (inherited from FeatureType)	TextPlacement	association	0,1

11.5.1 General

Military practice (or exercise) areas at sea are of various types and may be classified as follows with regard to their significance for the mariner:

- Firing danger areas, sometimes called firing practice areas, i.e. permanent or temporary ranges, including bombing, torpedo, and missile ranges.
- Mine-laying practice (and counter-measures) areas.
- Submarine exercise areas.
- Other exercise areas.

Some degree of restriction on navigation and other rights may be implied by the encoding of military practice areas. There may be varying interpretations of the validity of the restrictions and possible infringement of the rights of innocent passage through territorial waters and elsewhere. Where it is thought desirable to depict such areas, even though clear range procedure may be observed, or the areas appear to be a derogation of the freedom of the seas, mariners should be informed (not necessarily on ENCs) that publication of the details of a law or regulation is solely for the safety and convenience of shipping and implies no recognition of the international validity of the law or regulation. By this means infringements are not condoned but the mariner receives a warning which may be necessary for their safety.

If it is required to encode a military practice area, it must be done using the feature Military Practice Area.

11.5.2 Remarks

- Submarine exercise areas should generally not be encoded where submarines exercise over wide areas which it would not be practicable to depict, and over which cautions (to keep a good look out for them) are unlikely to be effective. They may, however, be encoded where they occur in or near major shipping lanes or port approaches.
- Firing danger areas at sea are frequently marked by IALA special buoys sometimes laid around the perimeter of the area and/or by specially erected lights, beacons, and targets. If required, all such features which could assist the navigator in identifying their position, or could be a hazard, must be encoded in the normal way.

- The existence of mine-laying (and counter-measures/clearance) practice areas implies the possibility of unexploded mines or depth charges on the sea floor, and also the presence of harmless practice mines.

11.6 Piracy Risk Area

IHO Definition: An area where there is a raised risk of piracy or armed robbery.				
S-127 Geo Feature: PiracyRiskArea				
Super Type: ReportableServiceArea				
Primitives: point surface				
Real World	*Paper Chart Symbol*	*ECDIS Symbol*		
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Restriction		1: Anchoring Prohibited 2: Anchoring Restricted 3: Fishing Prohibited 4: Fishing Restricted 5: Trawling Prohibited 6: Trawling Restricted 7: Entry Prohibited 8: Entry Restricted 9: Dredging Prohibited 10: Dredging Restricted 11: Diving Prohibited 12: Diving Restricted 14: Area To Be Avoided 18: Industrial or Mineral Exploration/ Development Prohibited 19: Industrial or Mineral Exploration/ Development Restricted 20: Drilling Prohibited 21: Drilling Restricted 24: Dragging Prohibited 25: Stopping Prohibited 26: Landing Prohibited 27: Speed Restricted 31: Berthing Prohibited 32: Berthing Restricted 33: Making Fast Prohibited 34: Making Fast Restricted	EN	0,*
Status		1: Permanent 2: Occasional 5: Periodic/Intermittent 7: Temporary	EN	0,*
Inherited Attributes				
S-127Attribute	**Inherited From**		**Type**	**Multiplicity**
Fixed Date Range	FeatureType		C	0,1
Periodic Date Range	FeatureType		C	0,*
Feature Name	FeatureType		C	0,*
Source Indication	FeatureType		C	0,1
Text Content	FeatureType		C	0,1

Interoperability Identifier	FeatureType	URN	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
reptForTrafficServ	TrafficServiceReport (inherited from ReportableServiceArea)	ShipReport	association	0,*
controlAuthority	ServiceControl (inherited from SupervisedArea)	Authority	association	0,1
theContactDetails	ServiceContact (inherited from OrganizationContactArea)	ContactDetails	association	0,*
permission	PermissionType (inherited from FeatureType)	Applicability	association	0,*
theRxN	AssociatedRxN (inherited from FeatureType)	AbstractRxN	association	0,*
theInformation	AdditionalInformation (inherited from FeatureType)	NauticalInformation	association	0,*

Feature associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
theCartographicText	TextAssociation (inherited from FeatureType)	TextPlacement	association	0,1

11.6.1 General

When it is required to encode an area with risk of piracy or armed robbery, it must be done using a Piracy Risk Area. A PiracyRiskArea is an area where there is a raised risk of piracy or armed robbery. Piracy consists of any of the following acts:

(United Nations Convention on the Law of the Sea – Article 101)

Armed robbery takes place within the jurisdiction of a State.

Regular bulletins come from the IMB Piracy Reporting Centre – Kuala Lumpur.

11.6.2 Remarks

- If it required to encode any ship reporting requirements within the Piracy Risk Area, this must be done using an associated Ship Report information type.

11.7 Place of Refuge

IHO Definition: A place where a ship in need of assistance can take action to enable it to stabilize its condition and reduce the hazards to navigation, and to protect human life and the environment.		
S-127 Geo Feature: PlaceOfRefuge		
Super Type: ReportableServiceArea		
Primitives: point surface		
Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-127 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Communication Channel			TE	0,*
Status		1: Permanent 2: Occasional 3: Recommended 4: Not in Use 5: Periodic/Intermittent 6: Reserved 7: Temporary 8: Private 9: Mandatory 28: Buoyed	EN	0,*
Inherited Attributes				
S-127Attribute	**Inherited From**		**Type**	**Multiplicity**
Fixed Date Range	FeatureType		C	0,1
Periodic Date Range	FeatureType		C	0,*
Feature Name	FeatureType		C	0,*
Source Indication	FeatureType		C	0,1
Text Content	FeatureType		C	0,1
Interoperability Identifier	FeatureType		URN	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
reptForTrafficServ	TrafficServiceReport (inherited from ReportableServiceArea)	ShipReport	association	0,*
controlAuthority	ServiceControl (inherited from SupervisedArea)	Authority	association	0,1
theContactDetails	ServiceContact (inherited from OrganizationContactArea)	ContactDetails	association	0,*
permission	PermissionType (inherited from FeatureType)	Applicability	association	0,*
theRxN	AssociatedRxN (inherited from FeatureType)	AbstractRxN	association	0,*
theInformation	AdditionalInformation (inherited from FeatureType)	NauticalInformation	association	0,*

Feature associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
theCartographicText	TextAssociation (inherited from FeatureType)	TextPlacement	association	0,1

11.7.1 General

If it is required to encode a place refuge for a ship or mariners, it must be done using the feature class Place of refuge. If the place of refuge is equipped with communication equipment, the VHF communication channel can be described in the attribute communicationChannel. Communication information for authorities located at other places (or whose location is irrelevant or unknown) may be encoded in an associated Contact Details object.

Where possible the full extent of the place of refuge area should be encoded using surface geometry. When it is not possible to define the area, point geometry can be placed in a central place of the area.

Authorities may designate any other location (port, harbour, a sheltered place along the coastline, etc.) as a place of refuge for a specific occurrence without designating it as a permanent or general place of refuge. Such places should not normally be encoded as Place Of Refuge features without consulting the responsible authority.

The relevant IMO circular and policies issued by maritime authorities on places of refuge make it abundantly clear that designated places are not the only possibilities for refuge, however, data producers may, as a precaution, include general information about places of refuge with their datasets. Such general information may be encoded as a note advising mariners that other places of refuge may be arranged for a particular incident with the consent of the appropriate authorities. Such a note might be encoded as a Nautical Information object associated to appropriate geographic features.

Places of reguge may be indicated on source material such as charts by the addition of appropriate text. For example, see Figure 11-2 below.

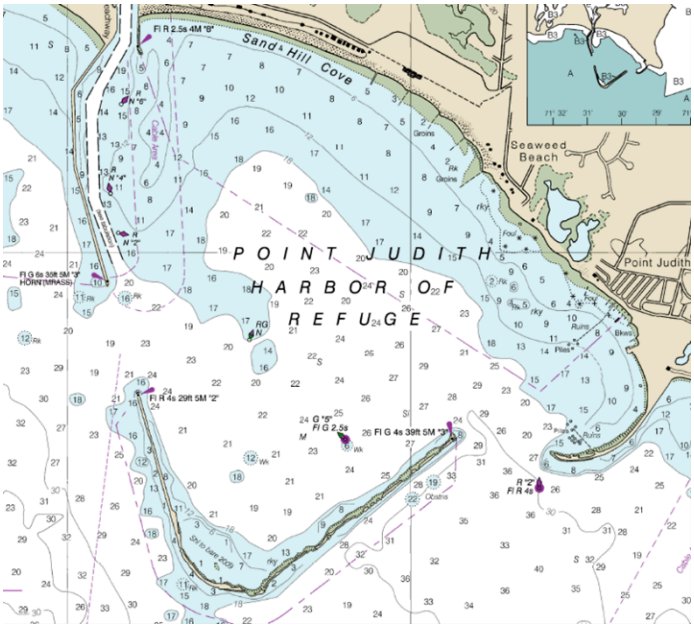

Figure 11-2 — Place of Refuge indicated on raster chart

11.8 Restricted Area

IHO Definition: A specified area designated by an appropriate authority within which navigation is restricted in accordance with certain specified conditions.		
S-127 Geo Feature: RestrictedArea		
Super Type: SupervisedArea		
Primitives: surface		
Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-127 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of Restricted Area		1: Offshore Safety Zone 4: Nature Reserve 5: Bird Sanctuary 6: Game Reserve 7: Seal Sanctuary 8: Degaussing Range 9: Military Area 10: Historic Wreck Area 12: Navigational Aid Safety Zone 14: Minefield 19: Waiting Area 20: Research Area 22: Fish Sanctuary 23: Ecological Reserve 25: Swinging Area 27: Environmentally Sensitive Sea Area 28: Particularly Sensitive Sea Area 29: Disengagement Area 30: Port Security Area 31: Coral Sanctuary 32: Recreation Area	EN	0,*
Restriction		1: Anchoring Prohibited 2: Anchoring Restricted 3: Fishing Prohibited 4: Fishing Restricted 5: Trawling Prohibited 6: Trawling Restricted 7: Entry Prohibited 8: Entry Restricted 9: Dredging Prohibited 10: Dredging Restricted 11: Diving Prohibited 12: Diving Restricted 13: No Wake 14: Area To Be Avoided 15: Construction Prohibited 16: Discharging Prohibited 17: Discharging Restricted 18: Industrial or Mineral Exploration/Development Prohibited 19: Industrial or Mineral Exploration/Development Restricted 20: Drilling Prohibited 21: Drilling Restricted 22: Removal of Historical Artefacts Prohibited 23: Cargo Transhipment (Lightening) Prohibited 24: Dragging Prohibited 25: Stopping Prohibited 26: Landing Prohibited 27: Speed Restricted 28: Overtaking Prohibited 29: Overtaking of Convoys by Convoys Prohibited 30: Passing or Overtaking Prohibited 35: Turning Prohibited 36: Restricted Fairway Depth	EN	1,*

		37: Restricted Fairway Width 38: Use of Spuds Prohibited 39: Swimming Prohibited 40: SOx Emission Restricted 41: NOx Emission Restricted 42: Power-Driven Vessels Prohibited 43: Passing or Overtaking of Convoys by Convoys Prohibited		
Status		1: Permanent 2: Occasional 3: Recommended 4: Not in Use 5: Periodic/Intermittent 6: Reserved 7: Temporary 9: Mandatory 18: Existence Doubtful 28: Buoyed	EN	0,*

Inherited Attributes

S-127Attribute	Inherited From	Type	Multiplicity
Fixed Date Range	FeatureType	C	0,1
Periodic Date Range	FeatureType	C	0,*
Feature Name	FeatureType	C	0,*
Source Indication	FeatureType	C	0,1
Text Content	FeatureType	C	0,1
Interoperability Identifier	FeatureType	URN	0,*

Information associations

S-127 Role	S-127 Association Name	Associated to	Type	Mult.
controlAuthority	ServiceControl (inherited from SupervisedArea)	Authority	association	0,1
theContactDetails	ServiceContact (inherited from OrganizationContactArea)	ContactDetails	association	0,*
permission	PermissionType (inherited from FeatureType)	Applicability	association	0,*
theRxN	AssociatedRxN (inherited from FeatureType)	AbstractRxN	association	0,*
theInformation	AdditionalInformation (inherited from FeatureType)	NauticalInformation	association	0,*

Feature associations

S-127 Role	S-127 Association Name	Associated to	Type	Mult.
theCartographicText	TextAssociation (inherited from FeatureType)	TextPlacement	association	0,1

11.8.1 General

If it is required to encode a restricted area, it must be done using the feature RestrictedArea, or using other features having the attribute restriction (Military Practice Area, Piracy Risk Area).

11.8.2 Ice control zones

Ice Control Zones where navigational restrictions are applied to all or some vessels must be encoded as a **RestrictedArea** with attribute *restriction = 8 (Entry Restricted)*. Any seasonality must be encoded in the attribute *periodicDateRange*. Additional details on restrictions in effect must be captured as an associated instance of **Restrictions** (see clause 14.5). The authority managing the Ice Control Zone must be captured as an associated instance of **Authority** information type (see clause 15.3). Means of contacting the managing authority must be captured as an associated instance of **ContactDetails** information type (see clause 15.4). If the area is specific to only some vessels, details regarding this must be captured as an associated instance of **Applicability** information type (see clause 16.5). Additional information may be captured in an associated instance of the information type **NauticalInformation** (see clause 14.7) when applicable to multiple instances, or as the complex attribute *textContent* when the information is specific to the instance.

11.8.3 Remarks

- **RestrictedArea** must only be encoded if one of the allowable values for restriction applies for the area.
- The term “no anchoring area” is used to identify the IMO routeing measure of that name. Such areas, where required, must be encoded as **RestrictedArea** with attribute *restriction = 1 (anchoring prohibited)*.

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12 Cartographic Features

12.1 Text Placement

IHO Definition: The Text Placement feature is used in association with the Feature Name attribute or a light description to optimize text positioning in ECDIS.				
S-127 Geo Feature: TextPlacement				
Super Type:				
Primitives: point				
Real World	*Paper Chart Symbol*		*ECDIS Symbol*	
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Text Offset Bearing			IN	1,1
Text Offset Distance			IN	1,1
Text Rotation			BO	0,1
Text Type		1: Name	EN	1,2
Scale Minimum			IN	0,1
Inherited Attributes				
S-127Attribute	**Inherited From**		**Type**	**Multiplicity**
No inherited attributes				

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**

Feature associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
thePositionProvider	TextAssociation	FeatureType	composition	1,1

12.1.1 General

If it is required to place text to improve clarity and readability of display, it must be done using the cartographic feature Text Placement. In navigationally relevant areas such as shipping channels and dredged areas, where default ECDIS text positioning may cover other features, Data Producers should consider using Text Placement. The Text Placement feature must be associated with the relevant geo feature using the composition Text Association (see clause 19.3).

While the feature associations table above indicates the abstract type FeatureType as the target of feature associations from TextPlacement, the actual association in any TextPlacement instance should be a reverse link to the non-abstract feature type (sub-type of FeatureType at any level) which links to the particular TextPlacement instance.

NOTE: Where an associated instance of Text Placement has not been related to a feature having the attribute name and/or the attributes associated with the characteristics of a feature populated, the text

will be positioned in the ECDIS display in accordance with the default position for text strings defined in the Portrayal Catalogue.

12.1.2 Remarks

- The Text Placement cartographic feature is used by the ECDIS to optionally position text in ECDIS, which has been populated using an attribute(s) for the associated feature. The attribute(s) is identified by populating the mandatory attribute text type.
- Where two instances of text type are populated for a Text Placement instance, the feature name and characteristics as derived from the target feature attribution will be vertically aligned in the ECDIS display in accordance with the defined text offset bearing and distance. If it is required to position the feature name and the feature characteristics independently, this must be done by associating two instances of Text Placement, one having text type = 1 (name) and the other having text type = 2 (feature characteristic), to the target feature. Note, however, that independent vertical or horizontal alignment of both the name and the characteristic of a feature is not recommended, as the text will overlap as the Mariner zooms to smaller scales than the optimum display scale for the data.
- The attributes text offset bearing and text offset distance define the bearing (related to true north) and distance of the anchor point of the text, in millimetres in the ECDIS display, to be displayed from the associated feature. The values populated for these attributes must be determined based on the desired position of the text at the optimum display scale of the ENC data. Note that the attribute text offset bearing does not rotate the text itself, but determines the alignment of the anchor point (or justification) for the text location (horizontal (left, centred or right) and vertical (bottom, centre or top)) based on the encoded bearing. Displayed text will always appear horizontal regardless of the display mode set by the mariner (north-up or course-up), unless the Boolean attribute text rotation is set to True.
- The Boolean attribute text rotation, when populated as True, will rotate the text on the ECDIS display to align along the bearing populated for the attribute text offset bearing.
- Data Producers are advised to determine the best positioning for text at the optimum display scale for the data; and based on “north-up” ECDIS display. While text offset bearing, text offset distance and text rotation will position the text at the same location relative to the associated feature at all Mariner’s Selected Viewing Scales, Data Producers are advised that, as the Mariner zooms out to smaller viewing scales, text may unintentionally cover other charted detail. Therefore, as an alternative, Data Producers may experiment with positioning the text so that it clears the majority of other charted features at the smallest scale at which the text is intended to be displayed, and populating the attribute scale minimum accordingly (see bullet below). Data Producers are also advised that optimum results may not be achieved when the Mariner has set the display setting for the ECDIS to screen rotations other than “north-up”. Encoders should also consider the positioning of the name of a feature where the name is encoded in multiple languages, as the name displayed may be of varying character length based on the Mariner’s language settings (see clause 2.7.1).
- The attribute scale minimum (if permitted by the data format) may be used to determine a scale at which the text string is no longer visible in the ECDIS when scale minimum functionality is enabled. Where populated, the value for scale minimum on Text Placement must not be set to a smaller scale value than the value populated for the associated feature.
- Text Placement should normally be associated with features of type point, but may be used for features of type curve and surface.

13 Abstract Information Types

The abstract information types are depicted in Figure 13-1 below. At the root is the type named **InformationType**, from which all information types except **SpatialQuality** and **QualityOfNonbathymetricData** inherit several attributes. This means that any information type in S-127 except **SpatialQuality** can have any of the several attributes in the InformationType box. The information types AbstractRxN adds attributes and associations inherited by the four types **Regulations**, **Restrictions**, **Recommendations**, and **NauticalInformation**.

The abstract information type hierarchy in S-127 is harmonised with the abstract hierarchy in other nautical publications Product Specifications.

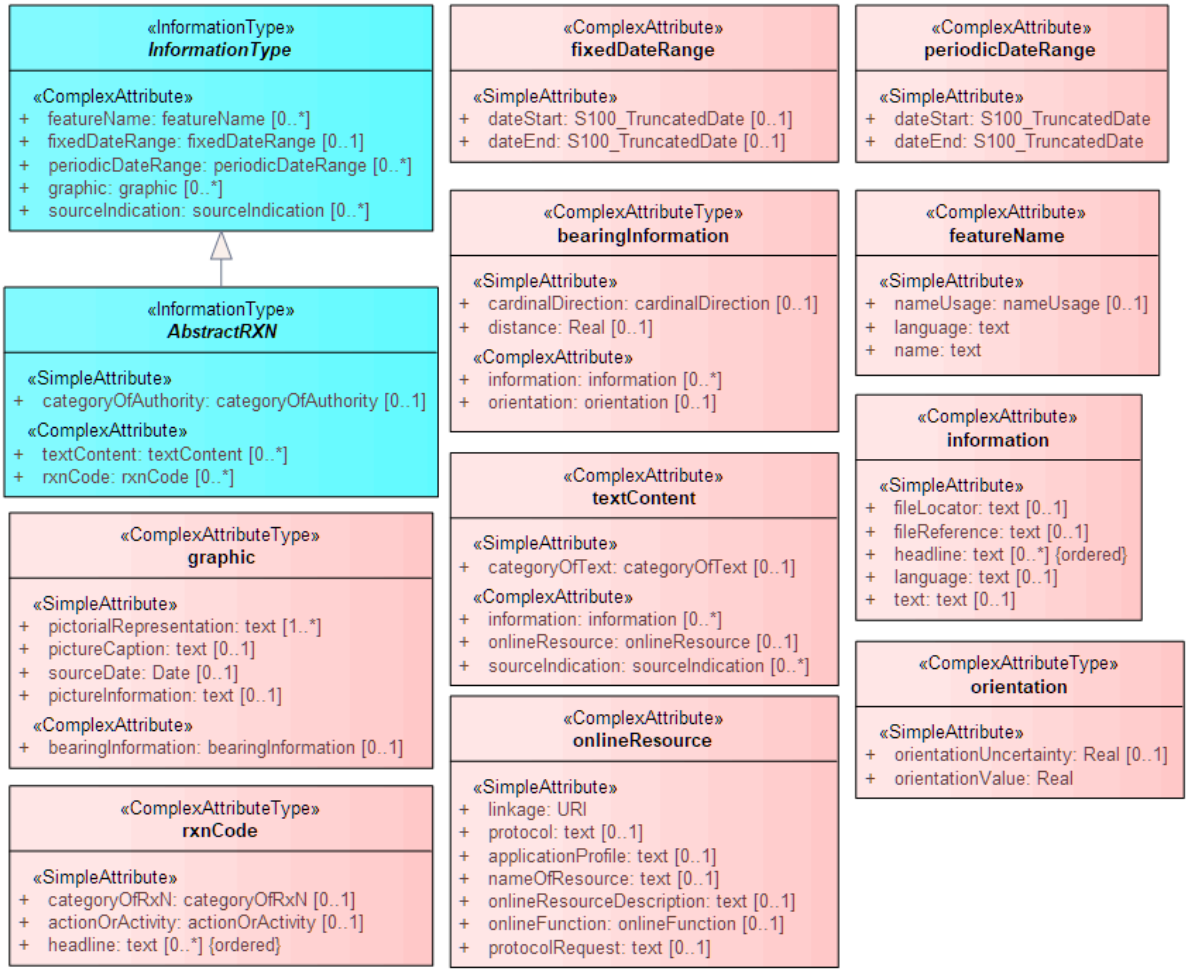

Figure 13-1 — Abstract Information Types

13.1 Information Type

IHO Definition: Generalized information type which carries all the common attributes.

S-127 Information Type: InformationType (Abstract type)				
Super Type:				
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Feature Name			C	0,*
Language			(S) TE	1,1
Name			(S) TE	1,1
Name Usage		1: Default Name Display 2: Alternate Name Display 3: No Chart Display	(S) EN	0,1
Fixed Date Range			C	0,1
Date Start			(S) TD	0,1
Date End			(S) TD	0,1
Periodic Date Range			C	0,*
Date Start			(S) TD	1,1
Date End			(S) TD	1,1
Graphic			C	0,*
Pictorial Representation			(S) TE	1,*
Picture Caption			(S) TE	0,1
Source Date			(S) DA	0,1
Picture Information			(S) TE	0,1
Bearing Information			(S) C	0,1
Source Indication			C	0,*
Category of Authority			(S) EN	0,1
Country Name			(S) TE	0,1
Source			(S) TE	0,1
Source Type		1: Law or Regulation 2: Official Publication 7: Mariner Report, Confirmed 8: Mariner Report, Not Confirmed 9: Industry Publications and Reports 10: Remotely Sensed Images 11: Photographs 12: Products Issued by HO Services 13: News Media 14: Traffic Data	(S) EN	0,1
Reported Date			(S) TD	0,1
Feature Name			(S) C	0,*

Inherited Attributes			
S-127 Attribute	**Inherited From**	**Type**	**Multiplicity**
No inherited attributes			

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**

13.1.1 General

Where a complex attribute has all its sub-attributes optional (e.g., multiplicity 0..1 or 0..*), at least one of the sub-attributes must be populated.

