

# **Draft Report of the Second Meeting of the S-129 Project Team**

Grand Hotel Savoia Genova  
Via Arsenale Di Terra, 5  
16126 Genova

## **1.1 Welcome and introductions**

Captain Luigi Sinapi, director of the Italian Hydrographic Institute welcomed PT members to Genoa and wished the meeting well.

Commander Carlo Marchi of the Italian Hydrographic Institute added his welcome and briefed the PT on logistic arrangements for the meeting.

PT members introduced themselves ([see attachment 1](#)).

## **1.2 Organisational arrangements, meeting expectations and opening statements**

The PT agreed to accept the draft agenda and noted the agenda is flexible.

The Chair outlined the aims of the meeting, which are to further populate the developing PS within the time available, focussing on the data model and portrayal sections. It was proposed that the PT could separate into two small working groups to enable modelling and portrayal work to be carried out concurrently.

Several matters were raised during opening statements:

- Several PT members advised of work taking place to establish high precision navigation projects, some of which include UKC.
- The Korean Hydrographic & Oceanographic Agency are undertaking test bed work for UKCM.
- Some Korean organisations are considering how to implement the S-129 PS.

Inputs from Intertanko received by emails and from discussions at IMO NCSR 4 (the previous week) were outlined. In summary, there is some concern that UKCM is being 'pushed' from ashore which could result in resistance to acceptance of UKCM as an Aid to Navigation service.

In response to Intertanko's concerns, the PT agreed that its work should focus on the key information output types from a UKCM analysis/calculation. The PT agreed it need not concern itself with the source of UKCM information or related administrative matters since these should be discussed in other higher level fora.

## **1.3 Review of minutes of last meeting**

Action items from the first PT meeting were reviewed with all action items noted as completed, except for one action item that involves the PT's ongoing development of the PS.

The Chair commented that between the first and second meeting some work has been done by Prof Seojeong Lee (RoK), Chris Henns (OMC) and Stefan Engstrom (Finland) to further develop the data model.

**Version 1.0**

The PT noted a report from an ad hoc meeting involving several PT members that took place at OMC in Melbourne in December 2016. The report provided further consideration on how to display 'no go' areas.

One of the action items from UKCMPT 1 was to propose to NIPWG3, to include information on shore-based Under Keel Clearance Management systems in the appropriate nautical publications.

NIPWG took note of the paper and discussed possible actions. NIPWG agreed in principle to items c and d in the paper that was provided by the UKCM PT Chair, but considered that the driver for including information in Nautical publications needs to come from the Maritime Authorities who implement such schemes. NIPWG found it inappropriate to recommend to member states what to include. NIPWG made action Items 3/25 and 3/26 to continue monitoring the work of the UKCM PT, and to incorporate an example of UKCM- data in the S-127 Traffic Management test data set.

***UKCM PT 2 Action item 1.*** Chair to provide a follow-up proposal to NIPWG and the S-101 Project Team proposing that S-127 include a feature attribute for a UKCM system (in a port or other area). The proposal should outline the information types that should be included.

#### **1.4 Presentation of Torres Strait UKCM system**

The Chair provided a presentation on the UKCM System AMSA uses in Torres Strait. The presentation included an overview of the system's functionality, regulation and the reasons for establishing the system.

The information provided enabled the PT to further discuss and understand the need for the UKCM PS. The PT considered the purpose of route plans for UKCM, and the accuracy and uncertainty levels of input information and modelling. The PT agreed that there could usefully be an option to include accuracy and uncertainty information in the PS. However, the PT agreed that at this stage it is not necessary to include uncertainty information in the draft PS.

***UKCM PT 2 Action item 2.*** Chair to make the Torres Strait UKCM presentation file available on the IHO website.

#### **2.1 Review of UKCM information required on board (go, no-go, route and transit windows)**

The PT reviewed its earlier discussions on the UKCM information that is most needed to be included in the PS. Topics discussed included:

- symbology, including qualities such as transparency and colour,
- use of a safety contour and the problem of one contour needing to vary in its depth value based on the time a vessel will reach individual points along the contour,
- limitations of current ENCs to display safety contours (e.g. 5m, 10m, etc),
- a dynamic safety contour would require an update to the capability of ECDIS (including ENCs) to facilitate contours at higher resolution than is currently typically available (e.g. 0.1m intervals),
- building a PS that will work with ECDIS and ENCs as they are today, or whether the PT should not limit its work to the current ECDIS capability – the outcome was that the PT should not limit the PS to current ECDIS and ENC capability.

In concluding this discussion, the PT agreed that portrayal will need user testing and refining, including in 'true motion' and 'relative motion' display modes.

### **3.2 Mariners perspective on the display of S-129**

The Chair reminded the PT of the SOLAS requirement for mariners to plan a ship's passage from berth to berth and then to monitor navigation from berth to berth.