The featureName attribute of an instance of an information type can be used for a short title that is either a proper name (if such is relevant) or which describes the instance. For example, the featureName attribute of an Authority information type can be the name of a government agency.

The *featureName* attributes of information types should not duplicate the geographic feature name of an associated feature, but should pertain to the information instance itself.

The *featureName* attribute should be populated only if the value conveys useful information to the end user. Some examples of such situations are:

- providing the name of an organisation, such as the name of an Authority.
- distinguishing between instances – if multiple instances of the same information type are associated to the same feature type (or another information type), the different instances may be given descriptive names to make it easier for the mariner to distinguish their content.

Some information instances are associated to multiple features, in which case its name should be general enough to be relevant to all the features.

For example, if naming Regulations instances describing regulations, consider whether (for example) there is a general regulation applicable to all areas in a jurisdiction and an exceptional regulations object associated to a single area or a subset of areas in the jurisdiction. In this situation, the general regulations may be encoded with the name “General regulations for (feature type) Areas” and associated to several features, while a specific feature can also have a specific regulation whose name is “Special regulations for (named area)”.

13.2 AbstractRxN

IHO Definition: An abstract superclass for information types that encode rules, recommendations, and general information in text or graphic form.				
S-127 Information Type: AbstractRxN (Abstract type)				
Super Type: InformationType				
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Category of Authority		2: Border Control 3: Police 4: Port 5: Immigration 6: Health 7: Coast Guard 8: Agricultural 9: Military 10: Private Company 11: Maritime Police 12: Environmental	EN	0,1

		13: Fishery 14: Finance 15: Maritime 16: Customs		
RxN Code			C	0,*
Category of RxN		1: Navigation 2: Communication 3: Environmental Protection 4: Wildlife Protection 5: Security 6: Customs 7: Cargo Operation 8: Refuge 9: Health 10: Natural Resources or Exploitation 11: Port 12: Finance 13: Agriculture	(S) CL	0,1
Action or Activity		1: Navigating With a Pilot 2: Entering Port 3: Leaving Port 4: Berthing 5: Slipping 6: Anchoring 7: Weighing Anchor 8: Transiting 9: Overtaking 10: Reporting 11: Working Cargo 12: Landing 13: Diving 14: Fishing 15: Discharging Overboard 16: Passing 17: Ballast Water Exchange 18: Hull Cleaning 19: Scientific Research 20: Tourism 21: Education 22: Infrastructure Maintenance	(S) CL	0,1
Headline			(S) TE	0,* (ordered)
Text Content			C	0,*
Category of Text		1: Abstract or Summary 2: Extract 3: Full Text	(S) EN	0,1
Information			(S) C	0,*
Online Resource			(S) C	0,1
Source Indication			(S) C	0,*
Inherited Attributes				
S-127 Attribute	**Inherited From**		**Type**	**Multiplicity**
Feature Name	InformationType		C	0,*

Fixed Date Range	InformationType	C	0,1
Periodic Date Range	InformationType	C	0,*
Graphic	InformationType	C	0,*
Source Indication	InformationType	C	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
isApplicableTo	InclusionType	Applicability	association	0,*
theOrganisation	RelatedOrganisation	Authority	association	0,*

13.2.1 General

AbstractRxN is the supertype of the four types intended primarily for encoding information from regulatory or other text sources. The attributes *categoryOfRxN* and *actionOrActivity* should be encoded wherever possible in order to allow software to classify the content according to the type of regulation (*categoryOfRxN*) and its effects on common maritime activities by both commercial and recreational vessels.

The complex attribute *rxNCode* can be used to classify regulations (or recommendations, etc.) according to their principal subject (sub-attribute categoryOfRxN) and the type of vessel activity affected (sub-attribute actionOrActivity), as well as provide a sequence of brief topic headings (sub-attribute headline). The *rxNCode* attribute is intended to be used to allow mariners to obtain information relevant to particular subjects or to particular kinds of vessel operations.

- As an abstract type, instances of **AbstractRxN** cannot be directly encoded in datasets. However, the encoding instructions for this type apply to all its sub-types unless explicitly overriden in the encoding instructions for any particular sub-type.

13.2.2 Remarks

- At least one of the attributes *textContent* and *graphic* must be populated. Populating both is permitted.

14 Textual Regulations

14.1 Introduction

The information types **Regulations**, **Restrictions, *Recommendations**, and **NauticalInformation** all inherit the attributes of their immediate abstract superclass **AbstractRxN**, which provides attributes *textContent* and *graphic* for textual and pictorial material respectively. The sub-attributes of its complex attribute *rxnCode* allow optional classification of the material encoded in textContent/graphic according to the type of material and the kind of nautical activity affected by it. The classifications in *rxNCode* sub-attributes *categoryOfRxN* and *actionOrActivity* are intended to facilitate software queries for information, while the sub-attribute *headline* provides additional topic headings for subject matter.

These four information types also inherit the attributes of abstract superclass InformationType, which allows encoding of the effective and expiry dates, if any, and the source of information , if it is necessary to encode that data.

The content of the regulation (recommendation, etc.) should be encoded in the textContent attribute, which is also inherited from the abstract superclass **InformationType**. It may be encoded inline (textContent.information.text) or in an external file (textContent.information.fileReference) depending on its length, on whether it is unique to the feature instance, and on whether the producer decides to include a support file containing multiple sections referenced from different places in the dataset. (See also clauses 2.4.8 and 2.4.9 for general guidance on encoding textual information.)

These four information types are intended primarily for encoding textual information, such as that which derives from textual source material such as port handbooks, national or local laws or official publications.

The four types for textual information are depicted in Figure 14-1

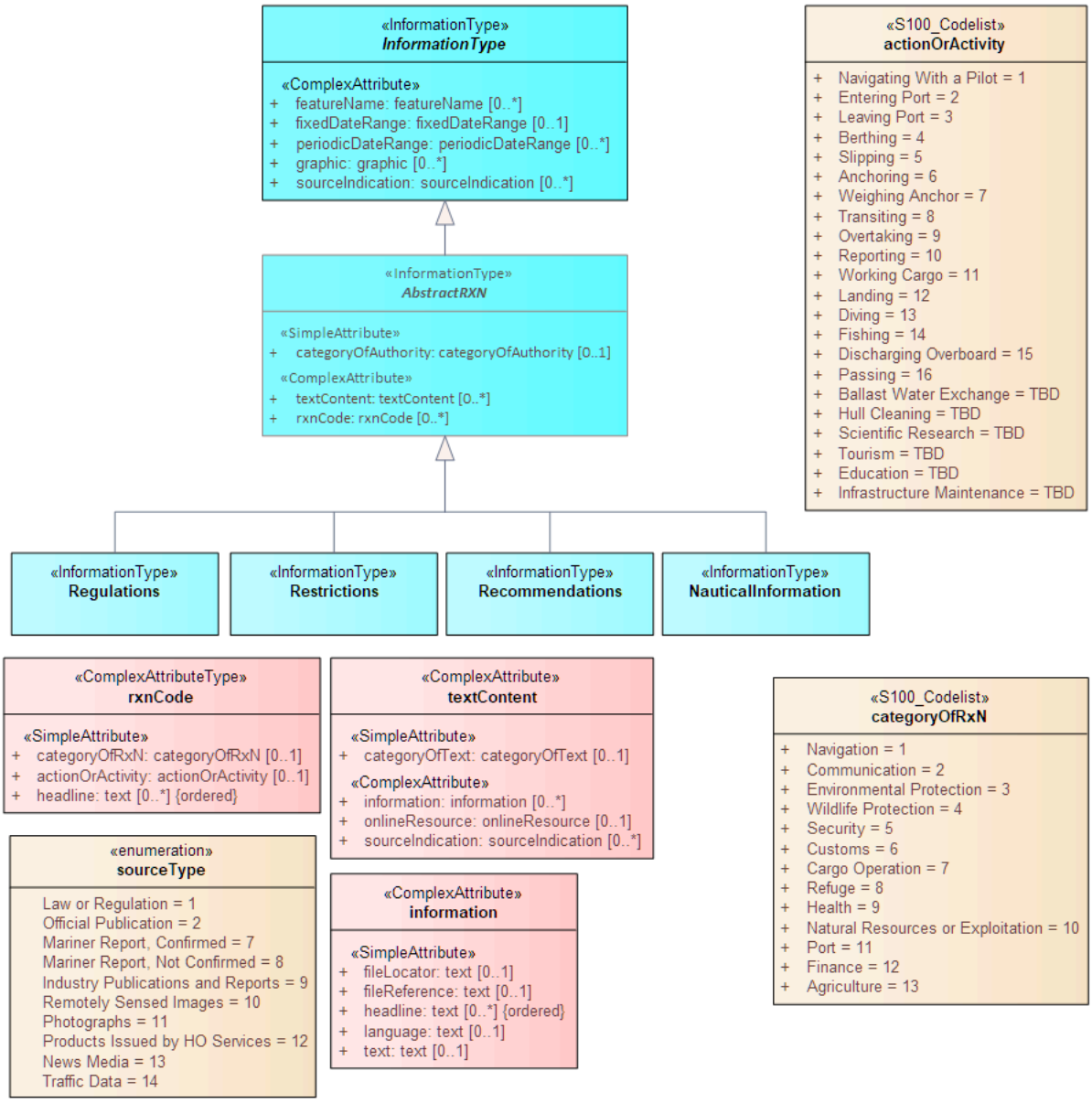

Figure 14-1 — Types for textual information concerning regulations, etc.

Where possible, these types should be classified using the *categoryOfRxN* and *actionOrActivity* codelists in the rxnCode complex attribute. Being open enumeration codelists, they allow for additional categories not listed among their standard values. For example, an “under repair” activity might be encoded in the *actionOrActivity* attribute (as “other: underRepair”, following the syntax rule for encoding “extra” values in open enumerations[2]).

[2] S-100 3-6.7 specifies the format as “The word ‘other’ followed by a colon and a single space character (that is ‘other: ’ without quotes), followed by one or more alphanumeric strings separated by single spaces.”

Producers should note that such extra values will merely be displayed and not processed (for example, the user interface will not use extra values to choose symbols or filter instances of Regulations[3], whereas it may apply filters to the standard values and/or them in portrayal).

14.2 Regulations, etc., for specific locations

All geo features may have an association to any of **Regulations** or its sibling information types. This association is **AssociatedRxN** and it is inherited from the root feature type **FeatureType**.

If it is necessary to identify an authority or organization related to a particular regulation (restriction, etc.) object, this may be done using the **RelatedOrganisation** association between **Regulations**, etc., and an **Authority** object.

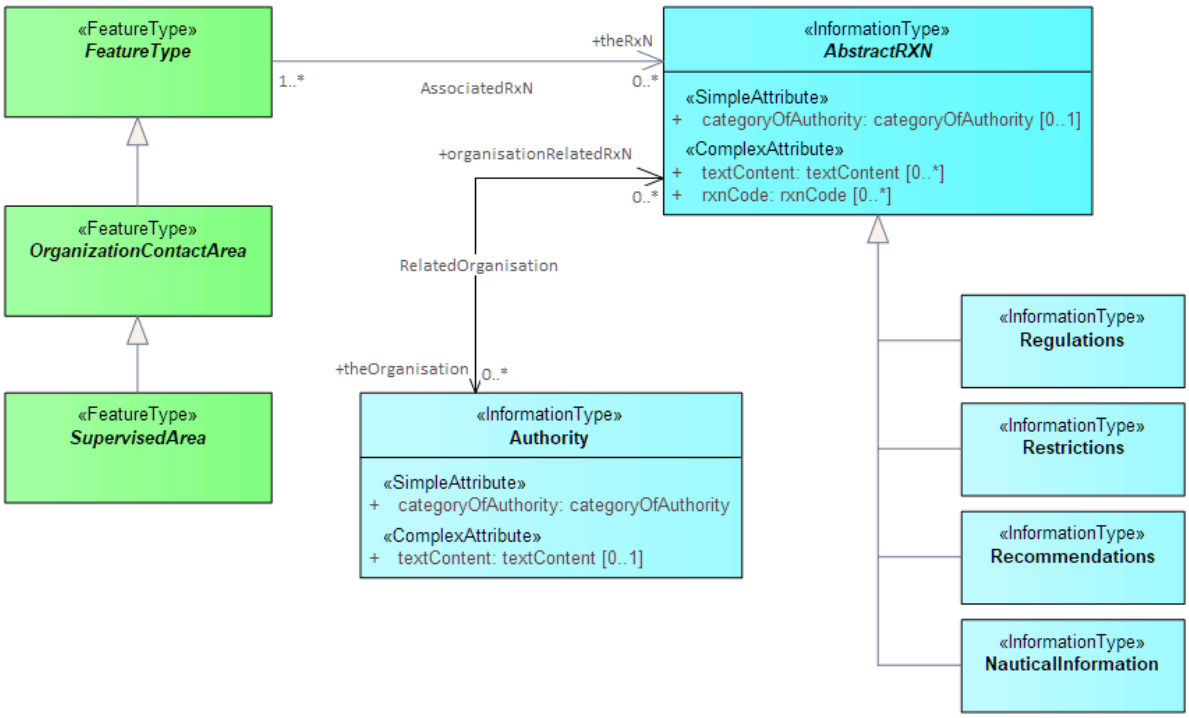

Figure 14-2 — Regulations, etc., for geo features

14.3 Regulations applying only to vessels with specific characteristics or cargoes

Regulations applying only to vessels of specified types, exceeding specified dimensions, or carrying specified cargoes (or other limitations which apply only to subsets of vessels) are encoded by defining the subset of vessels using an **Applicability** instance and associating the **Regulations** object to that **Applicability**.

For information on the use of **Applicability** to define subsets of vessels, see clause 16 in this DCEG and clause 4.2.1.9 in the main PS.

14.4 Regulations

IHO Definition: Regulations for a related area or facility.

[3] In the interest of brevity, “Regulations” in this sub-clause stands for any one of the four types described by this section.

S-127 Information Type: Regulations (Abstract type)				
Super Type: AbstractRxN				
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Inherited Attributes				
S-127 Attribute	**Inherited From**		**Type**	**Multiplicity**
Category of Authority	AbstractRxN		EN	0,1
RxN Code	AbstractRxN		C	0,*
Text Content	AbstractRxN		C	0,*
Feature Name	InformationType		C	0,*
Fixed Date Range	InformationType		C	0,1
Periodic Date Range	InformationType		C	0,*
Graphic	InformationType		C	0,*
Source Indication	InformationType		C	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
isApplicableTo	InclusionType (inherited from AbstractRxN)	Applicability	association	0,*
theOrganisation	RelatedOrganisation (inherited from AbstractRxN)	Authority	association	0,*

14.4.1 General

Regulations is intended to be used for official rules, laws, and similar source material, i.e., sources that have the force of law or are mandated by a controlling authority. They will generally originate from some kind of administration or authority, including port authorities.

A single instance of Regulations can be referenced by multiple feature instances.

14.4.2 Remarks

- Instances of Regulations do not encode a reverse link to the geographic features which reference them. While an association from geographic feature to information type can be encoded in the geographic feature instance, the reverse association from the information type to the geographic feature is omitted from the information type instance.

14.5 Restrictions

IHO Definition: Restrictions for a related area or facility.

S-127 Information Type: Restrictions (Abstract type)				
Super Type: AbstractRxN				
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Inherited Attributes				
S-127 Attribute	**Inherited From**		**Type**	**Multiplicity**
Category of Authority	AbstractRxN		EN	0,1
RxN Code	AbstractRxN		C	0,*
Text Content	AbstractRxN		C	0,*
Feature Name	InformationType		C	0,*
Fixed Date Range	InformationType		C	0,1
Periodic Date Range	InformationType		C	0,*
Graphic	InformationType		C	0,*
Source Indication	InformationType		C	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
isApplicableTo	InclusionType (inherited from AbstractRxN)	Applicability	association	0,*
theOrganisation	RelatedOrganisation (inherited from AbstractRxN)	Authority	association	0,*

14.5.1 General

Restrictions is intended for restrictions that constrain the activities of vessels temporarily with or without the legal force, or for longer terms without the force of law; they may be issued by a local authority such as a port captain or US Coast Guard district.

A single instance of Restrictions can be referenced by multiple feature instances.

14.5.2 Remarks

- Instances of Restrictions do not encode a reverse link to the geographic features which reference them. While an association from geographic feature to information type can be encoded in the geographic feature instance, the reverse association from the information type to the geographic feature is omitted from the information type instance.

14.6 Recommendations

IHO Definition: Recommendations for a related area or facility.

S-127 Information Type: Recommendations (Abstract type)				
Super Type: AbstractRxN				
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Inherited Attributes				
S-127 Attribute	**Inherited From**		**Type**	**Multiplicity**
Category of Authority	AbstractRxN		EN	0,1
RxN Code	AbstractRxN		C	0,*
Text Content	AbstractRxN		C	0,*
Feature Name	InformationType		C	0,*
Fixed Date Range	InformationType		C	0,1
Periodic Date Range	InformationType		C	0,*
Graphic	InformationType		C	0,*
Source Indication	InformationType		C	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
isApplicableTo	InclusionType (inherited from AbstractRxN)	Applicability	association	0,*
theOrganisation	RelatedOrganisation (inherited from AbstractRxN)	Authority	association	0,*

14.6.1 General

Recommendations is intended for encoding suggestions, limitations, or preferred procedures that are not mandatory.

For example, a recommendation for approaching a particular berth at a given orientation may be encoded in a Recommendations object associated to the Berth feature with an AssociatedRxN association from the Berth to the Recommendations object. If it is a port rule rather than a recommendation, it should be encoded as a Restrictions or Regulations object instead, with the same association from the Berth feature.

A single instance of Recommendations can be referenced by multiple feature instances.

14.6.2 Remarks

- Instances of Recommendations do not encode a reverse link to the geographic features which reference them. While an association from geographic feature to information type can be encoded in the geographic feature instance, the reverse association from the information type to the geographic feature is omitted from the information type instance.

14.7 Nautical Information

IHO Definition: Nautical information about a related area or facility.

S-127 Information Type: NauticalInformation (Abstract type)				
Super Type: AbstractRxN				
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Inherited Attributes				
S-127 Attribute	**Inherited From**		**Type**	**Multiplicity**
Category of Authority	AbstractRxN		EN	0,1
RxN Code	AbstractRxN		C	0,*
Text Content	AbstractRxN		C	0,*
Feature Name	InformationType		C	0,*
Fixed Date Range	InformationType		C	0,1
Periodic Date Range	InformationType		C	0,*
Graphic	InformationType		C	0,*
Source Indication	InformationType		C	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
isApplicableTo	InclusionType (inherited from AbstractRxN)	Applicability	association	0,*
theOrganisation	RelatedOrganisation (inherited from AbstractRxN)	Authority	association	0,*

14.7.1 General

NauticalInformation is intended for material that is largely informative in nature, of which does not fit into the category of regulation, recommendation, or restriction.

A single instance of NauticalInformation can be referenced by multiple feature instances.

14.7.2 Remarks

- Instances of NauticalInformation do not encode a reverse link to the geographic features which reference them. While an association from geographic feature to information type can be encoded in the geographic feature instance, the reverse association from the information type to the geographic feature is omitted from the information type instance.
- In theory, NauticalInformation can be associated with any geographic feature through either an AdditionalInformation or AssociatedRxN association. AdditionalInformation should be used only when the information encoded in Nautical Information is general in nature and does not supplement information encoded in a Regulations, Restrictions, or Recommendations object associated to the same feature.

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15 Services, Organisations and Schedules

15.1 Work schedules and holidays

Operating schedules and business hours of organizations are encoded by associating a **ServiceHours** instance to an **Authority**. Partial work schedules on holidays or other special days are encoded by associating a **NonstandardWorkingDay** instance to the **ServiceHours** instance.

Similarly, operating schedules for a facility are encoded by associating a **ServiceHours** to the geo feature representing the facility, and associating a **NonstandardWorkingDay** to the **ServiceHours** to encode partial working days. The types and associations are depicted in Figure 15-1 (note that this figure does not show inherited attributes, which are also available to the encoder).

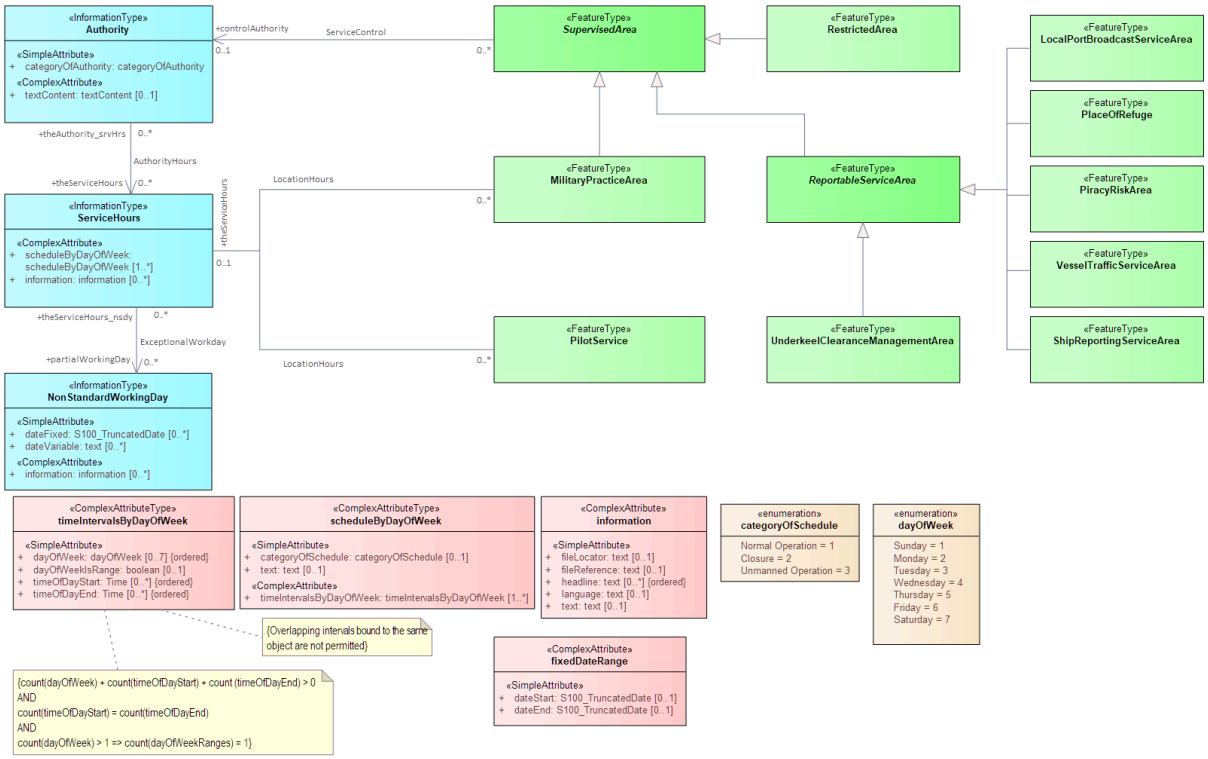

Figure 15-1 — Operating schedules

For further guidance and examples, see clause 2.4.10.4.

15.2 Contact information

Contact information for service operators, controllers or facilities should be encoded in instances of the **ContactDetails** information type, which may be linked from multiple instances of geographic features or information types. Any S-127 geographic feature except meta and cartographic features can be associated to an instance of ContactDetails. S-127 geographic features inherit the association to **ContactDetails** from the abstract feature type **OrganizationContactArea**, as shown in Figure 15-2 (note that this figure does not show inherited attributes, which are also available to the encoder).

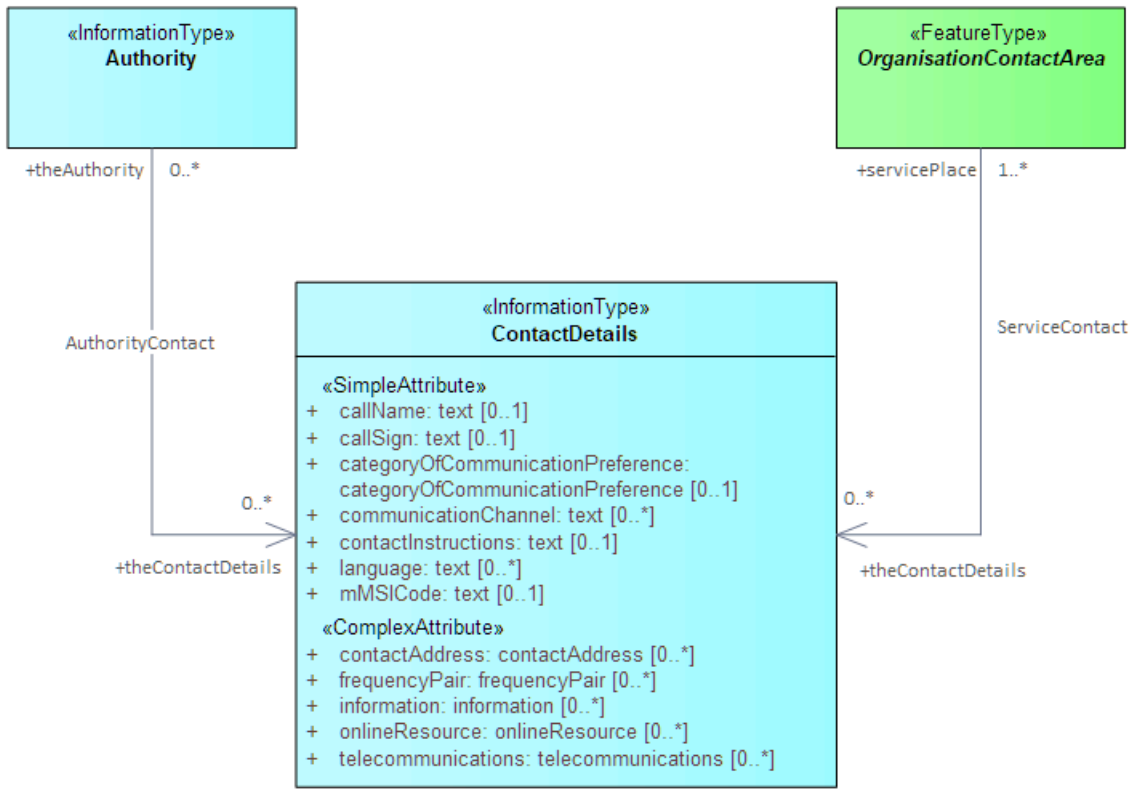

Figure 15-2 — Associations to contact information

Contact information must not be encoded directly in the feature or information type instance using a *textContent* or *information* complex attribute bound directly to the feature or information type. An instance of **ContactDetails** must be created instead. The exception to this rule is when contact-related attributes such as *communicationChannel* are bound to the feature or information type, in which case a **ContactDetails** instance should be created only if it is necessary to provide contact information which cannot be coded in the contact-specific attributes bound to the feature.

15.3 Authority

IHO Definition: A person or organisation having political or administrative power and control.				
S-127 Information Type: Authority (Abstract type)				
Super Type: InformationType				
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Category of Authority		2: Border Control 3: Police 4: Port 5: Immigration 6: Health 7: Coast Guard 8: Agricultural 9: Military 10: Private Company 11: Maritime Police 12: Environmental 13: Fishery 14: Finance 15: Maritime 16: Customs	EN	1,1

Text Content			C	0,1
Category of Text		1: Abstract or Summary 2: Extract 3: Full Text	(S) EN	0,1
Information			(S) C	0,*
Online Resource			(S) C	0,1
Source Indication			(S) C	0,*
Inherited Attributes				
S-127 Attribute	**Inherited From**		**Type**	**Multiplicity**
Feature Name	InformationType		C	0,*
Fixed Date Range	InformationType		C	0,1
Periodic Date Range	InformationType		C	0,*
Graphic	InformationType		C	0,*
Source Indication	InformationType		C	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
theContactDetails	AuthorityContact	ContactDetails	association	0,*
organisationRelatedRxN	RelatedOrganisation	AbstractRxN	association	0,*
theServiceHours	AuthorityHours	ServiceHours	association	0,*

15.3.1 General

The Authority information type is used for encoding information about organizations, including official authorities (port and other) as well as private organizations which control or operate port facilities.

For encoding the contact details for an organization, use an associated ContactDetails information type (see the information associations table below).

For encoding the general operating hours of an organization, use an associated ServiceHours information type (see clause 4.2.1.7 in the main Product Specification).

For encoding the supervisory or operating organization for a facility or area, such as a Terminal, use an information association from the geo feature to Authority (see clause Clause 5.4 (Supervised Area) and clause 4.2.1.7 in the main Product Specification).

15.3.2 Remarks

No remarks.

15.4 Contact Details

IHO Definition: Information on how to reach a person or organisation by postal, internet, telephone, telex and radio systems.

S-127 Information Type: ContactDetails (Abstract type)				
Super Type: InformationType				
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Call Name			TE	0,1
Call Sign			TE	0,1
Category of Communication Preference		1: Preferred Calling 2: Alternate Calling 3: Preferred Working 4: Alternate Working	EN	0,1
Communication Channel			TE	0,*
Contact Instructions			TE	0,1
Language			TE	0,*
MMSI Code			TE	0,1
Contact Address			C	0,*
Delivery Point			(S) TE	0,1
City Name			(S) TE	0,1
Administrative Division			(S) TE	0,1
Country Name			(S) TE	0,1
Postal Code			(S) TE	0,1
Frequency Pair			C	0,*
Frequency Shore Station Receives			(S) IN	0,1
Frequency Shore Station Transmits			(S) IN	1,1
Information			C	0,*
File Locator			(S) TE	0,1
File Reference			(S) TE	0,1
Headline			(S) TE	0,* (ordered)
Language			(S) TE	0,1
Text			(S) TE	0,1
Online Resource			C	0,*
Linkage			(S) URI	1,1
Protocol			(S) TE	0,1
Application Profile			(S) TE	0,1
Name of Resource			(S) TE	0,1
Online Resource Description			(S) TE	0,1
Online Function		1: Download 3: Offline Access	(S) EN	0,1

		4: Order 5: Search 6: Complete Metadata 7: Browse Graphic 8: Upload 9: Email Service 10: Browsing 11: File Access		
Protocol Request			(S) TE	0,1
Telecommunications			C	0,*
Category of Communication Preference		1: Preferred Calling 2: Alternate Calling 3: Preferred Working 4: Alternate Working	(S) EN	0,1
Telecommunication Identifier			(S) TE	1,1
Telecommunication Carrier			(S) TE	0,1
Contact Instructions			(S) TE	0,1
Telecommunication Service		1: Voice 2: Facsimile 3: SMS 4: Data 5: Streamed Data 6: Telex 7: Telegraph 8: Email	(S) EN	0,*
Inherited Attributes				
S-127 Attribute	**Inherited From**		**Type**	**Multiplicity**
Feature Name	InformationType		C	0,*
Fixed Date Range	InformationType		C	0,1
Periodic Date Range	InformationType		C	0,*
Graphic	InformationType		C	0,*
Source Indication	InformationType		C	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
theAuthority	AuthorityContact	Authority	association	0,*

15.4.1 General

The **ContactDetails** information type provides several attributes for encoding different types of contact details.

ContactDetails may be associated to:

- An **Authority** information type via an information association (**AuthorityContact**), in which case it encodes the contact information for the organization in general.
- A geo feature via a feature association **ServiceContact**, inherited by geo features from **OrganizationContactArea** (5.3), in which case it encodes contact information particular to the specific feature, either because further information about the controlling authority is not available or because the contact is specific to the feature.

A single instance of **ContactDetails** may be referenced from multiple feature or information type instances.

15.4.2 Remarks

- If it is required to encode different call name, call sign, communication preference or contact instructions in different languages, this must be done by creating and associating a different instance of ContactDetails per language. The *language* attribute must be used to designate the language(s) of each instance. If there is no difference in these attributes for different languages, a singe instance of ContactDetails should be created and all the languages indicated using *language* attributes.
- For attributes which allow multiplicity > 1 (*contactAddress*, *frequencyPair*, *information*, *onlineResource*, and *telecommunications*), information that is different for different languages may be encoded using different attribute instances taking care to indicate the language in each attribute instance. Where there is no language sub-attribute, use another appropriate sub-attribute (for example, *contactInstructions* or *onlineResourceDescription*) to indicate the language.
- The name of the contact (for example, the name of the agency, pilot service, office, etc.) should be encoded in the *featureName* attribute, which is inherited from InformationType.
- Reverse links from **ContactDetails** to a geo feature referencing it are not encoded, since S-100 feature catalogues does not provide information-to-feature bindings.

15.5 Service Hours

IHO Definition: The time when a service is available and known exceptions.				
S-127 Information Type: ServiceHours (Abstract type)				
Super Type: InformationType				
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Schedule by Day of Week			C	1,*
Category of Schedule		1: Normal Operation 2: Closure 3: Unmanned Operation	(S) EN	0,1
Text			(S) TE	0,1
Time Intervals by Day of Week			(S) C	1,*
Information			C	0,*
File Locator			(S) TE	0,1
File Reference			(S) TE	0,1
Headline			(S) TE	0,* (ordered)
Language			(S) TE	0,1
Text			(S) TE	0,1
Inherited Attributes				
S-127 Attribute	**Inherited From**		**Type**	**Multiplicity**
Feature Name	InformationType		C	0,*
Fixed Date Range	InformationType		C	0,1
Periodic Date Range	InformationType		C	0,*
Graphic	InformationType		C	0,*
Source Indication	InformationType		C	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
partialWorkingDay	ExceptionalWorkday	NonStandardWorkingDay	association	0,*
theAuthority_srvHrs	AuthorityHours	Authority	association	0,*

15.5.1 General

See clause 2.4.10.4 for more information on how to use **ServiceHours** to encode schedules.

Seasonal variations in service hours can be encoded using multiple **ServiceHours** instances with appropriate *periodicDateRange* values.

15.5.2 Remarks

- If none of the listed values of *categoryOfSchedule* applies, *categoryOfSchedule* must be omitted and its co-sub-attribute *text* used to describe the nature of the schedule.

15.6 Non-Standard Working Day

IHO Definition: Days when many services are not available. Often days of festivity or recreation or public holidays when normal working hours are limited, especially a national or religious festival, etc.				
S-127 Information Type: NonStandardWorkingDay (Abstract type)				
Super Type: InformationType				
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Date Fixed			TD	0,*
Date Variable			TE	0,*
Information			C	0,*
File Locator			(S) TE	0,1
File Reference			(S) TE	0,1
Headline			(S) TE	0,* (ordered)
Language			(S) TE	0,1
Text			(S) TE	0,1
Inherited Attributes				
S-127 Attribute	**Inherited From**		**Type**	**Multiplicity**
Feature Name	InformationType		C	0,*
Fixed Date Range	InformationType		C	0,1
Periodic Date Range	InformationType		C	0,*
Graphic	InformationType		C	0,*
Source Indication	InformationType		C	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**

15.6.1 General

An instance of **NonStandardWorkingDay** is used in conjunction with **ServiceHours** to indicate exceptions to normal work or operating schedules.

15.6.2 Remarks

- Non-standard workdays which cannot be represented using fixed or variable dates should be encoded using the information complex attribute, preferably as a short description in the text sub-attribute of information. The information attribute can also be used for encoding any additional explanatory information if the explanation is essential knowledge for specifying the day.
- The two date range attributes (fixed and periodic date range) should be used if the non-standard day applies only in specific years or periods (e.g., seasonally).

16 Limitations

16.1 Introduction

Certain regulations, recommendations, etc., apply only to vessels of specified dimensions, types, or carrying specified cargo, etc. Similarly, certain features have specific significance for vessels of specified dimensions (e.g., different speed limits for vessels carrying specified cargoes or exceeding specified dimensions, or entry prohibitions for certain vessel types).

16.2 Defining subsets of vessels by dimensions, cargo, and other characteristics

This is modelled by first defining the relevant subset of vessels according to the dimension, type, cargo, etc., and then associating that subset to the appropriate feature or information type. The subset of vessels is modelled using the **Applicability** class, which contains attributes for the most common vessel characteristics used in nautical publications. These include measurements (length, beam, draught), type of cargo, displacement, etc. Constraints which cannot be modelled using the attributes of **Applicability** can be described in plain text in its information attribute.

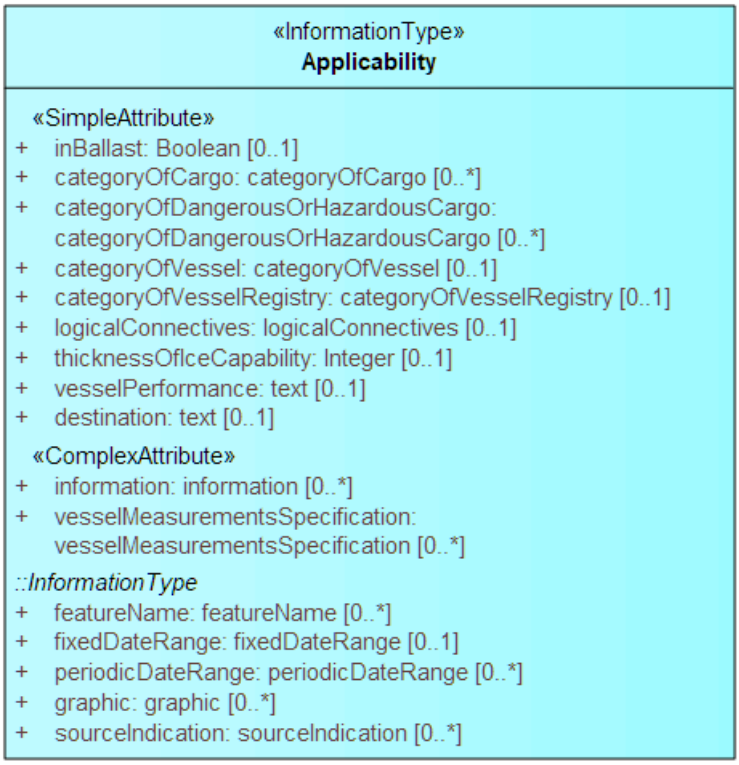

Figure 16-1 — Characteristics and dimensions defining sets of vessels

Conditions relating to vessel dimensions are modelled by the complex attribute *vesselMeasurementsSpecification*, which has sub-attributes for naming the dimension and indicating the limit (whether the condition applies to a vessel which exceeds or falls below the limit).

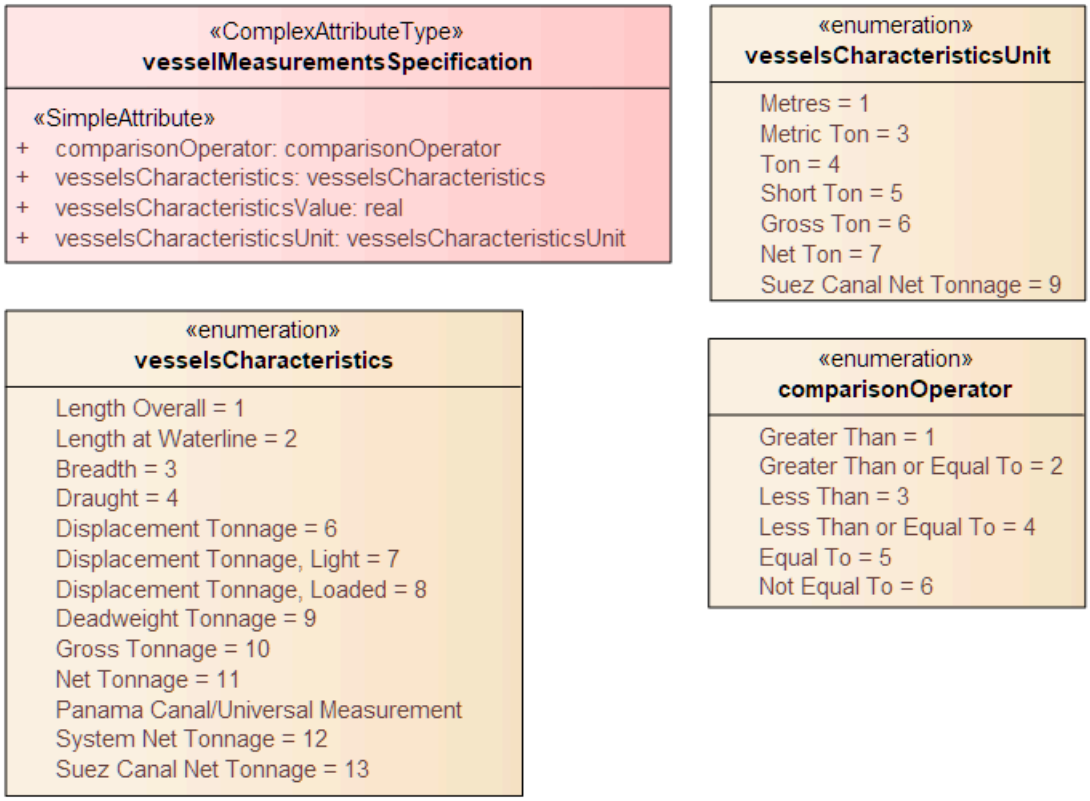

Figure 16-2 — Attributes for specifying vessel dimensions

For example, the combinations in Table 16-1 below describe the conditions “length overall > 50 m” (Condition 1); “length overall < 90 m” (Condition 2); and “breadth > 20 m” (Condition 3).

Table 16-1 — Examples of conditions based on vessel dimensions

Attribute	Condition 1	Condition 2	Condition 3
vesselsCharacteristics	length overall	length overall	breadth
comparisonOperator	greater than	less than	greater than
vesselsCharacteristicsValue	50	90	20
vesselsCharacteristicsUnit	metre	metre	metre

The *logicalConnectives* attribute of **Applicability** is used to indicate how multiple conditions are combined. Combinations may be cumulative (conjunctive, AND) or alternatives (disjunctive, OR).

EXAMPLE 1: Encoding *logicalConnectives=AND* combined with Conditions 1 and 2 above describes a vessel of length between 50 and 90 metres.

EXAMPLE 2: Encoding *logicalConnectives=OR* combined with Conditions 1 and 3 describes a vessel of length greater than 50 metres or beam greater than 20 metres.

This modelling cannot represent subsets defined by both AND and OR combinations, but it is always possible to convert such complex conditions into multiple combinations each using only AND (‘conjunctive normal form’) or OR (‘disjunctive normal form’), and model the subset using more than one **Applicability** object.

16.3 Characterizing the relationship between the vessel set and the feature or regulation

The relationship between a set of vessels and a geographic feature may be one of several different mandate levels ranging from prohibition on use of entry into a geographic location to mandatory use of a feature (such as vessels exceeding certain dimensions being required to board pilots at an outer boarding place).

The relationship between a set of vessels and a regulation information type (or recommendation, restriction, or special note) may be one of inclusion or specific exclusion — either the regulation (recommendation, etc.) specifically applies to the specified set of vessels, or the specified set of vessels is explicitly excluded from the regulation. (If a regulation does not apply to a set of vessels but there is no explicit exemption stated in the source material, there is no relationship that needs to be encoded.)

The association classes **PermissionType** and **InclusionType** (Figures 16-3 and 16-4) characterize these relationships using values of their attributes *categoryOfRelationship* and *membership* respectively.

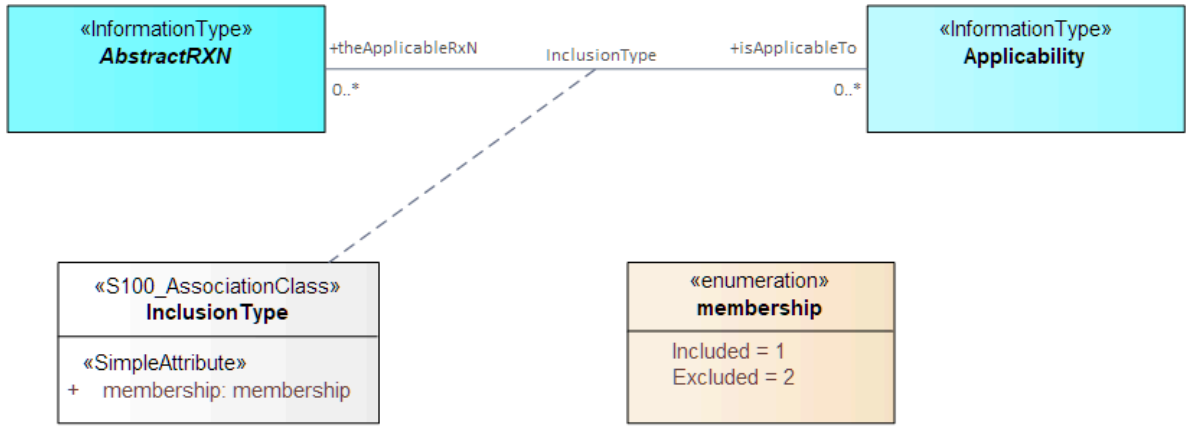

Figure 16-3 — Permission relationship

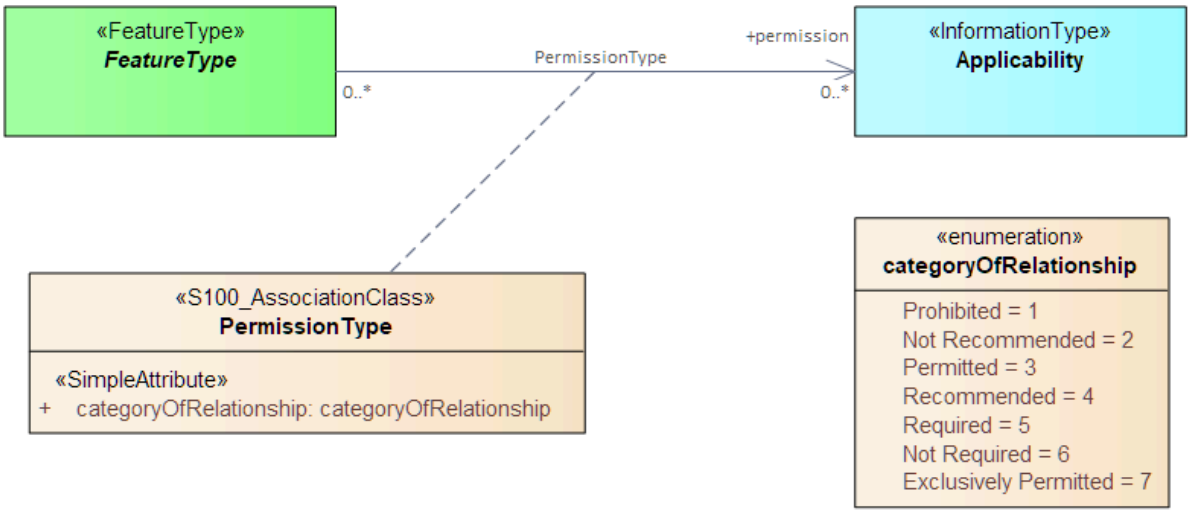

Figure 16-4 — Inclusion/exclusion relationship

EXAMPLE 1: A specified set of vessels is COVERED by a regulation and another set of vessels is EXEMPT from the regulation — described by the membership attribute values “included” and “excluded” respectively.