The PT discussed mariner's needs for information display to help inform the PT's deliberations on portrayal. The following points arose during discussions, including some agreed principles:

- UKCM information should be kept distinguishable from underlying navigation display information (e.g. ECDIS and INS),
- Options/considerations:
  - red lines,
  - transparency,
  - cross hatching,
  - change to dotted line when information is 'time expired',
- Interaction with other navigation system information (e.g. priority of display) - the 'go' area should cover safety contour artefacts but not obscure AtoN, cables, pipelines, no anchorage areas, etc,
- When approximating 'no go' and 'go' areas long edged polygons could approximate the areas, but care would be needed to not to over approximate the area to preserve the usefulness of the information displayed,
- The PT agreed that 'no go' and 'go' areas should be used - the 'go' area will be complementary to the 'no go' area (using the same vertices) but with closed off ends,
- The UKCM route could be provided multiple times, but the aim should be to not update the location of the route but only the meta data and other time related information,
- Suppressing ECDIS alerts based on the safety depth contour might only be possible using a 'go area', and
- The PT agreed to assume an Internet connection of some kind will most likely be needed to provide UKCM information to navigation displays (e.g. ECDIS and INS).

In concluding this discussion, the PT agreed there will need to be an analysis of the relative benefits of using 8211 or GML for transmission of UKCM information.

***UKCM PT 3 Action item 3.*** Chair to coordinate, by correspondence, a PT discussion and analysis of the benefits of using 8211 or GML to decide which one should be used in S-129.

### **4.1 S-129 data model explanatory presentation**

Prof Seojeong Lee (RoK) provided a presentation on data modelling which included an introduction to data modelling in general and the status of the S-129 data model.

Following the presentation, the PT discussed the next steps for data modelling:

- The data model can be simplified since the route exchange sections (RTZ format) do not need to be included but can simply be referred to,
- The PT should avoid creating new data items and instead use any existing items where available, and

- When considering portrayal, the PT should consider scaling (e.g. use of SCAMIN and SCAMAX to control between what scales S-129 feature is displayed).

## **4.2 Discussion on data transfer methods**

Using a summary brief (provided electronically, and included in [attachment 6](#)) the Chair led a discussion on the developing VDES which facilitated further discussion about communication methods, file sizes, and connection of INS and ECDIS to sources of information received by communications equipment.

The PT briefly considered security implications including cyber security. It was agreed that authentication can be used to check data integrity including its source (e.g. public and private keys). The PT was advised by Hannu Pippeon (Feruno) that current S-100 development work includes ways to deal with cyber security, as much as is possible within S-100.

The PT decided to leave any further discussion on these topics, and to focus on the needed information types and how it should best be portrayed.

## **5.1 Presentation: Visualising Uncertainty of Bathymetric Data and Under Keel Clearance**

Stefan Gladisch from Fraunhofer IGD provided a presentation on research conducted into the display of uncertainty information, and which was described in one of the meeting input papers.

The presentation facilitated a discussion by the PT on the need or otherwise to consider including uncertainty information in S-129.

The PT agreed multiple sources of uncertainty should be described in an aggregated way and provided to users using a quantitative description. The PT reaffirmed its decision that it is not necessary at the current stage of development to include uncertainty information in S-129. The PT also agreed that outside of S-129, providers of a UKCM service are free to consider providing information about the uncertainties in their information products and how the uncertainties are dealt with.

The PT agreed that some of the graphical presentation solutions provided by Stefan Gladisch were useful to help inform S-129 portrayal.

## **5.3 to 6.1 Data modelling and portrayal development**

Before the PT divided into two working groups, several portrayal issues were discussed:

- Go and No-go areas should be user selectable, since if not this would deny mariners access to underlying data that they may still need from time to time,
- Visualisation of planned speed over the ground,
- Portrayal of features - consider what parts of the ENC can be obscured / suppressed (i.e. what display priority is to be used for the UKCM information),
- Use of lines, shapes and priority of display, and
- After developing the data model, portrayal catalogue and rules, the PT will next need to generate test data and consider avenues to carry out testing.

Advice from the chair of the S-100 WG was to choose clear and unambiguous feature/object names, noting that other product specs can make use of the feature names (e.g. no-go areas could potentially be used for marine protected areas).

The PT worked in two groups to develop the S-129 data model and portrayal sections of the PS. The PT's work on data modelling is in [attachment 3](#) and the PT's work on portrayal is in [attachment 4](#).

In taking S-129 forward it will be necessary for an IHO member state to submit S-129 into the IHO registry.

**UKCM PT 2 Action item 4.** *Chair to appoint a member of the PT to be the 'submitter' to input S-129 into the IHO registry (note – this person needs to represent an IHO member state).*

## 8.1 Concluding discussions

The S-100 WG Chair provided the PT with S-412 and suggested it has similarities to S-129 and could be used to help guide the further development of S-129.