EXAMPLE 2: Vessels with specified cargo and dimensions MUST use a specified berth, vessels of smaller dimensions are RECOMMENDED to use the berth, and naval transports are EXEMPT from using the berth — described by the categoryOfRelationship attribute values “required”, “recommended” and “recommended” respectively.

16.4 Production hints and recommended practices (informative)

16.4.1 Capturing the application of a regulation, recommendation, etc. to specified kinds of vessels

Encoders may find it easiest to capture the application of a regulation (recommendation , etc.) to a class or set of vessels in three phases:

1) Encode the operative part of the regulation (the part that describes what the vessels subject to the regulation must or must not do), creating an instance of **Regulations** (or **Recommendations**, etc., as appropriate). Descriptions of what kinds of vessels are subject to the regulation must be excluded from the content of the **Regulations** instance.
2) Create an **Applicability** information type and encode the description of what kinds of vessels are subject to (or exempted from) the regulation.
3) Link the two using an **InclusionType** with *membership=included* if the vessels described by **Applicability** are subject to the regulation, or *membership=excluded* if they are explicitly exempted from the regulation.

It is not necessary to create separate instances of the regulation for inclusion and exclusion.

16.4.2 Capturing the permissibility or otherwise of a geographic feature for specified kinds of vessels

Encoders may find it easiest to capture the permissibility of a feature to specified kinds of vessels in three phases.

1) Create the geographic feature if it does not already exist.
2) Create an **Applicability** information type and encode the description of what kinds of vessels are required to use the geographic feature.
3) Link the two using a **PemissionType** with *categoryOfRelationship = required*.

For the other relationships (prohibited, not recommended, etc.) steps 2 and 3 should be modified accordingly (i.e., if use by certain kinds of vessels is “not recommended” encode the description of that

kind of vessels in an **Applicability** and create a linking **PermissionType** with *categoryOfRelationship = not recommended*).

It is not necessary to create a separate instance of the geographic feature for each type of relationship.

16.4.3 Constructing the Applicability information type

Where the source material describes complex conditions, encoders may find it useful to write out the conditions in structured language with grouping parentheses, for example, as “(condition A) AND (condition B) AND (condition C)”, or draw diagrams, before encoding **Applicability** and its associations.

Note that the model limitation on mixing logical connectives means some forms of conditions which use “nesting” cannot be encoded in a single **Applicability** instance and multiple instances must be created.

EXAMPLE: The complex condition “(condition A) AND condition B) OR (condition C” must be encoded as two **Applicability** instances, one with “(condition A) AND (condition B)” and the other with “(condition A) AND (condition C)”.

Table 16-2 — Example of conversion of complex condition to multiple simple conditions

Complex condition	Encode as
(condition A) AND condition B) OR (condition C	Applicability 1: (condition A) AND (condition B) Applicability 2: (condition A) AND (condition C)

Data producers may contact NIPWG with questions about encoding complex conditions.

As a last resort, conditions may be written as phrases in natural language and encoded in the information attribute. It is acceptable for an **Applicability** to have only the *information* attribute populated.

16.5 Applicability

IHO Definition: Describes the relationship between vessel characteristics and: (i) the applicability of an associated information object or feature to the vessel; or, (ii) the use of a facility, place, or service by the vessel; or, (iii) passage of the vessel through an area.				
S-127 Information Type: Applicability (Abstract type)				
Super Type: InformationType				
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
In Ballast			BO	0,1
Category of Cargo		1: Bulk 2: Container 3: General 4: Liquid 5: Passenger 6: Livestock 7: Dangerous or Hazardous 8: Heavy Lift 10: Dry Bulk Cargo 11: Liquid Bulk Cargo 12: Reefer Container Cargo 13: Ro-Ro Cargo 14: Project Cargo 15: Break Bulk Cargo	EN	0,*
Category Of Dangerous Or Hazardous Cargo		1: IMDG Code Class 1 Div. 1.1	EN	0,*

		2: IMDG Code Class 1 Div. 1.2 3: IMDG Code Class 1 Div. 1.3 4: IMDG Code Class 1 Div. 1.4 5: IMDG Code Class 1 Div. 1.5 6: IMDG Code Class 1 Div. 1.6 7: IMDG Code Class 2 Div. 2.1 8: IMDG Code Class 2 Div. 2.2 9: IMDG Code Class 2 Div. 2.3 10: IMDG Code Class 3 11: IMDG Code Class 4 Div. 4.1 12: IMDG Code Class 4 Div. 4.2 13: IMDG Code Class 4 Div. 4.3 14: IMDG Code Class 5 Div. 5.1 15: IMDG Code Class 5 Div. 5.2 16: IMDG Code Class 6 Div. 6.1 17: IMDG Code Class 6 Div. 6.2 18: IMDG Code Class 7 19: IMDG Code Class 8 20: IMDG Code Class 9 21: Harmful Substances in Packaged Form		
Category of Vessel		1: General Cargo Vessel 2: Container Carrier 3: Tanker 4: Bulk Carrier 5: Passenger Vessel 6: Roll-On Roll-Off 7: Refrigerated Cargo Vessel 8: Fishing Vessel 9: Service 10: Warship 11: Towed or Pushed Composite Unit 12: Tug and Tow 13: Light Recreational 14: Semi-Submersible Offshore Installation 15: Jack-Up Exploration or Project Installation 16: Livestock Carrier 17: Sport Fishing	CL	0,1
Category of Vessel Registry		1: Domestic 2: Foreign	EN	0,1
Logical Connectives		1: Logical Conjunction 2: Logical Disjunction	EN	0,1
Thickness of Ice Capability			IN	0,1

Vessel Performance			TE	0,1
Destination			TE	0,1
Information			C	0,*
File Locator			(S) TE	0,1
File Reference			(S) TE	0,1
Headline			(S) TE	0,* (ordered)
Language			(S) TE	0,1
Text			(S) TE	0,1
Vessel Measurements Specification			C	0,*
Comparison Operator		1: Greater Than 2: Greater Than or Equal To 3: Less Than 4: Less Than or Equal To 5: Equal To 6: Not Equal To	(S) EN	1,1
Vessels Characteristics		1: Length Overall 2: Length at Waterline 3: Breadth 4: Draught 6: Displacement Tonnage 7: Displacement Tonnage, Light 8: Displacement Tonnage, Loaded 9: Deadweight Tonnage 10: Gross Tonnage 11: Net Tonnage 12: Panama Canal/ Universal Measurement System Net Tonnage 13: Suez Canal Net Tonnage	(S) EN	1,1
Vessels Characteristics Value			(S) RE	1,1
Vessels Characteristics Unit		1: Metres 3: Metric Ton 4: Ton 5: Short Ton 6: Gross Ton 7: Net Ton 9: Suez Canal Net Tonnage	(S) EN	1,1
Inherited Attributes				
S-127 Attribute	**Inherited From**		**Type**	**Multiplicity**
Feature Name	InformationType		C	0,*
Fixed Date Range	InformationType		C	0,1
Periodic Date Range	InformationType		C	0,*

Graphic	InformationType	C	0,*
Source Indication	InformationType	C	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
theApplicableRxN	InclusionType	AbstractRxN	association	0,*

16.5.1 General

The Applicability information type is intended for defining sets of vessels according to their dimensions, capabilities, and cargo. Its attributes are intended for defining different limitation conditions, as described by their definitions in clauses 17 and 18.

Multiple instances of **Applicability** associated to the same feature or regulation are treated as “inclusive OR”, that is, each **Applicability** defines an independent set of vessels to which the regulation, permission or requirement applies (or which is specifically exempted, depending on the attribute encoded in the association class).

Clauses Clauses 16.1 to 16.3 , contains a comprehensive discussion of the use of **Applicability** to describe subsets of vessels according to dimensions, types, cargo, and other characteristics. The remarks below provide additional guidance.

16.5.2 Remarks

- Multiple values of *categoryOfCargo* and of *categoryOfDangerousOrHazardousCargo* should be treated as “inclusive OR” (i.e., if *categoryOfCargo* = *1* and *2*, then it means vessels with either bulk or container cargo or both).
- Limitations which cannot be expressed using more specific attributes should be encoded in text form in the *information* attribute.
- It is acceptable for an **Applicability** to have only the *information* attribute populated.
- Vessel types which do not conform to any of the listed categoryOfVessel values should be encoded as “other: <text>” where <text> is a producer-supplied type name.
- The attribute *logicalConnectives* has multiplicity lower bound 0 for the case where there is only a single limiting condition (for example, if the only condition is “length overall > 100m”) and must be omitted in such a situation. If there is more than one condition, *logicalConnectives* must be encoded. If *logicalConnectives* is omitted and there is more than one condition, the default value assumed is logical conjunction.
- Mutually inconsistent measurements (e.g., draught > 10m and draught < 5m) are an error.
- The inherited attributes *featureName* and *graphic* may be used to provide supplementary information in the form of a title for the defined set of vessels and sketch or other graphic pertaining to the set, but there being no widely acknowledged use cases for them, their use in **Applicability** is discouraged.
- Encoding the inherited *fixedDateRange* and *periodicDateRange* attributes for **Applicability** is discouraged. The *fixedDateRange* and *periodicDateRange* attributes may theoretically be used to qualify the set defined by the **Applicability** instance, but must not be used to define the commencement, termination, season, etc., of the regulation or feature to which **Applicability** is associated (fixed and periodic date ranges should be encoded in the regulation or feature instance instead).

17 Ship Reports

17.1 Introduction

Descriptions of ship reports are encoded using the **ShipReport** information type. The types and relationships are depicted in Figure 17-1. Any subtype of **ReportableServiceArea** may be associated to a report description encoded in **ShipReport**. The organisation receiving the report is identified by

an associated **Authority** and details about which vessels must file using the format described by **ShipReport** are encoded in an associated **Applicability**. If the report requirement and format apply to all vessels an associated **Applicability** is not needed.

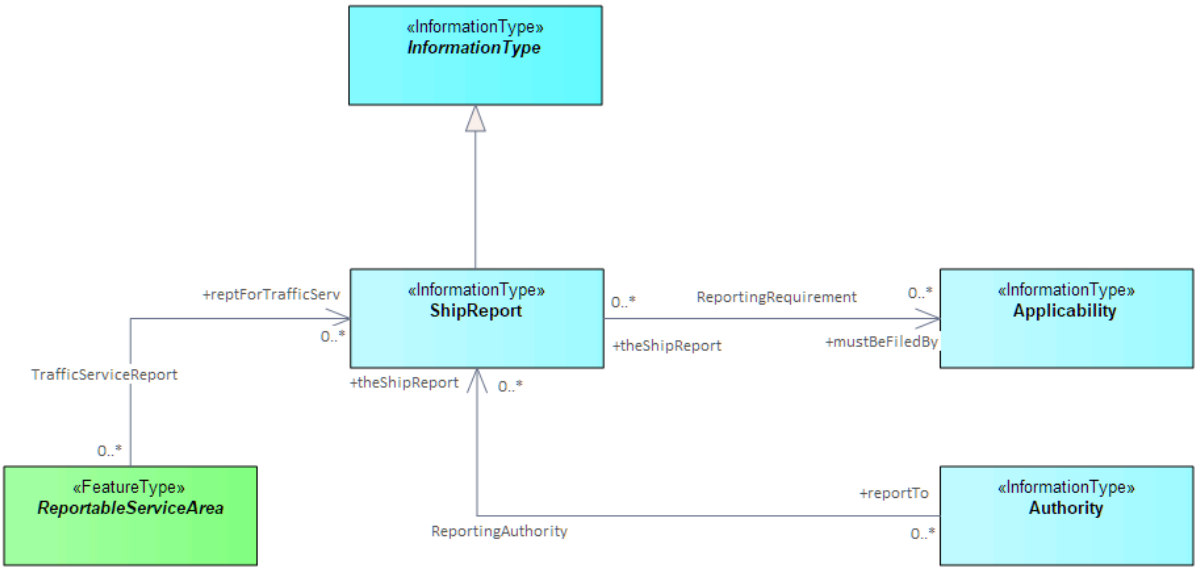

Figure 17-1 — ShipReport and related types.

17.2 Ship Report

IHO Definition: Description of how a ship should report to a maritime authority, including when to report, what to report and whether the format conforms to the IMO standard.				
S-127 Information Type: ShipReport (Abstract type)				
Super Type: InformationType				
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Category of Ship Report		1: Sailing Plan 2: Position Report 3: Deviation Report 4: Final Report 5: Dangerous Goods Report 6: Harmful Substances Report 7: Marine Pollutants Report 8: Any Other Report	EN	1,*
IMO Format for Reporting			BO	1,1
SRS Format Code		1: IMO Ship Reporting Format A 2: IMO Ship Reporting Format B 3: IMO Ship Reporting Format C 4: IMO Ship Reporting Format D 5: IMO Ship Reporting Format E	EN	0,* (ordered)

		6: IMO Ship Reporting Format F 7: IMO Ship Reporting Format G 8: IMO Ship Reporting Format H 9: IMO Ship Reporting Format I 10: IMO Ship Reporting Format J 11: IMO Ship Reporting Format K 12: IMO Ship Reporting Format L 13: IMO Ship Reporting Format M 14: IMO Ship Reporting Format N 15: IMO Ship Reporting Format O 16: IMO Ship Reporting Format P 17: IMO Ship Reporting Format Q 18: IMO Ship Reporting Format R 19: IMO Ship Reporting Format S 20: IMO Ship Reporting Format T 21: IMO Ship Reporting Format U 22: IMO Ship Reporting Format V 23: IMO Ship Reporting Format W 24: IMO Ship Reporting Format X 25: IMO Ship Reporting Format Y 26: IMO Ship Reporting Format Z		
Notice Time			C	1,*
Notice Time Hours			(S) RE	0,* (ordered)
Notice Time Text			(S) TE	0,1
Operation		1: Largest Value 2: Smallest Value	(S) EN	0,1
Text Content			C	0,1
Category of Text		1: Abstract or Summary 2: Extract 3: Full Text	(S) EN	0,1
Information			(S) C	0,*
Online Resource			(S) C	0,1
Source Indication			(S) C	0,*

Inherited Attributes			
S-127 Attribute	**Inherited From**	**Type**	**Multiplicity**
Feature Name	InformationType	C	0,*
Fixed Date Range	InformationType	C	0,1
Periodic Date Range	InformationType	C	0,*
Graphic	InformationType	C	0,*
Source Indication	InformationType	C	0,*

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**
mustBeFiledBy	ReportingRequirement	Applicability	association	0,*
reportTo	ReportingAuthority	Authority	association	0,*

17.2.1 General

The **ShipReport** information type is used for describing reports.

17.2.2 Remarks

- *textContent* is used to describe non-standard ship reports. The associated information object **Applicability** indicates characteristics of vessels which use this report.
- Association **TrafficServiceReport** is with a geographic feature. While an association from geographic feature to information type can be encoded in the geographic feature instance, the reverse association from the information type to the geographic feature is omitted from the information type instance.
- If it is required to encode one or more pre-arrival reporting times, it must be done using the complex attribute *noticeTime*, and the required time in hours before arrival in the attribute *noticeTimeHours*. Further explanations for the reporting time can be added in the *noticeTimeText* attribute.

18 Spatial Quality

18.1 Introduction

The spatial quality for individual spatial primitives may be reported using the SpatialQuality information type. The conceptual model is depicted in Figure 2-1.

18.2 Spatial Quality

IHO Definition: The indication of the quality of the locational information for features in a dataset.				
S-127 Information Type: SpatialQuality (Abstract type)				
Super Type:				
S-127 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Quality of Horizontal Measurement		1: Surveyed 2: Unsurveyed 3: Inadequately Surveyed 4: Approximate 5: Position Doubtful 6: Unreliable 7: Reported (Not Surveyed) 8: Reported (Not Confirmed) 9: Estimated 10: Precisely Known 11: Calculated	EN	0,1
Spatial Accuracy			C	0,*
Fixed Date Range			(S) C	0,1
Horizontal Position Uncertainty			(S) C	0,1
Inherited Attributes				
S-127 Attribute	**Inherited From**		**Type**	**Multiplicity**
No inherited attributes				

Information associations				
S-127 Role	**S-127 Association Name**	**Associated to**	**Type**	**Mult.**

18.2.1 General

The **SpatialQuality** information type allows indication of the spatial quality for individual spatial primitives. Quality information in **SpatialQuality** overrides quality information in covering quality meta-feature(s).

The association to **SpatialQuality** is from the spatial primitive. It is not encoded directly as an information association in the feature instance, but in the spatial primitive .

Information associations to *SpatialQuality from spatial primitives*					
Source	**Role**	**Association Name**	**Associated to**	**Type**	**Mult.**
(point or curve spatial primitive)	theQualityInformation	SpatialAssociation	SpatialQuality	association	0,1

The GML structures for point and curve primiitives are depicted in Figure 18-1 and Figure 18-2.

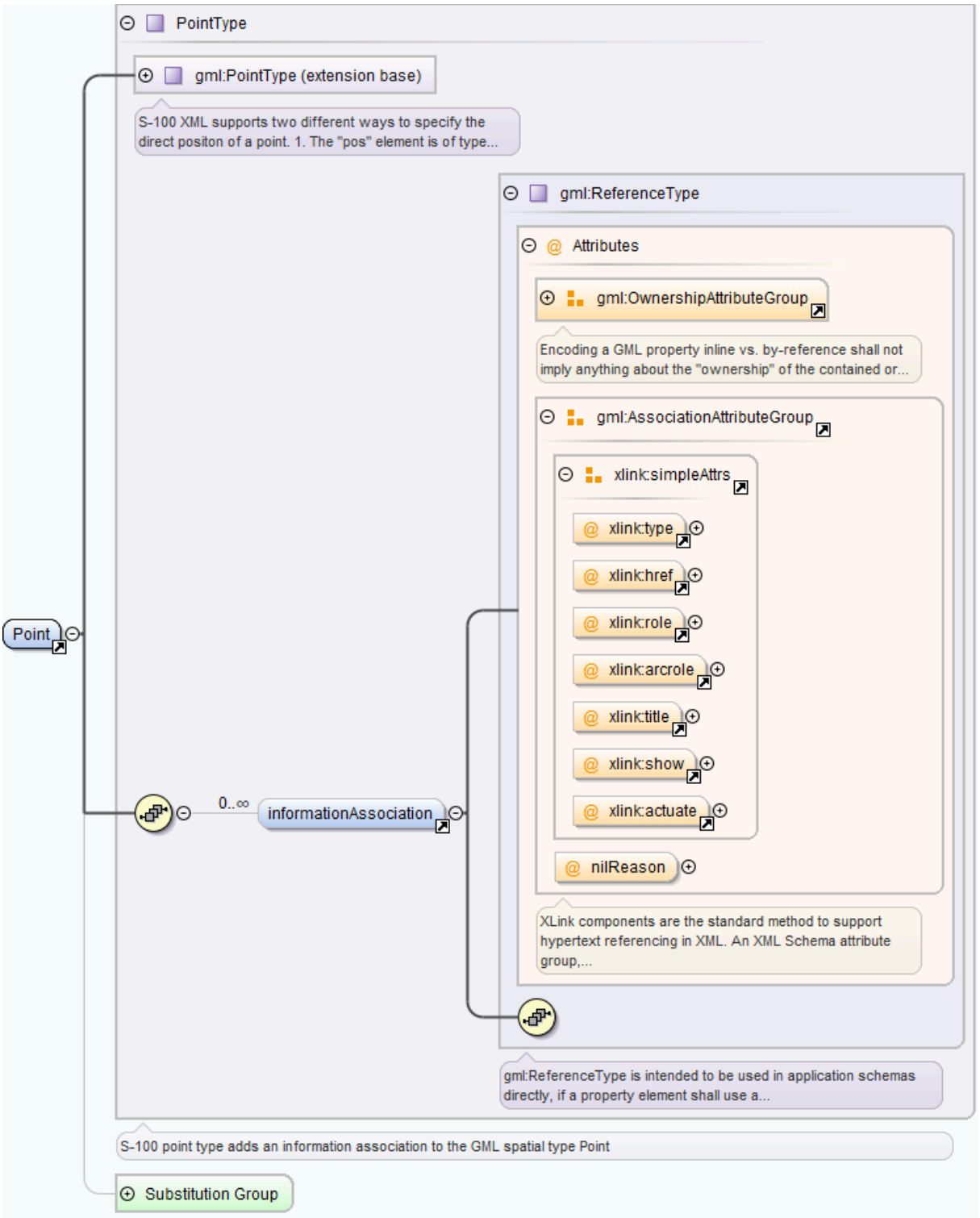

Figure 18-1 — Spatial quality for point spatial primitives

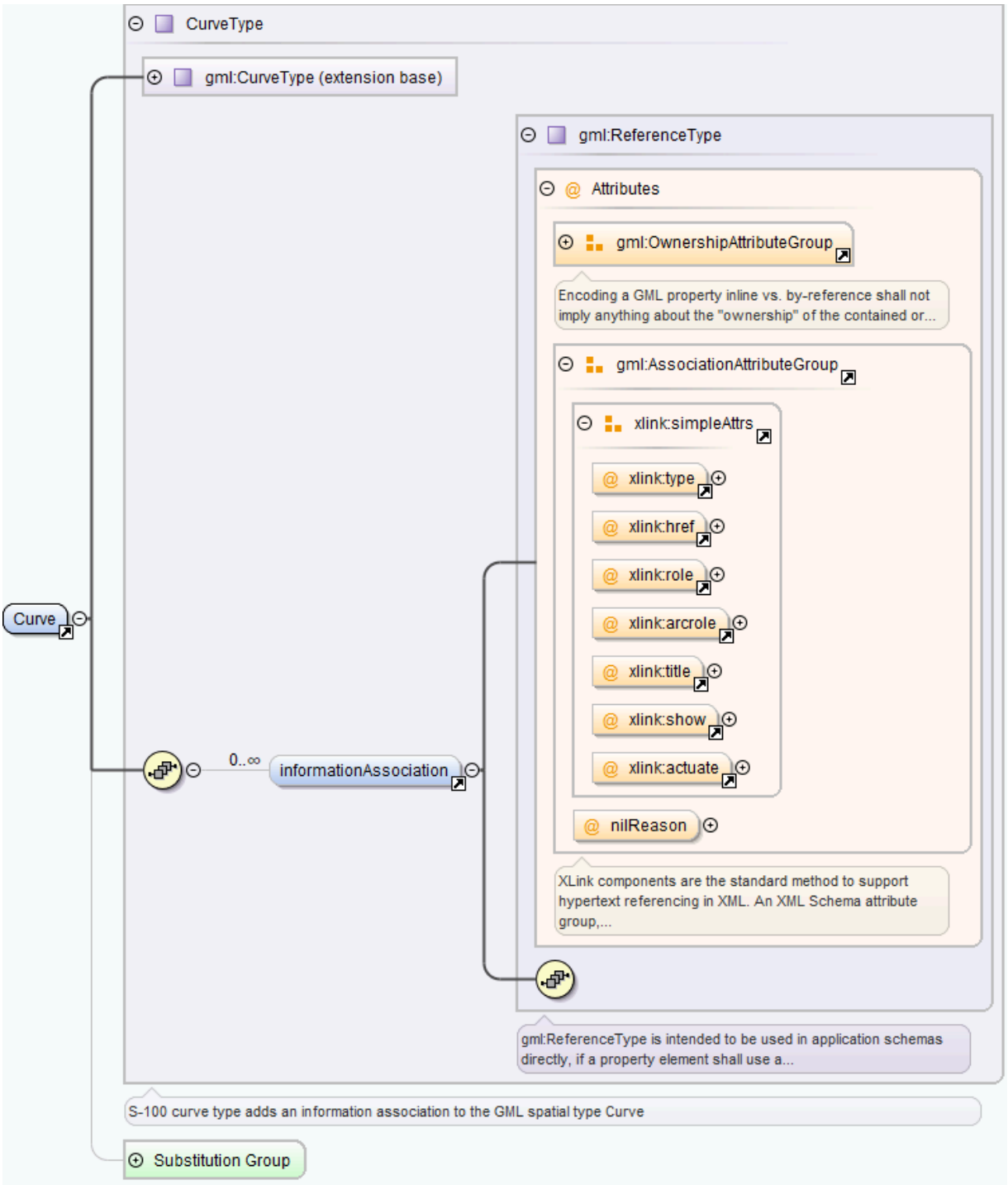

Figure 18-2 — Spatial quality for curve spatial primitives

The association must be encoded using the *informationAssociation* tag with:

- xlink:title = SpatialAssociation
- xlink:href = gml:id of the SpatialQuality instance (using the same prefix convention as for other information associations, for example #SQ00001)
- xlink:arcrole = data:theQualityInformation

The *xlink:show*, *xlink:type* and *xlink:actuate* attributes are not populated. S-100 permits the *xlink:role* attribute to be populated with the “[o]ptional description of the nature of the target resource, given as a URI”. However, since the rules for URIs describing target resources are still to be formulated at the time of writing, population of this optional attribute is not recommended.

18.2.2 Remarks

- **SpatialQuality** can only be associated to point and curve types. To indicate the quality of an area boundary, associate **SpatialQuality** to the curve feature for the area boundary.
- **SpatialQuality** associated to Curve or Composite Curve spatial objects cannot have vertical uncertainty attributes.

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19 Feature Associations

19.1 Service provision area

Definition : Association linking the location from which a service is provided and the area(s) served.

CamelCase : ServiceProvisionArea

Remarks :

Roles : serviceArea serviceProvider

19.2 Pilotage District Association

Definition : A feature association for the binding between a pilotage district and its component pilot boarding places.

CamelCase : PilotageDistrictAssociation

Remarks :

Roles : theCollection theComponent

19.3 Text association

Definition : A feature association for the binding between a geo feature and the cartographically positioned location for text.

CamelCase : TextAssociation

Remarks :

Roles : thePositionProvider theCartographicText

19.4 Traffic Control Service Aggregation

Definition : A feature association for the binding between a traffic control service and auxiliary features.

CamelCase : TrafficControlServiceAggregation

Remarks :

Roles : componentOf consistsOf

20 Information Associations

20.1 Additional information

Definition : A feature association for the binding between at least one instance of a geo feature and an instance of an information type.

CamelCase : AdditionalInformation

Remarks :

Roles : theInformation

20.2 Authority contact

Definition : Contact information for an authority

CamelCase : AuthorityContact

Remarks :

Roles : theAuthority theContactDetails

20.3 Authority hours

Definition : Service hours for an authority

CamelCase : AuthorityHours

Remarks :

Roles : theAuthority_srvHrs theServiceHours

20.4 Associated RxN

Definition : Association between a geographic location and a regulation, restriction, recommendation, or nautical information

CamelCase : AssociatedRxN

Remarks :

Roles : theRxN

20.5 Exceptional workday

Definition : Exception to the usual working day

CamelCase : ExceptionalWorkday

Remarks :

Roles : theServiceHours_nsdy partialWorkingDay

20.6 InclusionType

Definition : Association class specifying the relationship between the subset of vessels described by an APPLIC data object and a regulation (restriction, recommendation, or nautical information).

CamelCase : InclusionType

Remarks :

Roles : theApplicableRxN isApplicableTo

20.7 Permission Type

Definition : Association class for associations describing whether the subsets of vessels determined by the ship characteristics specified in APPLIC may (or must, etc.) transit, enter, or use a feature.

CamelCase : PermissionType

Remarks :

Roles : permission

20.8 Related organisation

Definition : Related organisation

CamelCase : RelatedOrganisation

Remarks :

Roles : organisationRelatedRxN theOrganisation

20.9 Reporting Authority

Definition : The authority with which a report must be filed

CamelCase : ReportingAuthority

Remarks :

Roles : reportTo theShipReport

20.10 Reporting Requirement

Definition : Association between types of reports and classes of vessels which must file report of the type described

CamelCase : ReportingRequirement

Remarks :

Roles : mustBeFiledBy theShipReport

20.11 Service Contact

Definition : Contact details for a service or facility

CamelCase : ServiceContact

Remarks :

Roles : theContactDetails

20.12 Service control

Definition : The controlling authority for a service area

CamelCase : ServiceControl

Remarks : This is an information association linking a location where a service is provided with an information type describing the provider. Contrast to serviceProvisionArea, which is a feature association linking the area served with another feature describing the provider. Role controlledService encodable only as a generic inverse association in 3.0.0 datasets as it is an information→feature link

Roles : controlAuthority

20.13 Spatial Association

Definition : An association for the binding between a spatial type and its spatial quality information.

CamelCase : SpatialAssociation

Remarks :

Roles : theQualityInformation

20.14 Location Hours

Definition : Working hours for a service or facility described by a geographic location

CamelCase : LocationHours

Remarks :

Roles : theServiceHours

20.15 Traffic Service Report

Definition : Association between traffic control service and reports required of vessels pertaining to that area

CamelCase : TrafficServiceReport

Remarks :

Roles : reptForTrafficServ

21 Association Roles

21.1 The Component

Definition : A pointer to the aggregate in a whole-part relationship.

CamelCase : theComponent

Remarks :

21.2 The Collection

Definition : A pointer to a part in a whole-part relationship.

CamelCase : theCollection

Remarks :

21.3 Authority(reference)

Definition : A pointer to an Authority object

CamelCase : theAuthority

Remarks :

21.4 Authority service hours

Definition : The authority for which service hours are given

CamelCase : theAuthority_srvHrs

Remarks :

21.5 Contact details

Definition : A pointer to an Contact Details object

CamelCase : theContactDetails

Remarks :

21.6 Component of

Definition : A pointer to the aggregate in a whole-part relationship.

CamelCase : componentOf

Remarks :

21.7 Consists Of

Definition : A pointer to a part in a whole-part relationship.

CamelCase : consistsOf

Remarks :

21.8 Control authority

Definition : The controlling organization or authority for a geographically located service

CamelCase : controlAuthority

Remarks :

21.9 Is Applicable To

Definition : The object or class of objects to which the regulation, restriction, recommendation, or nautical information applies

CamelCase : isApplicableTo

Remarks :

21.10 Must be Filed by

Definition : The class (generally, qualifying vessels) which must file the report

CamelCase : mustBeFiledBy

Remarks :

21.11 Organisation-Related RxN

Definition : Reference to regulation, recommendation, restriction or general information related to an organisation

CamelCase : organisationRelatedRxN

Remarks :

21.12 Partial Working Day

Definition : The work hours for a non-standard workday

CamelCase : partialWorkingDay

Remarks :

21.13 Permission

Definition : Association class for associations describing whether the subsets of vessels determined by the ship characteristics specified in APPLIC may (or must, etc.) transit, enter, or use a feature.

CamelCase : permission

Remarks :

21.14 Report to

Definition : The organisation or place to which a report is sent.

CamelCase : reportTo

Remarks :

21.15 The RxN

Definition : The regulation, restriction, recommendation, or nautical information

CamelCase : theRxN

Remarks :

21.16 Service Hours (reference)

Definition : Service hours for an authority or service provider

CamelCase : theServiceHours

Remarks :

21.17 The Applicable RxN

Definition : The applicable regulation, restriction, recommendation or nautical information

CamelCase : theApplicableRxN

Remarks :

21.18 The Cartographic Text

Definition : A pointer to a specific cartographically positioned location for text.

CamelCase : theCartographicText

Remarks :

21.19 The Information

Definition : The information

CamelCase : theInformation

Remarks :

21.20 The organisation

Definition : The organisation to which information relates

CamelCase : theOrganisation

Remarks :

21.21 The Position Provider

Definition : A pointer to a specific feature(s).

CamelCase : thePositionProvider

Remarks :

21.22 The Quality Information

Definition : A pointer to an information type providing spatial quality information.

CamelCase : theQualityInformation

Remarks :

21.23 The service hours for a non-standard workday

Definition : The usual service hours to which an exception applies

CamelCase : theServiceHours_nsdy

Remarks :

21.24 Service area

Definition : The area served by a service provider

CamelCase : serviceArea

Remarks :

21.25 Service provider

Definition : Pointer to a feature from where a provider supplies a service

CamelCase : serviceProvider

Remarks :

21.26 The ship report

Definition : The report to be filed by a vessel

CamelCase : theShipReport

Remarks :

21.27 Traffic service report

Definition : The report for a traffic service

CamelCase : reptForTrafficServ

Remarks :

22 Simple Attributes

22.1 Administrative Division

Definition : A generic term for an administrative region within a country at a level below that of the sovereign state.

Type : text

CamelCase : administrativeDivision

Alias :

Remarks :

22.2 Application Profile

Definition : Name of an application profile that can be used with the online resource.

Type : text

CamelCase : applicationProfile

Alias : APPPRF

Remarks :

22.3 Call Name

Definition : The designated call name of a station; for example, radio station, radar station, pilot.

Type : text

CamelCase : callName

Alias :

Remarks : This is the name used when calling a radio station by radio; for example, “Singapore Pilots”.

22.4 Call Sign

Definition : The designated call-sign of a station (radio station, radar station, pilot, …).

Type : text

CamelCase : callSign

Alias : CALSGN

Remarks :

22.5 Cardinal Direction

Definition : Principal and intermediate compass points.

Type : enumeration

CamelCase : cardinalDirection

Alias : CARDIR

Remarks :

Code	Label	Definition
1	North	348.75-011.25 degrees (true north).
2	North Northeast	011.25 — 033.75 degrees.
3	Northeast	033.75 — 056.25 degrees.
4	East Northeast	056.25-078.75 degrees.
5	East	078.75-101.25 degrees.
6	East Southeast	101.25-123.75 degrees.
7	Southeast	123.75-146.25 degrees.
8	South Southeast	146.25-168.75 degrees.
9	South	168.75-191.25 degrees.
10	South Southwest	191.25-213.75 degrees.
11	Southwest	213.75-236.25 degrees.
12	West Southwest	236.25-258.75 degrees.
13	West	258.75-281.25 degrees.
14	West Northwest	281.25-303.75 degrees.
15	Northwest	303.75 — 326.25 degrees.
16	North Northwest	326.25 — 348.75 degrees.

22.6 Category of Authority

Definition : The type of person, government agency or organisation granted powers of managing or controlling access to and/or activity in an area.

Type : enumeration

CamelCase : categoryOfAuthority

Alias : CATAUT

Remarks :

Code	Label	Definition
2	Border Control	The administration to prevent or detect and prosecute violations of rules and regulations at international boundaries.
3	Police	The department of government, or civil force, charged with maintaining public order.
4	Port	Person or corporation, owners of, or entrusted with or invested with the power of managing a port. May be called a Harbour Board, Port Trust, Port Commission, Harbour Commission, Marine Department.
5	Immigration	The authority controlling people entering a country.
6	Health	The authority with responsibility for checking the validity of the health declaration of a vessel and for declaring free pratique.
7	Coast Guard	Organization keeping watch on shipping and coastal waters according to governmental law; normally the authority with responsibility for search and rescue.
8	Agricultural	The authority with responsibility for preventing infection of the agriculture of a country and for the protection of the agricultural interests of a country.

Code	Label	Definition
9	Military	A military authority which provides control of access to or approval for transit through designated areas or airspace.
10	Private Company	A private or publicly owned company or commercial enterprise which exercises control of facilities, for example a calibration area.
11	Maritime Police	A governmental or military force with jurisdiction in territorial waters. Examples could include Gendarmerie Maritime, Carabinierie, and Guardia Civil.
12	Environmental	An authority with responsibility for the protection of the environment.
13	Fishery	An authority with responsibility for the control of fisheries.
14	Finance	An authority with responsibility for the control and movement of money.
15	Maritime	A national or regional authority charged with administration of maritime affairs.
16	Customs	The agency or establishment for collecting duties, tolls.

22.7 Category of Communication Preference

Definition : Classification of frequencies, VHF channels, telephone numbers, or other means of communication based on preference.

Type : enumeration

CamelCase : categoryOfCommunicationPreference

Alias :

Remarks :

Code	Label	Definition
1	Preferred Calling	The first choice channel or frequency to be used when calling a radio station.
2	Alternate Calling	A channel or frequency to be used for calling a radio station when the preferred channel or frequency is busy or is suffering from interference.
3	Preferred Working	The first choice channel or frequency to be used when working with a radio station.
4	Alternate Working	A channel or frequency to be used for working with a radio station when the preferred working channel or frequency is busy or is suffering from interference.

22.8 Category of Cargo

Definition : Classification of the different types of cargo that a ship may be carrying.

Type : enumeration

CamelCase : categoryOfCargo

Alias : CATCGO

Remarks : If item 7 is used, the nature of dangerous or hazardous cargoes can be amplified with category of dangerous or hazardous cargo.

Code	Label	Definition
1	Bulk	Unpacked homogenous cargo poured loose in a certain space of a vessel, for example oil or grain.

Code	Label	Definition
2	Container	One of a number of standard sized cargo carrying units, secured using standard corner attachments and bar.
3	General	Break bulk cargo normally loaded by crane.
4	Liquid	Any cargo loaded by pipeline.
5	Passenger	A fee paying traveller.
6	Livestock	Live animals carried in bulk.
7	Dangerous or Hazardous	Dangerous or hazardous cargo as described by the IMO International Maritime Dangerous Goods code.
8	Heavy Lift	Indivisible heavy items of weight generally over 100 tons, and width or height greater than 100 metres.
9	Ballast	Material carried by a ship to ensure its stability.
10	Dry Bulk Cargo	Commodity cargo that is transported unpackaged in large quantities. These types of goods usually need to be kept dry during the whole transportation period.
11	Liquid Bulk Cargo	Liquids or gases that are transported in bulk and carried unpackaged.
12	Reefer Container Cargo	Cargo transported in refrigerated containers, generally perishable commodities which require temperature-controlled transportation, such as fruit, meat, fish, vegetables, dairy products and other foods.
13	Ro-Ro Cargo	Wheeled cargo, such as cars, busses, trucks, agricultural vehicles and cranes, that are driven on and off the ship on their own wheels or using a platform vehicle, such as a self-propelled modular transporter.
14	Project Cargo	Project cargo is a term used to broadly describe the national or international transportation of large, heavy, high value, or critical (to the project they are intended for) pieces of equipment. Also commonly referred to as heavy lift, this includes shipments made of various components which need disassembly for shipment and reassembly after delivery.
15	Break Bulk Cargo	Goods that are stowed on board ship in individually counted units, and not in intermodal containers nor in bulk as with oil or grain.

22.9 Category of Concentration of Shipping Hazard Area

Definition : Classification of shipping hazards due to traffic volume or density.

Type : enumeration

CamelCase : categoryOfConcentrationOfShippingHazardArea

Alias :

Remarks :

Code	Label	Definition
1	Concentration of Merchant Shipping	Concentration of vessels whose primary purpose is to engage in commerce, including ferries.
2	Concentration of Recreational Vessels	Concentration of powered or sailing vessels principally engaged in recreation, leisure, or sporting competition.
3	Concentration of Fishing Vessels	Concentration of vessels whose primary purpose is to hunt, trap or process fish. The concentration could be on the fishing ground, in transit or in the approaches to home bases or fish markets.

Code	Label	Definition
4	Concentration of Military Vessels	Concentration of vessels principally engaged in military activities. This includes activities based on mandate of international organizations (for example, UN). The concentration is in areas others than military exercise areas.

22.10 Category Of Dangerous Or Hazardous Cargo

Definition : Classification of dangerous goods or hazardous materials based on the International Maritime Dangerous Goods Code (IMDG Code).

Type : enumeration

CamelCase : categoryOfDangerousOrHazardousCargo

Alias : CATDHC

Remarks :

Code	Label	Definition
1	IMDG Code Class 1 Div. 1.1	Explosives, Division 1: Substances and articles which have a mass explosion hazard.
2	IMDG Code Class 1 Div. 1.2	Explosives, Division 2: Substances and articles which have a projection hazard but not a mass explosion hazard.
3	IMDG Code Class 1 Div. 1.3	Explosives, Division 3: Substances and articles which have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard.
4	IMDG Code Class 1 Div. 1.4	Explosives, Division 4: Substances and articles which present no significant hazard.
5	IMDG Code Class 1 Div. 1.5	Explosives, Division 5: Very insensitive substances which have a mass explosion hazard.
6	IMDG Code Class 1 Div. 1.6	Explosives, Division 6: Extremely insensitive articles which do not have a mass explosion hazard.
7	IMDG Code Class 2 Div. 2.1	Gases, flammable gases.
8	IMDG Code Class 2 Div. 2.2	Gases, non-flammable, non-toxic gases.
9	IMDG Code Class 2 Div. 2.3	Gases, toxic gases.
10	IMDG Code Class 3	Flammable liquids.
11	IMDG Code Class 4 Div. 4.1	Flammable solids, self-reactive substances and desensitized explosives.
12	IMDG Code Class 4 Div. 4.2	Substances liable to spontaneous combustion.
13	IMDG Code Class 4 Div. 4.3	Substances which, in contact with water, emit flammable gases.
14	IMDG Code Class 5 Div. 5.1	Oxidizing substances.
15	IMDG Code Class 5 Div. 5.2	Organic peroxides.

Code	Label	Definition
16	IMDG Code Class 6 Div. 6.1	Toxic substances.
17	IMDG Code Class 6 Div. 6.2	Infectious substances.
18	IMDG Code Class 7	Radioactive material.
19	IMDG Code Class 8	Corrosive substances.
20	IMDG Code Class 9	Miscellaneous dangerous substances and articles.
21	Harmful Substances in Packaged Form	Harmful substances are those substances which are identified as marine pollutants in the International Maritime Dangerous Goods Code (IMDG Code). Packaged form is defined as the forms of containment specified for harmful substances in the IMDG Code.

22.11 Category of Military Practice Area

Definition : Classification of area by military use.

Type : enumeration

CamelCase : categoryOfMilitaryPracticeArea

Alias : CATMPA

Remarks :

Code	Label	Definition
2	Torpedo Exercise Area	An area within which exercises are carried out with torpedoes.
3	Submarine Exercise Area	An area within which submarine exercises are carried out.
4	Firing Danger Area	Areas for bombing and missile exercises.
5	Mine-Laying Practice Area	An area within which mine laying exercises are carried out.
6	Small Arms Firing Range	An area for shooting pistols, rifles and machine guns etc. at a target.

22.12 Category of Navigation Line

Definition : Classification of route guidance given to vessels.

Type : enumeration

CamelCase : categoryOfNavigationLine

Alias : CATNAV

Remarks :

Code	Label	Definition
1	Clearing Line	A straight line that marks the boundary between a safe and a dangerous area or that passes clear of a navigational danger.
2	Transit Line	A line passing through one or more fixed marks.

Code	Label	Definition
3	Leading Line Bearing a Recommended Track	A line passing through one or more clearly defined objects, along the path of which a vessel can approach safely up to a certain distance off.

22.13 Category of Pilot

Definition : Classification of pilots and pilot services by type of waterway where piloting services are provided.

Type : enumeration

CamelCase : categoryOfPilot

Alias : CATPLT

Remarks :

Code	Label	Definition
1	Pilot	Pilot licenced to conduct vessels during approach from sea to a specified place which may be a handover place, an anchorage or alongside.
2	Deep Sea	Pilot licenced to conduct vessels over extensive sea areas.
3	Harbour	A reporting point of a harbour.
4	Bar	A ridge or succession of ridges of sand or other substances extending across the mouth of a river or harbour and which may obstruct navigation.
5	River	A relatively large natural stream of water.
6	Channel	Pilot licensed to conduct vessels from and to specified places, along the course of a channel. (For example as used in Rio Amazonas and Rio de La Plata.)
7	Lake	A large body of water entirely surrounded by land.

22.14 Category of Pilot Boarding Place

Definition : Classification of pilot boarding method.

Type : enumeration

CamelCase : categoryOfPilotBoardingPlace

Alias : CATPIL

Remarks :

Code	Label	Definition
1	Boarding by Pilot-Cruising Vessel	Pilot boards from a cruising vessel.
2	Boarding by Helicopter	Pilot boards by helicopter which comes out from the shore.
3	Pilot Comes Out from Shore	Pilot embarks from a vessel or disembarks on a vessel which comes out from the shore on request.

22.15 Category of Preference

Definition : The selection of a first choice compared to other options.

Type : enumeration

CamelCase : categoryOfPreference

Alias :

Remarks :

Code	Label	Definition
1	Primary	The preferred first choice used in normal conditions.
2	Alternate	The preferred choice in extraordinary conditions.

22.16 Category of Relationship

Definition : Expresses constraints or requirements on vessel actions or activities in relation to a geographic feature, facility, or service.

Type : enumeration

CamelCase : categoryOfRelationship

Alias :

Remarks :

Code	Label	Definition
1	Prohibited	Use of facility, waterway or service is forbidden.
2	Not Recommended	Use of facility, waterway or service is not recommended.
3	Permitted	Use of facility, waterway, or service is permitted but not required.
4	Recommended	Use of facility, waterway, or service is recommended.
5	Required	Use of facility, waterway, or service is required.
6	Not Required	Use of facility, waterway, or service is not required.
7	Exclusively Permitted	Only vessels of the specified characteristics may use the facility, waterway, or service.

22.17 Category of Restricted Area

Definition : The official legal status of each kind of restricted area defines the kind of restriction(s), for example the restriction for a ‘game reserve’ may be ‘entering prohibited’.

Type : enumeration

CamelCase : categoryOfRestrictedArea

Alias : CATREA

Remarks :

Code	Label	Definition
1	Offshore Safety Zone	The area around an offshore installation within which vessels are prohibited from entering without permission. Special regulations protect installations within a safety zone and vessels of all nationalities are required to respect the zone.
4	Nature Reserve	A tract of land or water managed so as to preserve its flora, fauna, physical features, etc.
5	Bird Sanctuary	A place where birds are bred and protected.

Code	Label	Definition
6	Game Reserve	A place where wild animals or birds hunted for sport or food are kept undisturbed for private use.
7	Seal Sanctuary	A place where seals are protected.
8	Degaussing Range	An area, usually about two cables diameter, within which ships' magnetic fields may be measured; sensing instruments and cables are installed on the sea bed in the range and there are cables leading from the range to a control position ashore.
9	Military Area	An area controlled by the military in which restrictions may apply.
10	Historic Wreck Area	An area around certain wrecks of historical importance to protect the wrecks from unauthorized interference by diving, salvage or deposition (including anchoring).
12	Navigational Aid Safety Zone	An area around a navigational aid which vessels are prohibited from entering.
14	Minefield	An area laid and maintained with explosive mines for defence or practice purposes.
19	Waiting Area	An area reserved for vessels waiting to enter a harbour.
20	Research Area	An area where marine research takes place.
22	Fish Sanctuary	A place where fish (including shellfish and crustaceans) are protected.
23	Ecological Reserve	A tract of land managed so as to preserve the relation of plants and living creatures to each other and to their surroundings.
25	Swinging Area	An area where vessels turn.
27	Environmentally Sensitive Sea Area	A generic term which may be used to describe a wide range of areas, considered sensitive for a variety of environmental reasons.
28	Particularly Sensitive Sea Area	An area that needs special protection through action by IMO because of its significance for regional ecological, socio-economic or scientific reasons and because it may be vulnerable to damage by international shipping activities.
29	Disengagement Area	An area near a fairway where vessels can go to clear the way or make an about turn and possibly return to a waiting area when nautical conditions impose it.
30	Port Security Area	An area in which defence, law and treaty enforcement, and counter-terrorism activities that fall within the port and maritime domain apply.
31	Coral Sanctuary	A place where coral is protected.
32	Recreation Area	An area within which recreational activities regularly take place and therefore vessel movement may be restricted.

22.18 Category of Routeing Measure

Definition : Classification of routeing measures by type.

Type : enumeration

CamelCase : categoryOfRouteingMeasure

Alias :

Remarks :

Code	Label	Definition
1	Archipelagic Sea Lane	Sea lanes designated by an archipelagic State for the passage of ships and aircraft. The Archipelagic Sea Lane aggregates all component parts of an Archipelagic Sea Lane system.
2	Deep Water Route	A route within defined limits which has been accurately surveyed for clearance of sea bottom and submerged obstacles as indicated on the chart.
3	Fairway System	That part of a river, harbour and so on, where the main navigable channel for vessels of larger size lies. It is also the usual course followed by vessels entering or leaving harbours, called ship channel. A fairway system is an aggregation of connected fairway features making up a complex fairway system.
4	Recommended Route	A navigation line, range system, or a recommended track, lane, or route.
5	Traffic Separation Scheme	A routeing measure aimed at the separation of opposing streams of traffic by appropriate means and by the establishment of traffic lanes.
6	Two-Way Route	A route within defined limits inside which two way traffic is established, aimed at providing safe passage of ships through waters where navigation is difficult or dangerous.

22.19 Category of Schedule

Definition : The type of schedule, for instance opening, closure, etc.

Type : enumeration

CamelCase : categoryOfSchedule

Alias :

Remarks :

Code	Label	Definition
1	Normal Operation	The service, office, is open, fully manned, and operating normally, or the area is accessible as usual.
2	Closure	The service, office, or area is closed.
3	Unmanned Operation	The service is available but not manned.

22.20 Category of Ship Report

Definition : Classification of ship reports based on IMO standard report formats.

Type : enumeration

CamelCase : categoryOfShipReport

Alias : CATREP

Remarks : Through Resolution A.851(20), the IMO encourages authorities to require standard formats and procedures for ship reporting and recognizes that some authorities require amended formats. (Appendix to IMO Resolution A.851(20) GENERAL PRINCIPLES FOR SHIP REPORTING SYSTEMS AND SHIP REPORTING REQUIREMENTS, INCLUDING GUIDELINES FOR REPORTING INCIDENTS INVOLVING DANGEROUS GOODS, HARMFUL SUBSTANCES AND/OR MARINE POLLUTANTS.)

Code	Label	Definition
1	Sailing Plan	Before or as near as possible to the time of departure from a port within a system or when entering the area covered by a system (for instance A, B, J, X etc).
2	Position Report	When necessary to ensure effective operation of the system.
3	Deviation Report	When the ships position varies significantly from the position that would have been predicted from previous reports; when changing the reported route; or as decided by the master.
4	Final Report	On arrival at the destination or on leaving the area covered by the system.
5	Dangerous Goods Report	When an incident takes place involving the loss or likely loss overboard of packaged dangerous goods, including those in freight containers, portable tanks, road and rail vehicles and ship-borne barges, into the sea.
6	Harmful Substances Report	Report submitted when an incident takes place involving the discharge or probable discharge of oil or noxious liquid substances in bulk.
7	Marine Pollutants Report	In the case of the loss or likely loss overboard of harmful substances in packaged form, including those in freight containers, portable tanks, road and rail vehicles and ship-borne barges identified in the International Maritime Goods Code as marine pollutants.
8	Any Other Report	Any other type of non-defined report that is made in accordance with the system procedures as notified in accordance with paragraph 9 of the general principles.

22.21 Category of Signal Station, Traffic

Definition : Classification of station based on the traffic service provided.

Type : enumeration

CamelCase : categoryOfSignalStationTraffic

Alias : CATSIT

Remarks :

Code	Label	Definition
1	Port Control	A signal station for the control of vessels within a port.
2	Port Entry and Departure	A signal station for the control of vessels entering or leaving a port.
3	International Port Traffic	A signal station displaying International Port Traffic signals.
4	Berthing	A signal station for the control of vessels when berthing.
5	Dock	A signal station for the control of vessels entering or leaving a dock.
6	Lock	A signal station for the control of vessels entering or leaving a lock.
7	Flood Barrage Station	A signal station for the control of vessels wishing to pass through a flood control barrage.
8	Bridge Passage	A signal station for the control of vessels wishing to pass under a bridge.
9	Dredging	A signal station indicating when dredging is in progress.
10	Traffic Control Light	Visual signal lights placed in a waterway to indicate to shipping the movements authorized at the time at which they are shown.

Code	Label	Definition
13	Oncoming Traffic Indication	Indicates the oncoming traffic on an inland waterway.

22.22 Category of Signal Station, Warning

Definition : Classification of station based on the warning service provided.

Type : enumeration

CamelCase : categoryOfSignalStationWarning

Alias : CATSIW

Remarks :

Code	Label	Definition
1	Danger	A signal or message warning of the presence of a danger to navigation.
2	Maritime Obstruction	A signal or message warning of the presence of a maritime obstruction.
3	Cable	A signal or message warning of the presence of a cable.
4	Military Practice	A signal or message warning of activity in a military practice area.
5	Distress	A station that may receive or transmit distress signals.
6	Weather	A visual signal displayed to indicate a weather forecast.
7	Storm	A signal or message conveying information about storm conditions.
8	Ice Warning	A signal or message conveying information about ice conditions.
9	Time	An accurate signal marking a specified time or time interval. It is used primarily for determining errors of timepieces. Such signals are usually sent from an observatory by radio or telegraph, but visual signals are used at some ports.
10	Tide	A signal or message conveying information on tidal conditions in the area in question.
11	Tidal Stream	A signal or message conveying information on condition of tidal currents in the area in question.
12	Tide Gauge	A device for measuring the height of tide. A graduated staff in a sheltered area where visual observations can be made or it may consist of an elaborate recording instrument making a continuous graphic record of tide height against time. Such an instrument is usually actuated by a float in a pipe communicating with the sea through a small hole which filters out shorter waves.
13	Tide Scale	A visual scale which directly shows the height of the water above chart datum or a local datum.
14	Diving	A signal or message warning of diving activity.
15	Water Level Gauge	A device for measuring and conveying information about the water level (non-tidal) in the area in question.
16	Vertical Clearance Indication	An indication of the vertical clearance of a bridge, overhead cable, etc.
17	High Water Mark	An indication of the official high water level.

Code	Label	Definition
18	Depth Indication	An indication of the local depth.

22.23 Category of Temporal Variation

Definition : An assessment of the likelihood of change over time.

Type : enumeration

CamelCase : categoryOfTemporalVariation

Alias :

Remarks :

Code	Label	Definition
1	Extreme Event	Indication of the possible impact of a significant event (for example hurricane, earthquake, volcanic eruption, landslide, etc), which is considered likely to have changed the seafloor or landscape significantly.
4	Likely to Change	Continuous or frequent change to non-bathymetric features (for example river siltation, glacier creep/recession, sand dunes, buoys, marine farms, etc).
5	Unlikely to Change	Significant change to the seafloor is not expected.
6	Unassessed	Not having been assessed.

22.24 Category of Text

Definition : Classification of completeness of textual information in relation to the source material from which it is derived.

Type : enumeration

CamelCase : categoryOfText

Alias : CATTXT

Remarks :

Code	Label	Definition
1	Abstract or Summary	A statement summarizing the important points of a text.
2	Extract	An excerpt or excerpts from a text.
3	Full Text	The whole text.

22.25 Category of Traffic Separation Scheme

Definition : International classification of traffic separation scheme.

Type : enumeration

CamelCase : categoryOfTrafficSeparationScheme

Alias : CATTSS

Remarks :

Code	Label	Definition
1	IMO Adopted	A defined maritime traffic route that has been adopted as an IMO routeing measure.
2	Not IMO — Adopted	A defined Traffic Separation Scheme that has not been adopted as an IMO routing measure.

22.26 Category of Vessel Registry

Definition : The locality of vessel registration or enrolment relative to the nationality of a port, territorial sea, administrative area, exclusive zone or other location.

Type : enumeration

CamelCase : categoryOfVesselRegistry

Alias :

Remarks :

Code	Label	Definition
1	Domestic	The vessel is registered or enrolled under the same national flag as the port, harbour, territorial sea, exclusive economic zone, or administrative area in which the object that possesses this attribute applies or is located.
2	Foreign	The vessel is registered or enrolled under a national flag different from the port, harbour, territorial sea, exclusive economic zone, or other administrative area in which the object that possesses this attribute applies or is located.

22.27 City Name

Definition : The name of a town or city.

Type : text

CamelCase : cityName

Alias : CITYNM

Remarks :

22.28 Communication Channel

Definition : A channel number assigned to a specific radio frequency, frequencies or frequency band.

Type : text

CamelCase : communicationChannel

Alias : COMCHA

Remarks : The expected input is the specific VHF-Channel. The attribute ‘communication channel’ encodes the various VHF-channels used for communication.

22.29 Comparison Operator

Definition : Numerical comparison.

Type : enumeration

CamelCase : comparisonOperator

Alias : COMPOP

Remarks : Provides the relation between the value given in the model and the real ship's value.

Code	Label	Definition
1	Greater Than	The value of the left value is greater than that of the right.
2	Greater Than or Equal To	The value of the left expression is greater than or equal to that of the right.
3	Less Than	The value of the left expression is less than that of the right.
4	Less Than or Equal To	The value of the left expression is less than or equal to that of the right.
5	Equal To	The two values are equivalent.
6	Not Equal To	The two values are not equivalent.

22.30 Condition

Definition : The various conditions of buildings and other constructions.

Type : enumeration

CamelCase : condition

Alias : CONDTN

Remarks : The default 'condition' should be considered to be completed, undamaged and working normally.

Code	Label	Definition
1	Under Construction	Being built but not yet capable of function.
3	Under Reclamation	An area of the sea, a lake or the navigable part of a river that is being reclaimed as land, usually by the dumping of earth and other material.
5	Planned Construction	Detailed planning has been completed but construction has not been initiated.

22.31 Contact Instructions

Definition : Instructions provided on how to contact a particular person, organisation or service.

Type : text

CamelCase : contactInstructions

Alias :

Remarks :

22.32 Country Name

Definition : The name of a nation.

Type : text

CamelCase : countryName

Alias :

Remarks :

22.33 Date End

Definition : The latest date on which an object (for example a buoy) will be present.

Type : S100_TruncatedDate

CamelCase : dateEnd

Alias : DATEND

Remarks : The Date End should be encoded using 4 digits for the calendar year (YYYY), 2 digits for the month (MM) (for example April = 04) and 2 digits for the day (DD). When no specific month and/or day is required/known, indication of the month and/or day is omitted, and replaced with dashes (-). When no specific year is required (that is, the event or date range ends at the same time each year) the following two cases may be considered:- same day each year: ——MMDD- same month each year: ——MM— This conforms to ISO 8601: 2004. Date End indicates the latest date of an event or the end of a date range. It is used to indicate the end of a fixed date range, the end of a periodic date range, or the removal or cancellation of a feature at a specific date in the future.

22.34 Date Fixed

Definition : The date of an event.

Type : S100_TruncatedDate

CamelCase : dateFixed

Alias :

Remarks :

22.35 Date Start

Definition : The earliest date on which an object (for example a buoy) will be present.

Type : S100_TruncatedDate

CamelCase : dateStart

Alias : DATSTA

Remarks : The Date Start should be encoded using 4 digits for the calendar year (YYYY), 2 digits for the month (MM) (for example April = 04) and 2 digits for the day (DD). When no specific month and/or day is required/known, indication of the month and/or day is omitted, and replaced with dashes (-). When no specific year is required (that is, the event or date range ends at the same time each year) the following two cases may be considered:- same day each year: ——MMDD- same month each year: ——MM— This conforms to ISO 8601: 2004. Date Start indicates the earliest date of an event or the start of a date range. It is used to indicate the start of a fixed date range, the start of a periodic date range, or the deployment or implementation of a feature at a specific date in the future.

22.36 Date Variable

Definition : A day which is not fixed in the Gregorian calendar.

Type : text

CamelCase : dateVariable

Alias :

Remarks : Examples: The fourth Thursday in November; new moon day of Kartika (Diwali); Easter Sunday.

22.37 Day of Week

Definition : Any one of seven days in a week.

Type : enumeration

CamelCase : dayOfWeek

Alias :

Remarks :

Code	Label	Definition
1	Sunday	The first day of the week.
2	Monday	The second day of the week.
3	Tuesday	The third day of the week.
4	Wednesday	The fourth day of the week.
5	Thursday	The fifth day of the week.
6	Friday	The sixth day of the week.
7	Saturday	The seventh day of the week.

22.38 Day of Week is Range

Definition : A statement expressing if the days of the week identified define a range or not.

Type : boolean

CamelCase : dayOfWeekIsRange

Alias :

Remarks : A True value is an indication that the identified days of the week define a range between and inclusive of those days.

22.39 Delivery Point

Definition : Details of where post can be delivered such as the apartment, name and/or number of a street, building or PO Box.

Type : text

CamelCase : deliveryPoint

Alias : DELPNT

Remarks :

22.40 Destination

Definition : The place or general direction to which a vessel is going or directed.

Type : text

CamelCase : destination

Alias :

Remarks : In addition to a place name of a port, harbour area or terminal, the place could include generalities such as The north-west, or upriver.

22.41 Distance

Definition : A numeric measure of the spatial separation between two locations.

Type : real

CamelCase : distance

Alias :

Remarks :

22.42 Dynamic Resource

Definition : Whether a vessel must use a shore-based or other resource to obtain up-to-date information.

Type : enumeration

CamelCase : dynamicResource

Alias :

Remarks :

Code	Label	Definition
1	Static	The information is static, or a source of up-to-date information is unavailable or unknown.
2	Mandatory External Dynamic	An external source of up-to-date information is available and interaction with it to obtain up-to-date information is required.
3	Optional External Dynamic	An external source of up-to-date information is available but interaction with it to obtain up-to-date information is not required.
4	Onboard Dynamic	Up-to-date information may be computed using only onboard resources.

22.43 File Locator

Definition : The location of a fragment of text or other information in a support file.

Type : text

CamelCase : fileLocator

Alias :

Remarks : Application schemas must describe how the associated file is identified. The associated file will commonly be named in a file reference co-attribute of the same complex attribute. Each DCEG must specify requirements for the format of the associated file and the semantics of file locator. For example, the value of file locator may be an HTML ID in an HTML file, line number in a text file) or a bookmark in a PDF file.

22.44 File Reference

Definition : The file name of an externally referenced text file.

Type : text

CamelCase : fileReference

Alias : TXTDSC

Remarks :

22.45 Frequency Shore Station Receives

Definition : The shore station receiver frequency.

Type : integer

CamelCase : frequencyShoreStationReceives

Alias : FRQRXV

Remarks :

Units: Hz **Definition**: Cycles per second **Symbol**: Hz

Range: Lower Bound (Exclusive): 0 Upper Bound: (not specified)

22.46 Frequency Shore Station Transmits

Definition : The shore station transmitter frequency.

Type : integer

CamelCase : frequencyShoreStationTransmits

Alias : FRQTXM

Remarks :

Units: Hz **Definition**: Cycles per second **Symbol**: Hz

Range: Lower Bound (Exclusive): 0 Upper Bound: (not specified)

22.47 Headline

Definition : Words set at the head of a passage or page to introduce or categorize.

Type : text

CamelCase : headline

Alias :

Remarks :

22.48 Horizontal Distance Uncertainty

Definition : The best estimate of the horizontal accuracy of horizontal clearances and distances.

Type : real

CamelCase : horizontalDistanceUncertainty

Alias : HORACC

Remarks : The error is assumed to be positive and negative. The plus/minus character must not be encoded.

22.49 IMO Format for Reporting

Definition : Whether a report must be in an IMO standard format.

Type : boolean

CamelCase : iMOFormatForReporting

Alias : IMOREP

Remarks :

22.50 Interoperability Identifier

Definition : A common unique identifier for entities which describe a single real-world feature, and which is used to identify instances of the feature in end-user systems where the feature may be included in multiple data product types.

Type : URN

CamelCase : interoperabilityIdentifier

Alias :

Remarks :

22.51 ISPS level

Definition : Classification of ISPS security levels according to the ISPS Code.

Type : enumeration

CamelCase : iSPSLevel

Alias : ISPSLV

Remarks :

Code	Label	Definition
1	ISPS Level 1	The level for which minimum appropriate protective security measures shall be maintained at all times.
2	ISPS Level 2	The level for which appropriate additional protective security measures shall be maintained for a period of time as a result of heightened risk of a security incident.
3	ISPS Level 3	The level for which further specific protective security measures shall be maintained for a limited period of time when a security incident is probable or imminent, although it may not be possible to identify the specific target.

22.52 In Ballast

Definition : Whether the vessel is in ballast.

Type : boolean

CamelCase : inBallast

Alias :

Remarks :

22.53 Language

Definition : The method of human communication, either spoken or written, consisting of the use of words in a structured and conventional way.

Type : text

CamelCase : language

Alias :

Remarks : The language is encoded by a 3 character code following ISO 639-2/T.

22.54 Linkage

Definition : Location (address) for on-line access using a URL/URI address or similar addressing scheme.

Type : URI

CamelCase : linkage

Alias :

Remarks :

22.55 Membership

Definition : Indicates whether a vessel is included or excluded from the regulation/restriction/recommendation/nautical information.

Type : enumeration

CamelCase : membership

Alias : MBRSHP

Remarks :

Code	Label	Definition
1	Included	Vessels with these characteristics are included in the regulation/restriction/recommendation/nautical information.
2	Excluded	Vessels with these characteristics are excluded from the regulation/restriction/recommendation/nautical information.

22.56 Name Usage

Definition : Classification of the type and display level of the name of a feature in an end-user system.

Type : enumeration

CamelCase : nameUsage

Alias :

Remarks :

Code	Label	Definition
1	Default Name Display	The name is intended to be displayed when the end-user system is set to the default name/text display setting.
2	Alternate Name Display	The name is intended to be displayed when the end-user system is set to an alternate name/text display setting, for example an alternate language.
3	No Chart Display	The name or text is not intended to be displayed.

22.57 Logical Connectives

Definition : Expresses whether all the constraints described by its co-attributes must be satisfied, or only one such constraint need be satisfied.

Type : enumeration

CamelCase : logicalConnectives

Alias : LOGCON

Remarks : Is intended to be used with co-attributes that encode limits on vessel dimensions, type of cargo, and other characteristics. The combination of constraints described by logicalConnectives and its co-attributes defines a subset of vessels to which information described by a feature or information type instance applies (or does not apply, is required, recommended, etc.). The relationship between the vessel subset and the information is indicated by an association — see PermissionType and InclusionType). The two listed values of logicalConnective are two of the basic operations of Boolean logic. The third basic operation (not) is not used.

Code	Label	Definition
1	Logical Conjunction	All the conditions described by the other attributes of the object, or sub-attributes of the same complex attribute, are true.
2	Logical Disjunction	At least one of the conditions described by the other attributes of the object, or sub-attributes of the same complex attributes, is true.

22.58 Maximum Display Scale

Definition : The largest intended viewing scale for the data.

Type : integer

CamelCase : maximumDisplayScale

Alias :

Remarks :

Range: Lower Bound (Inclusive): 1 Upper Bound: (not specified)

22.59 Minimum Display Scale

Definition : The smallest intended viewing scale for the data.

Type : integer

CamelCase : minimumDisplayScale

Alias :

Remarks :

Range: Lower Bound (Inclusive): 1 Upper Bound: (not specified)

22.60 MMSI Code

Definition : The Maritime Mobile Service Identity (MMSI) Code is formed of a series of nine digits which are transmitted over the radio path in order to uniquely identify ship stations, ship earth stations, coast stations, coast earth stations, and group calls. These identities are formed in such a way that the identity or part thereof can be used by telephone and telex subscribers connected to the general telecommunications network principally to call ships automatically.

Type : text

CamelCase : mMSICode

Alias :

Remarks :

22.61 Name

Definition : The individual name of a feature.

Type : text

CamelCase : name

Alias : OBJNAM

Remarks :

22.62 Name of Resource

Definition : Name of the online resource.

Type : text

CamelCase : nameOfResource

Alias :

Remarks :

22.63 Nationality

Definition : Identifier of membership of a particular nation.

Type : text

CamelCase : nationality

Alias : NATION

Remarks :

22.64 Notice Time Hours

Definition : The time duration prior to the time the service is needed, when notice must be provided to the service provider.

Type : real

CamelCase : noticeTimeHours

Alias :

Remarks :

Units: hours **Definition**: 60 minutes or 3600 seconds. **Symbol**: hrs

22.65 Notice Time Text

Definition : Text string qualifying the notice time hours. This may explain the time specification of the hours (for example, 3 working days for a value of 72 for the notice time hours intended to indicate a time period of 3 days) or consist of other language qualifying the time; for example, On departure from last port or On passing reporting line XY).

Type : text

CamelCase : noticeTimeText

Alias :

Remarks :

22.66 Online Function

Definition : Code for function performed by the online resource.

Type : enumeration

CamelCase : onlineFunction

Alias : ONLFUN

Remarks :

Code	Label	Definition
1	Download	Online instructions for transferring data from one storage device or system to another.
3	Offline Access	Online instructions for requesting the resource from the provider.
4	Order	Online order process for obtaining the resource.
5	Search	To make painstaking investigation or examination.
6	Complete Metadata	Complete metadata provided.
7	Browse Graphic	Browse graphic provided.
8	Upload	Online resource upload capability provided.
9	Email Service	Online email service provided.
10	Browsing	Online browsing provided.
11	File Access	Online file access provided.

22.67 Online Resource Description

Definition : Detailed text description of what the online resource is/does.

Type : text

CamelCase : onlineResourceDescription

Alias :

Remarks :

22.68 Operation

Definition : Indicates whether the minimum or maximum value should be used to describe a condition or in application processing.

Type : enumeration

CamelCase : operation

Alias : OPERAT

Remarks : Null attributes are ignored. Example use: Complex attribute underkeelAllowance with UKCFIX=2.5, UKCVAR=10.00, OPERAT=1 inicates that the under-keel allowance required is the greater of 2.5 metres or 10% of the ship’s draught.

Code	Label	Definition
1	Largest Value	The numerically largest value computed from the applicable attributes or sub-attributes.

Code	Label	Definition
2	Smallest Value	The numerically smallest value computed from the applicable attributes or sub-attributes.

22.69 Optimum Display Scale

Definition : The largest intended viewing scale for the data.

Type : integer

CamelCase : optimumDisplayScale

Alias : CSCALE

Remarks :

Range: Lower Bound (Inclusive): 1 Upper Bound: (not specified)

22.70 Orientation Uncertainty

Definition : The best estimate of the accuracy of a bearing.

Type : real

CamelCase : orientationUncertainty

Alias :

Remarks :

Units: degrees **Definition**: degrees of arc **Symbol**: °

Range: Lower Bound (Inclusive): 0.000 Upper Bound (Inclusive): 360.000

22.71 Orientation Value

Definition : The angular distance measured from true north to the major axis of the feature.

Type : real

CamelCase : orientationValue

Alias : ORIENT

Remarks :

Units: degrees **Definition**: degrees of arc **Symbol**: °

Range: Lower Bound (Inclusive): 0.0 Upper Bound (Inclusive): 360.0

22.72 Pictorial Representation

Definition : Indicates whether a pictorial representation of the feature is available.

Type : text

CamelCase : pictorialRepresentation

Alias : PICREP

Remarks : The ‘pictorial representation’ could be a drawing or a photo. The string encodes the file name of an external graphic file (pixel/vector).

22.73 Picture Caption

Definition : Short description of the purpose of the image.

Type : text

CamelCase : pictureCaption

Alias :

Remarks :

22.74 Picture Information

Definition : A set of information to provide credits to picture creator, copyright owner etc.

Type : text

CamelCase : pictureInformation

Alias :

Remarks :

22.75 Pilot Movement

Definition : Classification of pilot activity by arrival, departure, or change of pilot. It may also describe the place where the pilot's advice begins, ends, or is transferred to a different pilot.

Type : enumeration

CamelCase : pilotMovement

Alias :

Remarks :

Code	Label	Definition
1	Embarkation	The place where vessels not being navigated according to a pilot's instructions pick up a pilot while in transit from sea to a port or constricted waters for future navigation under pilot instructions.
2	Disembarkation	The place where vessels being navigated under a pilot's instructions in transit from sea to a port or constricted waters drop the pilot and proceed without being subject to pilot instructions.
3	Pilot Change	The place where vessels being navigated under a pilot's instructions drop off the pilot and pick up a different pilot for future navigation under pilot's instructions.

22.76 Pilot Qualification

Definition : Classification of pilots and pilot services by type of license qualification or type of organization providing services.

Type : enumeration

CamelCase : pilotQualification

Alias :

Remarks :

Code	Label	Definition
1	Government Pilot	A pilot service carried out by government pilots.

Code	Label	Definition
2	Pilot Approved by Government	A pilot service carried out by pilots who are approved by government.
3	State Pilot	A pilot that is licensed by the State (USA) and/or their respective pilot association, required for all foreign vessels and all American vessels under registry, bound for a port with compulsory State pilotage. A federal licence is not sufficient to pilot such vessels into the port.
4	Federal Pilot	A pilot who carries a Federal endorsement, offering services to vessels that are not required to obtain compulsory State pilotage. Services are usually contracted for in advance.
5	Company Pilot	A pilot provided by a commercial company.
6	Local Pilot	A pilot with local knowledge but who does not hold a qualification as a pilot.
7	Citizen With Sufficient Local Knowledge	A pilot service carried out by a citizen with sufficient local knowledge.
8	Citizen With Doubtful Local Knowledge	A pilot service carried out by a citizen whose local knowledge is uncertain.

22.77 Pilot Request

Definition : Description of the pilot request procedure.

Type : text

CamelCase : pilotRequest

Alias : PLTRQS

Remarks :

22.78 Pilot Vessel

Definition : Description of the pilot vessel. The pilot vessel is a small vessel used by a pilot to go to or from a vessel employing the pilot’s services.

Type : text

CamelCase : pilotVessel

Alias :

Remarks :

22.79 Postal Code

Definition : Known in various countries as a postcode, or ZIP code, the postal code is a series of letters and/or digits that identifies each postal delivery area.

Type : text

CamelCase : postalCode

Alias : POSCOD Postcode ZIP Code

Remarks :

22.80 Protocol

Definition : Connection protocol to be used. Example: ftp, http get KVP, http POST, etc.

Type : text

CamelCase : protocol

Alias : PROTCL

Remarks :

22.81 Protocol Request

Definition : Request used to access the resource. Structure and content depend on the protocol and standard used by the online resource, such as Web Feature Service standard.

Type : text

CamelCase : protocolRequest

Alias : PROTRQ

Remarks :

22.82 Quality of Horizontal Measurement

Definition : The degree of reliability attributed to a position.

Type : enumeration

CamelCase : qualityOfHorizontalMeasurement

Alias : QUAPOS

Remarks :

Code	Label	Definition
1	Surveyed	The position(s) was(were) determined by the operation of making measurements for determining the relative position of points on, above or beneath the earth's surface. Survey implies a regular, controlled survey of any date.
2	Unsurveyed	Survey data is does not exist or is very poor.
3	Inadequately Surveyed	Not surveyed to modern standards; or due to its age, scale, or positional or vertical uncertainties is not suitable to the type of navigation expected in the area.
4	Approximate	A position that is considered to be less than third-order accuracy, but is generally considered to be within 30.5 metres of its correct geographic location. Also may apply to an object whose position does not remain fixed.
5	Position Doubtful	Of uncertain position. The expression is used principally on charts to indicate that a wreck, shoal, etc., has been reported in various positions and not definitely determined in any.
6	Unreliable	A feature's position has been obtained from questionable or unreliable data.
7	Reported (Not Surveyed)	An object whose position has been reported and its position confirmed by some means other than a formal survey such as an independent report of the same object.
8	Reported (Not Confirmed)	An object whose position has been reported and its position has not been confirmed.
9	Estimated	The most probable position of an object determined from incomplete data or data of questionable accuracy.

Code	Label	Definition
10	Precisely Known	A position that is of a known value, such as the position of an anchor berth or other defined object.
11	Calculated	A position that is computed from data.

22.83 Remote Pilot

Definition : Indication as to whether pilotage is available remotely from shore or other location remote from the vessel requiring pilotage or not.

Type : boolean

CamelCase : remotePilot

Alias : RMTPLT

Remarks :

22.84 Reported Date

Definition : The date that the item was observed, done, or investigated.

Type : S100_TruncatedDate

CamelCase : reportedDate

Alias : SORDAT

Remarks :

22.85 Requirements for Maintenance of Listening Watch

Definition : Something needed to ensure constant acoustic monitoring.

Type : text

CamelCase : requirementsForMaintenanceOfListeningWatch

Alias :

Remarks :

22.86 Restriction

Definition : The official legal statute of each kind of restricted area.

Type : enumeration

CamelCase : restriction

Alias : RESTRN

Remarks : Defines the kind of restriction(s), for example, the restriction for ‘a game preserve’ may be ‘entry prohibited’, the restriction for an ‘anchoring prohibition’ is ‘anchoring prohibited’. The complete information about the restriction(s), actually held in handbooks or other publications, may be encoded using an Information type.

Code	Label	Definition
1	Anchoring Prohibited	An area within which anchoring is not permitted.

Code	Label	Definition
2	Anchoring Restricted	A specified area designated by appropriate authority, within which anchoring is restricted in accordance with certain specified conditions.
3	Fishing Prohibited	An area within which fishing is not permitted.
4	Fishing Restricted	A specified area designated by appropriate authority, within which fishing is restricted in accordance with certain specified conditions.
5	Trawling Prohibited	An area within which trawling is not permitted.
6	Trawling Restricted	A specified area designated by appropriate authority, within which trawling is restricted in accordance with certain specified conditions.
7	Entry Prohibited	An area within which navigation and/or anchoring is prohibited.
8	Entry Restricted	A specified area designated by appropriate authority, within which navigation is restricted in accordance with certain specified conditions.
9	Dredging Prohibited	An area within which dredging is not permitted.
10	Dredging Restricted	A specified area designated by appropriate authority, within which dredging is restricted in accordance with certain specified conditions.
11	Diving Prohibited	An area within which diving is not permitted.
12	Diving Restricted	A specified area designated by appropriate authority, within which diving is restricted in accordance with certain specified conditions.
13	No Wake	Mariners must adjust the speed of their vessels to reduce the wave or wash which may cause erosion or disturb moored vessels.
14	Area To Be Avoided	An IMO declared routeing measure comprising an area within defined limits in which either navigation is particularly hazardous or it is exceptionally important to avoid casualties and which should be avoided by all ships, or certain classes of ships.
15	Construction Prohibited	The erection of permanent or temporary fixed structures or artificial islands is prohibited.
16	Discharging Prohibited	An area within which discharging or dumping is prohibited.
17	Discharging Restricted	A specified area designated by an appropriate authority, within which discharging or dumping is restricted in accordance with specified conditions.
18	Industrial or Mineral Exploration/ Development Prohibited	An area within which industrial or mineral exploration and development are prohibited.
19	Industrial or Mineral Exploration/ Development Restricted	A specified area designated by an appropriate authority, within which industrial or mineral exploration and development is restricted in accordance with certain specified conditions.
20	Drilling Prohibited	An area within which excavating a hole on the sea-bottom with a drill is prohibited.
21	Drilling Restricted	A specified area designated by an appropriate authority, within which excavating a hole on the sea-bottom with a drill is restricted in accordance with certain specified conditions.
22	Removal of Historical Artefacts Prohibited	An area within which the removal of historical artefacts is prohibited.
23	Cargo Transhipment (Lightening) Prohibited	An area in which cargo transhipment (lightening) is prohibited.

Code	Label	Definition
24	Dragging Prohibited	An area in which the dragging of anything along the bottom, e.g. bottom trawling, is prohibited.
25	Stopping Prohibited	An area in which a vessel is prohibited from stopping.
26	Landing Prohibited	An area in which landing is prohibited.
27	Speed Restricted	An area within which speed is restricted.
28	Overtaking Prohibited	A specified area designated by appropriate authority, within which overtaking is generally prohibited.
29	Overtaking of Convoys by Convoys Prohibited	A specified area designated by appropriate authority, within which overtaking between convoys is prohibited.
30	Passing or Overtaking Prohibited	A specified area designated by appropriate authority, within which passing or overtaking is generally prohibited.
31	Berthing Prohibited	A specified area designated by appropriate authority, within which vessels, assemblies of floating material or floating establishments may not berth.
32	Berthing Restricted	A specified area designated by appropriate authority, within which berthing is restricted.
33	Making Fast Prohibited	A specified area designated by appropriate authority, within which vessels, assemblies of floating material or floating establishments may not make fast to the bank.
34	Making Fast Restricted	A specified area designated by appropriate authority, within which making fast to the bank is restricted.
35	Turning Prohibited	A specified area designated by appropriate authority, within which all turning is generally prohibited.
36	Restricted Fairway Depth	An area within which the fairway depth is restricted.
37	Restricted Fairway Width	An area within which the fairway width is restricted.
38	Use of Spuds Prohibited	The use of anchoring spuds (telescopic piles) is prohibited.
39	Swimming Prohibited	An area in which swimming is prohibited.
40	SOx Emission Restricted	An area within which the emission of SOx is restricted.
41	NOx Emission Restricted	An area within which the emission of NOx is restricted.
42	Power-Driven Vessels Prohibited	An area within which any vessel propelled by machinery is prohibited.
43	Passing or Overtaking of Convoys by Convoys Prohibited	A specified area designated by appropriate authority, within which passing or overtaking of convoys by convoys is prohibited

22.87 Scale Minimum

Definition : The minimum scale at which the feature may be used for example for ECDIS presentation.

Type : integer

CamelCase : scaleMinimum

Alias : SCAMIN

Remarks : The modulus of the scale is indicated, that is 1:1 250 000 is encoded as 1250000.

22.88 Service Access Procedure

Definition : A description of the procedure to access the marine service.

Type : text

CamelCase : serviceAccessProcedure

Alias :

Remarks :

22.89 Siltation Rate

Definition : A description of the rate at which the depth in an area decreases.

Type : text

CamelCase : siltationRate

Alias :

Remarks :

22.90 Source

Definition : The publication, document, or reference work from which information comes or is acquired.

Type : text

CamelCase : source

Alias :

Remarks : May be populated with the corresponding paper chart Notice to Mariners numbers, although other references are permitted.

22.91 Source Date

Definition : The production date of the source; for example the date of measurement.

Type : date

CamelCase : sourceDate

Alias : SORDAT

Remarks :

22.92 SRS Format Code

Definition : The standard ship reporting formats according to IMO Resolution A.531(13) General Principles for Ship Reporting System or IMO A.851(20).

Type : enumeration

CamelCase : sRSFormatCode

Alias :

Remarks :

Code	Label	Definition
1	IMO Ship Reporting Format A	IMO Ship Reporting Format A-Ship (alpha); Information required: Name, call sign or ship station identity, and flag
2	IMO Ship Reporting Format B	IMO Ship Reporting Format B-Time (bravo); Information required: A 6-digit group giving day of month (first two digits), hours and minutes (last four digits). If other than UTC state time zone used
3	IMO Ship Reporting Format C	IMO Ship Reporting Format C-Position (charlie); Information required: A 4-digit group giving latitude in degrees and minutes suffixed with N (north) or S (south) and a 5-digit group giving longitude in degrees and minutes suffixed with E (east) or W (west)
4	IMO Ship Reporting Format D	IMO Ship Reporting Format D-Position (delta); Information required: True bearing (first 3-digits) and distance (state distance) in nautical miles from a clearly identified landmark (state landmark)
5	IMO Ship Reporting Format E	IMO Ship Reporting Format E-Course (echo); Information required: True course, a 3-digit group
6	IMO Ship Reporting Format F	IMO Ship Reporting Format F-Speed (foxtrot); Information required: Speed in knots and tenths of knots, a 3-digit group
7	IMO Ship Reporting Format G	IMO Ship Reporting Format G-Departed (golf); Information required: Name of last port of call
8	IMO Ship Reporting Format H	IMO Ship Reporting Format H-Entry (hotel); Information required: Entry time expressed as in (B) and entry position expressed as in © or (D)
9	IMO Ship Reporting Format I	IMO Ship Reporting Format I-Destination and ETA (india); Information required: Name of port and date time group expressed as in (B)
10	IMO Ship Reporting Format J	IMO Ship Reporting Format J-Pilot (juliet); Information required: State whether a deep-sea or local pilot is on board
11	IMO Ship Reporting Format K	IMO Ship Reporting Format K-Exit (kilo); Information required: Exit time expressed as in (B) and exit position expressed as in © or (D)
12	IMO Ship Reporting Format L	IMO Ship Reporting Format L-Route (lima); Information required: Intended track
13	IMO Ship Reporting Format M	IMO Ship Reporting Format M-Radio communications (mike); Information required: State in full names of stations/frequencies guarded
14	IMO Ship Reporting Format N	IMO Ship Reporting Format N-Next report (november); Information required: Date time group expressed as in (B)
15	IMO Ship Reporting Format O	IMO Ship Reporting Format O-Draught (oscar); Information required: 4-digit group giving metres and centimetres
16	IMO Ship Reporting Format P	IMO Ship Reporting Format P-Cargo (papa); Information required: Cargo and brief details of any dangerous cargoes as well as harmful substances and gases that could endanger persons or the environment (See detailed reporting requirements)

Code	Label	Definition
17	IMO Ship Reporting Format Q	IMO Ship Reporting Format Q-Defect, damage, deficiency, limitations (quebec); Information required: Brief details of defects, damage, deficiencies or other limitations (See detailed reporting requirements)
18	IMO Ship Reporting Format R	IMO Ship Reporting Format R-Pollution/dangerous goods lost overboard (romeo); Information required: Brief details of type of pollution (oil, chemicals, etc.) or dangerous goods lost overboard; position expressed as in © or (D) (See detailed reporting requirements)
19	IMO Ship Reporting Format S	IMO Ship Reporting Format S-Weather (sierra); Information required: Brief details of weather and sea conditions prevailing
20	IMO Ship Reporting Format T	IMO Ship Reporting Format T-Agent (tango); Information required: Details of name and particulars of ship's representative or owner or both for provision of information (See detailed reporting requirements)
21	IMO Ship Reporting Format U	IMO Ship Reporting Format U-Size and type (uniform); Information required: Details of length, breadth, tonnage, and type, etc., as required
22	IMO Ship Reporting Format V	IMO Ship Reporting Format V-Medic (victor); Information required: Doctor, physician's assistant, nurse, personnel without medical training
23	IMO Ship Reporting Format W	IMO Ship Reporting Format W-Persons (whiskey); Information required: State number
24	IMO Ship Reporting Format X	IMO Ship Reporting Format X-Remarks (x-ray); Information required: Any other information-including, as appropriate, brief details of incident and of other ships involved either in incident, assistance or salvage (See detailed reporting requirements)
25	IMO Ship Reporting Format Y	IMO Ship Reporting Format Y-Relay (yankee); Information required: Content of report
26	IMO Ship Reporting Format Z	IMO Ship Reporting Format Z-End of report (zulu); Information required: No further information required

22.93 Source Type

Definition : Type of the source.

Type : enumeration

CamelCase : sourceType

Alias :

Remarks :

Code	Label	Definition
1	Law or Regulation	Treaty, convention, or international agreement; law or regulation issued by a national or other authority.
2	Official Publication	Publication not having the force of law, issued by an international organisation or a national or local administration.
7	Mariner Report, Confirmed	Reported by mariner(s) and confirmed by another source.

Code	Label	Definition
8	Mariner Report, Not Confirmed	Reported by mariner(s) but not confirmed.
9	Industry Publications and Reports	Shipping and other industry publications, including graphics, charts and web sites.
10	Remotely Sensed Images	Information obtained from satellite images.
11	Photographs	Information obtained from photographs.
12	Products Issued by HO Services	Information obtained from products issued by Hydrographic Offices.
13	News Media	Information obtained from news media.
14	Traffic Data	Information obtained from the analysis of traffic data.

22.94 Status

Definition : The condition of an object at a given instant in time.

Type : enumeration

CamelCase : status

Alias : STATUS

Remarks :

Code	Label	Definition
1	Permanent	Intended to last or function indefinitely.
2	Occasional	Acting on special occasions; happening irregularly.
3	Recommended	Presented as worthy of confidence, acceptance, use, etc.
4	Not in Use	Use has ceased, but the facility still exists intact; disused.
5	Periodic/ Intermittent	Recurring at intervals.
6	Reserved	Set apart for some specific use.
7	Temporary	Meant to last only for a time.
8	Private	Administered by an individual or corporation, rather than a State or a public body.
9	Mandatory	Compulsory; enforced.
12	Illuminated	Lit by floodlights, strip lights, etc.
14	Public	Belonging to, available to, used or shared by, the community as a whole and not restricted to private use.
15	Synchronized	Occur at a time, coincide in point of time, be contemporary or simultaneous.
16	Watched	Looked at or observed over a period of time especially so as to be aware of any movement or change.
17	Unwatched	Usually automatic in operation, without any permanently-stationed personnel to superintend it.
18	Existence Doubtful	A feature that has been reported but has not been definitely determined to exist.

Code	Label	Definition
28	Buoyed	Marked by buoys.

22.95 Telecommunication Identifier

Definition : An identifier, such as words, numbers, letters, symbols, or any combination of those used to establish a contact to a particular person, organisation or service.

Type : text

CamelCase : telecommunicationIdentifier

Alias :

Remarks :

22.96 Telecommunication Carrier

Definition : The name of a provider or type of carrier for a telecommunication service. This service may include land line based, shore based or satellite based radio connections.

Type : text

CamelCase : telecommunicationCarrier

Alias :

Remarks :

22.97 Telecommunication Service

Definition : Classification of methods of communication over a distance by electrical, electronic, or electromagnetic means.

Type : enumeration

CamelCase : telecommunicationService

Alias :

Remarks :

Code	Label	Definition
1	Voice	The transfer or exchange of information by using sounds that are being made by mouth and throat when speaking.
2	Facsimile	A system of transmitting and reproducing graphic matter (as printing or still pictures) by means of signals sent over telephone lines.
3	SMS	Short Message Service is a form of text messaging communication on phones and mobile phones.
4	Data	A representation of facts, concepts or instructions in a formalised manner suitable for communication, interpretation or processing.
5	Streamed Data	Data that is constantly received by and presented to an end-user while being delivered by a provider.
6	Telex	A system of communication in which messages are sent over long distances by using a telephone system and are printed by using a special machine (called a teletypewriter).
7	Telegraph	An apparatus, system or process for communication at a distance by electric transmission over wire.

Code	Label	Definition
8	Email	Messages and other data exchanged between individuals using computers in a network.

22.98 Text

Definition : A non-formatted digital text string.

Type : text

CamelCase : text

Alias : INFORM NINFOM

Remarks : Should be used, for example, to hold the information that is for short cautionary or explanatory notes. Therefore, text populated in text must not exceed 300 characters. Text may be in English, or in a national language. No formatting of text is possible within text. If formatted text, or text strings exceeding 300 characters, is required, then an alternate concept should be used.

22.99 Text Offset Bearing

Definition : The angular distance measured from true north that text associated with a feature is positioned from the feature in an end-user system.

Type : integer

CamelCase : textOffsetBearing

Alias :

Remarks :

Units: Degree of Arc **Definition**: 1° = (π/180) rad **Symbol**: °

Range: Lower Bound (Exclusive): 0 Upper Bound (Exclusive): 360

22.100 Text Offset Distance

Definition : The distance that text associated with a feature is positioned from the feature in an end-user system.

Type : integer

CamelCase : textOffsetDistance

Alias :

Remarks :

Units: Millimetre **Definition**: 1 metre = 1000 millimetres **Symbol**: mm

Range: Lower Bound (Exclusive): 0 Upper Bound (Inclusive): 50

22.101 Text Rotation

Definition : A statement that expresses if text associated with a feature is to be rotated in the ECDIS display or not.

Type : boolean

CamelCase : textRotation

Alias :

Remarks :

22.102 Text Type

Definition : The attribute from which a text string is derived.

Type : enumeration

CamelCase : textType

Alias :

Remarks :

Code	Label	Definition
1	Name	The individual name of a feature.

22.103 Thickness of Ice Capability

Definition : The thickness of ice that the ship can safely transit.

Type : integer

CamelCase : thicknessOfIceCapability

Alias :

Remarks :

Units: centimetres **Definition**: Centimetres (SI) **Symbol**: cm

Range: Lower Bound (Exclusive): 0 Upper Bound: (not specified)

22.104 Time of Day End

Definition : The time corresponding to the end of an active period.

Type : time

CamelCase : timeOfDayEnd

Alias :

Remarks : The time of day end must be encoded using 2 digits for the hour (hh), 2 digits for the minutes(mm) and 2 digits for the seconds (ss). This conforms to ISO 8601:2004.

22.105 Time of Day Start

Definition : The time corresponding to the start of an active period.

Type : time

CamelCase : timeOfDayStart

Alias :

Remarks : The time of day start must be encoded using 2 digits for the hour (hh), 2 digits for the minutes(mm) and 2 digits for the seconds (ss). This conforms to ISO 8601:2004.

22.106 Traffic Flow

Definition : Direction of vessels passing a reference point.

Type : enumeration

CamelCase : trafficFlow

Alias : TRAFIC

Remarks :

Code	Label	Definition
1	Inbound	Traffic flow in a general direction toward a port or similar destination.
2	Outbound	Traffic flow in a general direction away from a port or similar point of origin.
3	One-Way	Traffic flow in one general direction only.
4	Two-Way	Traffic flow in two generally opposite directions.

22.107 Under Keel Allowance Fixed

Definition : A fixed allowance given by an authority, which is added to draught in order to maintain a minimum under keel clearance.

Type : real

CamelCase : underKeelAllowanceFixed

Alias :

Remarks :

Units: metre **Definition**: SI metre **Symbol**: m

22.108 Under Keel Allowance Variable Beam Based

Definition : A percentage value, given by an authority, which is applied to ship's beam in order to calculate under keel allowance.

Type : real

CamelCase : underKeelAllowanceVariableBeamBased

Alias :

Remarks :

Range: Lower Bound (Exclusive): 0 Upper Bound: (not specified)

22.109 Under Keel Allowance Variable Draught Based

Definition : A percentage value, given by an authority, which is applied to ship's draught in order to calculate under keel allowance.

Type : real

CamelCase : underKeelAllowanceVariableDraughtBased

Alias :

Remarks :

Range: Lower Bound (Exclusive): 0 Upper Bound: (not specified)

22.110 Uncertainty Fixed

Definition : The best estimate of the fixed horizontal or vertical accuracy component for positions, depths, heights, vertical distances and vertical clearances.

Type : real

CamelCase : uncertaintyFixed

Alias : POSACC SOUACC VERACC

Remarks :

Units: Metre **Definition**: The basic unit of length in the International System of Units (SI) system.
Symbol: m

22.111 Uncertainty Variable Factor

Definition : The factor to be applied to the variable component of an uncertainty equation so as to provide the best estimate of the variable horizontal or vertical accuracy component for positions, depths, heights, vertical distances and vertical clearances.

Type : real

CamelCase : uncertaintyVariableFactor

Alias :

Remarks :

22.112 Vessel Performance

Definition : A description of the required handling characteristics of a vessel including hull design, main and auxiliary machinery, cargo handling equipment, navigation equipment and manoeuvring behaviour.

Type : text

CamelCase : vesselPerformance

Alias :

Remarks :

22.113 Vessels Characteristics

Definition : Characteristics of vessels.

Type : enumeration

CamelCase : vesselsCharacteristics

Alias : VSLCAR

Remarks :

Code	Label	Definition
1	Length Overall	The maximum length of the ship.
2	Length at Waterline	The ship’s length measured at the waterline.
3	Breadth	The width or beam of the vessel.
4	Draught	The depth of water necessary to float a vessel fully loaded.
6	Displacement Tonnage	A measurement of the weight of the vessel, usually used for warships. (Merchant ships are usually measured based on the volume of cargo space; see tonnage). Displacement is expressed either in long tons of 2,240 pounds or metric tonnes of 1,000 kg. Since the two units are very close in size (2,240 pounds = 1,016 kg and 1,000 kg = 2,205 pounds), it is common not to distinguish between them. To preserve secrecy, nations sometimes misstate a warship’s displacement.

Code	Label	Definition
7	Displacement Tonnage, Light	The weight of the ship excluding cargo, fuel, ballast, stores, passengers, and crew, but with water in the boilers to steaming level.
8	Displacement Tonnage, Loaded	The weight of the ship including cargo, passengers, fuel, water, stores, dunnage and such other items necessary for use on a voyage, which brings the vessel down to her load draft.
9	Deadweight Tonnage	The difference between displacement, light and displacement, loaded. A measure of the ship's total carrying capacity.
10	Gross Tonnage	The entire internal cubic capacity of the ship expressed in tons of 100 cubic feet to the ton, except certain spaces with are exempted such as: peak and other tanks for water ballast, open forecastle bridge and poop, access of hatchways, certain light and air spaces, domes of skylights, condenser, anchor gear, steering gear, wheel house, galley and cabin for passengers.
11	Net Tonnage	Obtained from the gross tonnage by deducting crew and navigating spaces and allowances for propulsion machinery.
12	Panama Canal/ Universal Measurement System Net Tonnage	The Panama Canal/Universal Measurement System (PC/UMS) is based on net tonnage, modified for Panama Canal purposes. PC/UMS is based on a mathematical formula to calculate a vessel's total volume; a PC/UMS net ton is equivalent to 100 cubic feet of capacity.
13	Suez Canal Net Tonnage	The Suez Canal Net Tonnage (SCNT) is derived with a number of modifications from the former net register tonnage of the Moorsom System and was established by the International Commission of Constantinople in its Protocol of 18 December 1873. It is still in use, as amended by the Rules of Navigation of the Suez Canal Authority, and is registered in the Suez Canal Tonnage Certificate.

22.114 Vessels Characteristics Unit

Definition : The unit used for vessel characteristics attribute.

Type : enumeration

CamelCase : vesselsCharacteristicsUnit

Alias : VSLUNT

Remarks :

Code	Label	Definition
1	Metres	The basic unit of length in the International System of Units (SI) system.
3	Metric Ton	The tonne or metric ton (U.S.), often redundantly referred to as a metric tonne, is a unit of mass equal to 1,000 kg (2,205 lb) or approximately the mass of one cubic metre of water at four degrees Celsius. It is sometimes abbreviated as mt in the United States, but this conflicts with other SI symbols. The tonne is not a unit in the International System of Units (SI), but is accepted for use with the SI. In SI units and prefixes, the tonne is a megagram (Mg). The Imperial and US customary units comparable to the tonne are both spelled ton in English, though they differ in mass. Pronunciation of tonne (the word used in the UK) and ton is usually identical, but is not too confusing unless accuracy is important as the tonne and UK long ton differ by only 1.6.
4	Ton	Long ton (weight ton or imperial ton) is the name for the unit called the "ton" in the avoirdupois or Imperial system of measurements, as used in the United Kingdom and several other Commonwealth countries. It has been mostly replaced by the tonne, and in the United States by the short ton. One long ton is equal to 2,240 pounds (1,016 kg) or 35 cubic feet (0.9911 m^3) of salt water with a density of 64 lb/ft^3(1.025 g/ml). It has some limited use in the United States, most commonly in measuring the displacement of ships,

Code	Label	Definition
		and was the unit prescribed for warships by the Washington Naval Treaty for example battleships were limited to a mass of 35,000 long tons (36,000 t; 39,000 ST).
5	Short Ton	A unit of weight equal to 2,000 pounds (907.18474 kg). In the United States it is often called simply ton without distinguishing it from the metric ton (tonne, 1,000 kilograms) or the long ton (2,240 pounds / 1,016.0469088 kilograms); rather, the other two are specifically noted. There are, however, some US applications for which unspecified tons normally means long tons (for example, Navy ships) or metric tons (world grain production figures). Both the long and short ton are defined as 20 hundredweights, but a hundredweight is 100 pounds (45.359237 kg) in the US system (short or net hundredweight) and 112 pounds (50.80234544 kg) in the Imperial system (long or gross hundredweight).
6	Gross Ton	Gross tonnage (GT) is a function of the volume of all ship's enclosed spaces (from keel to funnel) measured to the outside of the hull framing. There is a sliding scale factor. So GT is a kind of capacity-derived index that is used to rank a ship for purposes of determining manning, safety and other statutory requirements and is expressed simply as GT, which is a unitless entity, even though its derivation is tied to the cubic meter unit of volumetric capacity.Tonnage measurements are now governed by an IMO Convention (International Convention on Tonnage Measurement of Ships, 1969 (London-Rules)), which applies to all ships built after July 1982. In accordance with the Convention, the correct term to use now is GT, which is a function of the moulded volume of all enclosed spaces of the ship.
7	Net Ton	Net tonnage (NT) is based on a calculation of the volume of all cargo spaces of the ship. It indicates a vessel's earning space and is a function of the moulded volume of all cargo spaces of the ship.
9	Suez Canal Net Tonnage	The Suez Canal Net Tonnage (SCNT) is derived with a number of modifications from the former net register tonnage of the Moorsom System and was established by the International Commission of Constantinople in its Protocol of 18 December 1873. It is still in use, as amended by the Rules of Navigation of the Suez Canal Authority, and is registered in the Suez Canal Tonnage Certificate.

22.115 Vessels Characteristics Value

Definition : The value of a particular characteristic such as a dimension or tonnage of a vessel.

Type : real

CamelCase : vesselsCharacteristicsValue

Alias :

Remarks : Examples: VSLVAL = 12.345 + VSLCAR = 4 (draught) = draught of 12.345 VSLUNT = 1 (m); VSLVAL = 12345 + VSLCAR = 11 (net tonnage) = net tonnage of 12345 VSLUNT = 7 (net ton (NT)); VSLVAL = 123.45 + VSLCAR = 1 (length overall) = length overall of 123.45 VSLUNT = 1 (m).

22.116 Water Level Trend

Definition : The tendency of water level to change in a particular direction.

Type : enumeration

CamelCase : waterLevelTrend

Alias :

Remarks :

Code	Label	Definition
1	Decreasing	Becoming smaller in magnitude.
2	Increasing	Becoming larger in magnitude.

Code	Label	Definition
3	Steady	Constant.

22.117 Action or Activity

Definition : The action or activity of a vessel.

Type : S100_CodeList

CamelCase : actionOrActivity

Alias :

Remarks :

Code	Label	Definition
1	Navigating With a Pilot	Carrying a qualified pilot as part of the vessel navigation team.
2	Entering Port	Navigating a vessel into a port.
3	Leaving Port	Navigating a vessel out of a port.
4	Berthing	A signal station for the control of vessels when berthing.
5	Slipping	Detaching a vessel from a wharf or jetty.
6	Anchoring	Attaching a vessel to the seabed by means of an anchor and cable.
7	Weighing Anchor	Detaching a vessel from the seabed by recovering an anchor and cable.
8	Transiting	Navigating a vessel along a route or through a narrow gap, such as under a bridge or through a lock.
9	Overtaking	Navigating a vessel past another traveling broadly in the same direction.
10	Reporting	Providing details such as the name, location or intentions of a vessel.
11	Working Cargo	Loading or unloading cargo.
12	Landing	Placing crew or passengers on shore.
13	Diving	A signal or message warning of diving activity.
14	Fishing	Hunting or catching fish.
15	Discharging Overboard	Releasing anything into the sea; often ballast water; or spoil from dredging elsewhere.
16	Passing	Navigating a vessel past another travelling broadly in the opposite direction.
17	Ballast Water Exchange	Discharge and uptake of ballast water.
18	Hull Cleaning	The removal or treatment of biofouling (accumulation of aquatic organisms including microfouling and macrofouling) from a ship’s submerged surfaces, including hull and niche areas, conducted either in-water or during dry-docking. The process includes both proactive cleaning (periodic removal of microfouling) and reactive cleaning (removal of micro- and macrofouling as corrective action).
19	Scientific Research	The conduct of observational, sampling, or experimental activities by authorised personnel to collect scientific or environmental data, which may involve the deployment of scientific instruments, collection of biological or geological samples, or in-water survey operations.

Code	Label	Definition
20	Tourism	Organised recreational visitation and leisure activities in marine areas, including sight-seeing, wildlife observation, glass-bottom vessel tours, and guided nature excursions conducted by commercial or permitted operators.
21	Education	Structured activities conducted for training, awareness, or interpretive purposes involving groups or individuals learning about the marine environment, including guided educational programs, school activities, and field instruction conducted within designated marine areas.
22	Infrastructure Maintenance	Inspection, repair, or upkeep of existing marine or coastal infrastructure such as wharves, piers, pipelines, moorings, subsea cables, navigational aids, or coastal protection structures, including minor works that do not expand the original footprint.

22.118 Category of RxN

Definition : The principal subject matter of regulations, restrictions, recommendations or nautical information.

Type : S100_CodeList

CamelCase : categoryOfRxN

Alias :

Remarks :

Code	Label	Definition
1	Navigation	The process of directing the movement of a craft from one point to another.
2	Communication	Transmitting and/or receiving electronic communication signals.
3	Environmental Protection	Pertaining to environmental protection.
4	Wildlife Protection	Pertaining to wildlife protection.
5	Security	Pertaining to security.
6	Customs	The agency or establishment for collecting duties, tolls.
7	Cargo Operation	Pertaining to cargo operations.
8	Refuge	Pertaining to a place of safety or refuge.
9	Health	The authority with responsibility for checking the validity of the health declaration of a vessel and for declaring free pratique.
10	Natural Resources or Exploitation	Pertaining to natural resources or exploitation.
11	Port	Person or corporation, owners of, or entrusted with or invested with the power of managing a port. May be called a Harbour Board, Port Trust, Port Commission, Harbour Commission, Marine Department.
12	Finance	An authority with responsibility for the control and movement of money.
13	Agriculture	The science, art, or practice of cultivating the soil, producing crops, and raising livestock and in varying degrees the preparation and marketing of the resulting products.

22.119 Category of Vessel

Definition : Classification of vessels by function or use.

Type : S100_CodeList

CamelCase : categoryOfVessel

Alias :

Remarks :

Code	Label	Definition
1	General Cargo Vessel	A vessel which is designed for carrying general cargo, e.g. boxes, sacks.
2	Container Carrier	A vessel designed to carry ISO containers.
3	Tanker	A vessel which is designed for carrying liquid goods, for example oil or water.
4	Bulk Carrier	A vessel which is designed for carrying bulk goods, e.g. coal, ore or grain.
5	Passenger Vessel	A day trip or cabin vessel constructed and equipped to carry more than 12 passengers.
6	Roll-On Roll-Off	A vessel designed to allow road vehicles to be driven on and off; often a ferry.
7	Refrigerated Cargo Vessel	A vessel designed to carry refrigerated cargo.
8	Fishing Vessel	A vessel that is used and equipped for the fishing of living aquatic resources.
9	Service	A vessel which provides a service such as a tug, anchor handler, survey or supply vessel.
10	Warship	A vessel designed for the conduct of military operations.
11	Towed or Pushed Composite Unit	Either a tug and tow, or any combination of a tug providing propulsion to barges or vessels secured ahead or alongside.
12	Tug and Tow	A combination of tug(s) and non-powered tow(s).
13	Light Recreational	A pleasure boat or watercraft, or an excursion vessel used for short cruises such as whale watching.
14	Semi-Submersible Offshore Installation	An installation which is designed to float at all times and which is normally anchored in position when deployed in the offshore gas and oil industry.
15	Jack-Up Exploration or Project Installation	An exploration or project installation with legs which can be raised and lowered. The legs are raised when the installation is re-positioned. When stationary the legs are lowered to the sea floor and the working platform is raised clear of the sea surface.
16	Livestock Carrier	A vessel designed to carry large quantities of live animals.
17	Sport Fishing	A vessel used in fishing for pleasure or competition.

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23 Complex Attributes

23.1 Bearing Information

Definition : A bearing is the direction one object is from another object.

CamelCase : bearingInformation

Alias :

Remarks :

- At least one of the sub-attributes must be populated.

Sub-attributes :

Sub-Attribute	Type	Multiplicity
cardinalDirection	enumeration	0,1
distance	real	0,1
information	Complex	0,*
orientation	Complex	0,1

23.2 Contact Address

Definition : Direction or superscription of a letter, package, etc., specifying the name of the place to which it is directed, and optionally a contact person or organisation who should receive it.

CamelCase : contactAddress

Alias :

Remarks :

Sub-attributes :

Sub-Attribute	Type	Multiplicity
deliveryPoint	text	0,1
cityName	text	0,1
administrativeDivision	text	0,1
countryName	text	0,1
postalCode	text	0,1

23.3 Feature Name

Definition : Provides the name of an entity, defines the national language of the name, and provides the option to display the name at various system display settings.

CamelCase : featureName

Alias :

Remarks :

Sub-attributes :

Sub-Attribute	Type	Multiplicity
language	text	1,1
name	text	1,1
nameUsage	enumeration	0,1

23.4 Fixed Date Range

Definition : An active period of a single fixed event or occurrence, as the date range between discrete start and end dates.

CamelCase : fixedDateRange

Alias :

Remarks : Dates must be encoded in the format YYYYMMDD; using 4 digits for the calendar year (YYYY) and, optionally, 2 digits for the month (MM) (for example April = 04) and 2 digits for the day (DD). When no specific month and/or day is required/known, the values are replaced with dashes (-). The date range of a recurring event or occurrence must be encoded using periodicDateRange.

Sub-attributes :

Sub-Attribute	Type	Multiplicity
dateStart	S100_TruncatedDate	0,1
dateEnd	S100_TruncatedDate	0,1

23.5 Frequency Pair

Definition : A pair of frequencies for transmitting and receiving radio signals. The shore station transmits and receives on the frequencies indicated.

CamelCase : frequencyPair

Alias : FRQPAR

Remarks :

Sub-attributes :

Sub-Attribute	Type	Multiplicity
frequencyShoreStationReceives	integer	0,1
frequencyShoreStationTransmits	integer	1,1

23.6 Graphic

Definition : Pictorial information such as a photograph, sketch or other graphic, optionally accompanied by descriptive information about the graphic and the location relative to its subject from which it was made.

CamelCase : graphic

Alias :

Remarks :

Sub-attributes :

Sub-Attribute	Type	Multiplicity
pictorialRepresentation	text	1,*
pictureCaption	text	0,1
sourceDate	date	0,1
pictureInformation	text	0,1
bearingInformation	Complex	0,1

23.7 Horizontal Position Uncertainty

Definition : The best estimate of the accuracy of a position.

CamelCase : horizontalPositionUncertainty

Alias : POSACC

Remarks : The expected input is the maximum of the two-dimensional error. The error is assumed to be positive and negative.

Sub-attributes :

Sub-Attribute	Type	Multiplicity
uncertaintyFixed	real	1,1
uncertaintyVariableFactor	real	0,1

23.8 Information

Definition : Textual information about the feature. The information may be provided as a string of text or as a file name of a single external text file that contains the text.

CamelCase : information

Alias : INFORM

Remarks : At least one of the sub-attributes file reference or text must be populated.The sub-attribute file reference is generally used for long text strings or those that require formatting, however, there is no restriction on the type of text (except for lexical level) that can be held in files referenced by sub-attribute file reference.

Sub-attributes :

Sub-Attribute	Type	Multiplicity
fileLocator	text	0,1
fileReference	text	0,1
headline	text	0,* (ordered)
language	text	0,1
text	text	0,1

23.9 Notice Time

Definition : Span of time, prior to the time the service is needed, for preparations to be made to fulfill the requirement.

CamelCase : noticeTime

Alias :

Remarks :

Sub-attributes :

Sub-Attribute	Type	Multiplicity
noticeTimeHours	real	0,* (ordered)
noticeTimeText	text	0,1
operation	enumeration	0,1

23.10 Online Resource

Definition : Information about online sources from which a resource or data can be obtained.

CamelCase : onlineResource

Alias :

Remarks :

Sub-attributes :

Sub-Attribute	Type	Multiplicity
linkage	URI	1,1
protocol	text	0,1
applicationProfile	text	0,1
nameOfResource	text	0,1
onlineResourceDescription	text	0,1
onlineFunction	enumeration	0,1
protocolRequest	text	0,1

23.11 Orientation

Definition : (1) The angular distance measured from true north to the major axis of the feature. (2) In ECDIS, the mode in which information on the ECDIS is being presented. Typical modes include: north-up — as shown on a nautical chart, north is at the top of the display; Ships head-up — based on the actual heading of the ship, (e.g. Ships gyrocompass); course-up display — based on the course or route being taken.

CamelCase : orientation

Alias :

Remarks :

Sub-attributes :

Sub-Attribute	Type	Multiplicity
orientationUncertainty	real	0,1
orientationValue	real	1,1

23.12 Periodic Date Range

Definition : The active period of a recurring event or occurrence.

CamelCase : periodicDateRange

Alias :

Remarks : The sub-attributes date start and date end should be encoded using 4 digits for the calendar year (YYYY), 2 digits for the month (MM) (for example April = 04) and 2 digits for the day (DD). When no specific year is required (that is, the feature is removed at the same time each year) the following two cases may be considered: — same day each year: ——MMDD — same month each year: ——MM — This conforms to ISO 8601:2004.

Sub-attributes :

Sub-Attribute	Type	Multiplicity
dateStart	S100_TruncatedDate	1,1
dateEnd	S100_TruncatedDate	1,1

23.13 RxN Code

Definition : A summary of the impact of the most common types of regulation, restriction, recommendation and nautical information on a vessel.

CamelCase : rxNCode

Alias :

Remarks :

Sub-attributes :

Sub-Attribute	Type	Multiplicity
categoryOfRxN	S100_CodeList	0,1
actionOrActivity	S100_CodeList	0,1
headline	text	0,* (ordered)

23.14 Schedule by Day of Week

Definition : The nature and timings of a daily schedule by days of the week.

CamelCase : scheduleByDayOfWeek

Alias :

Remarks :

Sub-attributes :

Sub-Attribute	Type	Multiplicity
categoryOfSchedule	enumeration	0,1
text	text	0,1
timeIntervalsByDayOfWeek	Complex	1,*

23.15 Source Indication

Definition : Information about the source document, publication, or reference from which object data or textual material included or referenced in a dataset are derived.

CamelCase : sourceIndication

Alias :

Remarks :

Sub-attributes :

Sub-Attribute	Type	Multiplicity
categoryOfAuthority	enumeration	0,1
countryName	text	0,1
source	text	0,1
sourceType	enumeration	0,1
reportedDate	S100_TruncatedDate	0,1
featureName	Complex	0,*

23.16 Survey Date Range

Definition : The complex attribute describes the period of the hydrographic survey, as the time between its sub-attributes.

CamelCase : surveyDateRange

Alias :

Remarks :

Sub-attributes :

Sub-Attribute	Type	Multiplicity
dateStart	S100_TruncatedDate	0,1
dateEnd	S100_TruncatedDate	1,1

23.17 Spatial Accuracy

Definition : Provides an indication of the vertical and horizontal positional uncertainty of bathymetric data, optionally within a specified date range.

CamelCase : spatialAccuracy

Alias :

Remarks :

Sub-attributes :

Sub-Attribute	Type	Multiplicity
fixedDateRange	Complex	0,1
horizontalPositionUncertainty	Complex	0,1

23.18 Telecommunications

Definition : A means or channel of communicating at a distance by electrical or electromagnetic means such as telegraphy, telephony, or broadcasting.

CamelCase : telecommunications

Alias :

Remarks : If no value is populated for the sub-attribute telecommunication service, this means the service is by voice communication. If no value is populated for the sub-attribute telecommunication carrier, this means the service is by land line communication.

Sub-attributes :

Sub-Attribute	Type	Multiplicity
categoryOfCommunicationPreference	enumeration	0,1
telecommunicationIdentifier	text	1,1
telecommunicationCarrier	text	0,1
contactInstructions	text	0,1
telecommunicationService	enumeration	0,*

23.19 Text Content

Definition : Textual material, or a pointer to a resource providing textual material. May be accompanied by basic information about its source and relationship to the source.

CamelCase : textContent

Alias : TXTCON

Remarks : Exactly one of sub-attributes onlineResource or information must be completed in one instance of textContent. Product specifications may restrict the use or content of onlineResource for security. For example, a product specification may forbid populating onlineResource. Product specification authors must consider whether applications using the data product may be prevented from accessing off-system resources by security policies.

Sub-attributes :

Sub-Attribute	Type	Multiplicity
categoryOfText	enumeration	0,1
information	Complex	0,*
onlineResource	Complex	0,1
sourceIndication	Complex	0,*

23.20 Time Intervals by Day of Week

Definition : The regular weekly operation times of a service or schedule.

CamelCase : timeIntervalsByDayOfWeek

Alias :

Remarks :

Sub-attributes :

Sub-Attribute	Type	Multiplicity
dayOfWeek	enumeration	0,7 (ordered)
dayOfWeekIsRange	boolean	0,1
timeOfDayStart	time	0,* (ordered)
timeOfDayEnd	time	0,* (ordered)

23.21 Under Keel Allowance

Definition : A fixed figure, or a figure derived by calculation, which is added to draught in order to maintain the minimum under keel clearance taking into account the vessel's static and dynamic characteristics, sea state and weather forecast, the reliability of the chart and variance from predicted height of tide or water level.

CamelCase : underKeelAllowance

Alias :

Remarks :

Sub-attributes :

Sub-Attribute	Type	Multiplicity
underKeelAllowanceFixed	real	0,1
underKeelAllowanceVariableBeamBased	real	0,1
underKeelAllowanceVariableDraughtBased	real	0,1
operation	enumeration	0,1

23.22 Vessel Measurements Specification

Definition : Combinations of values of measurable characteristics or dimensions of vessels, used to specify size and tonnage ranges.

CamelCase : vesselMeasurementsSpecification

Alias :

Remarks : Combines (i) specifications of vessels' measurable characteristics (length, beam, tonnages, etc.), (ii) limit values for the specified characteristics (with units), (iii) arithmetical comparison operators (greater than, etc.), and (iv) logical operators (AND/OR) to define a subset of vessels characterized by the specified ranges. For example, the combination (draught, 10.5, metres, greaterThan) describes "vessels with draught greater than 10.5 metres".

Sub-attributes :

Sub-Attribute	Type	Multiplicity
comparisonOperator	enumeration	1,1
vesselsCharacteristics	enumeration	1,1
vesselsCharacteristicsValue	real	1,1
vesselsCharacteristicsUnit	enumeration	1,1