Road map: The PT discussed and agreed to the following road map, based on advice from the Chair of the S-100 WG, and noting that testing needs to happen at most stages (PT members/organisations that agreed to lead areas of work are included in brackets):

1. Feature model (Scott Reeves, Stefan Engstrom, Seojeong Lee)
  - a. Definitions (Scott Reeves, Stefan Engstrom, Seojeong Lee)
2. Register in the GI Registry (Appointed individual (Luke Pugsley) – Chair to advise Jeff Wooten at IHO)
  - a. Register any new features
  - b. Register any new portrayals
3. Build feature catalogue (KHOA)
4. Build portrayal catalogue (KRISO)
5. Complete drafting the PS document
  - a. Testing – need to create some test data (OMC and Transas)
6. PT carry out a final overarching review (Chair to coordinate)
  - a. Decide on a final version of S-129 (if needed Chair to convene S-129 UKCM PT meeting)
7. Deliver completed draft S-129 PS to the HSSC via the S-100 WG (Chair)

**UKCM PT Action item 5** (replaces UKCM PT 1 Action item 3). The PT agreed work will continue by correspondence starting with updating the draft version of S-129 with the information developed at UKCM PT 2 and included in this report, and in [attachments 3](#) and [4](#) in particular.

## 8.2 Draft meeting report and next meeting

The Chair led a discussion covering the main decisions made and actions agreed during the PT meeting and undertook to provide a draft meeting report to attendees by email for comment and subsequent finalisation.

**UKCM PT 2 Action item 1.** *Chair to provide a follow-up proposal to NIPWG and the S-101 Project Team proposing that S-127 include a feature attribute for a UKCM system (in a port or other area). The proposal should outline the information types that should be included.*

**UKCM PT 2 Action item 2.** Chair to make the Torres Strait UKCM presentation file available on the IHO website.

**UKCM PT 2 Action item 3.** Chair to coordinate, by correspondence, a PT discussion and analysis of the benefits of using 8211 or GML to decide which one should be used in S-129.

**UKCM PT 2 Action item 4.** Chair to appoint a member of the PT to be the 'submitter' to input S-129 into the IHO registry (note – this person needs to represent an IHO member state).

**UKCM PT Action item 5** (replaces UKCM PT 1 Action item 3). The PT agreed work will continue by correspondence starting with updating the draft version of S-129 with the information developed at UKCM PT 2 and included in this report, and in **attachments 3 and 4** in particular.

Next meeting: No date was set for the next meeting. The PT agreed to progress development of S-129 by correspondence with a view to considering the need for a further meeting late in 2017 or early 2018 if a need arises. In this context, the PT was advised the next meeting of the S-100 WG would take place in March or April 2018 in Singapore.

**Attachments:**

1. Attendance list
2. Agenda UKCM PT 2
3. Data model development
4. Portrayal development
5. VHF Data Exchange System (VDES) - Information brief
6. UKCM PT 2 photos

**UKCM PT 2 Attendance List**

**Attended on day 1 and 2:**

Nick Lemon	Australian Maritime Safety Authority
Seojeong Lee	Korea Maritime and Ocean University
Chris Hens	OMC International
Hannu Peiponen	Furuno
Konstantin Ivanov	Transas
Per-Olof Seiron	Swedish Maritime Administration
Julia Powell	National Oceanic & Atmospheric Administration (Chair of S-100 WG)
Stegan Engstrom	Finnish Transport Agency
Scott Reeves	National Geospatial-Intelligence Agency
Yong Baek	Republic of Korea (Vice Chair of S-100 WG)
Junshik Lee	Korea Hydrographic and Oceanographic Agency
Jueun Kim	Republic of Korea

**Attended on day 2:**

Stefan Gladisch	Fraunhofer IGD
Dave Brazier	US

**UKCM PT 2 Agenda**

## Agenda for the Second Meeting of the S-129 Project Team

**Venue:**

Grand Hotel Savoia Genova  
Via Arsenale Di Terra, 5  
16126 Genova

**Session 1 – Monday 0900-1030**

- |     |  |         |
|-----|--|---------|
| 1.1 | Welcome and introductions                            | (All)   |
| 1.2 | Organisational arrangements and meeting expectations | (Chair) |
| 1.3 | Review of minutes of last meeting                    | (All)   |
| 1.4 | Program outline                                      | (Chair) |

**Session 2 – Monday 1050-1200**

- |     |   |         |
|-----|---|---------|
| 2.1 | Review of UKCM information required onboard<br>(go, no-go, route transit windows) | (Chair) |
|-----|---|---------|

**Session 3 – Monday 1300-1430**

- |     |  |              |
|-----|--|--------------|
| 3.2 | Mariners perspective of the display of S-129 | (Chair, all) |
|-----|--|--------------|

**Session 4 – Monday 1450-1700**

- |     |   |                |
|-----|---|----------------|
| 4.1 | S-129 data model explanatory presentation | (Seojeong Lee) |
| 4.2 | Discussion on data transfer methods       | (Chair, All)   |

**Session 5 – Tuesday 0900-1030**

- |     |   |                   |
|-----|---|-------------------|
| 5.1 | Presentation: Visualising Uncertainty of Bathymetric Data<br>and Under Keel Clearance | (Stefan Gladisch) |
| 5.2 | Data modelling discussion   | (All)             |
| 5.3 | Data modelling development  | (All)             |

**Session 6 – Tuesday 1050-1200**

- |     |                            |       |
|-----|----------------------------|-------|
| 6.1 | Data modelling development | (All) |
|-----|----------------------------|-------|

**Session 7 – Tuesday 1300-1430**

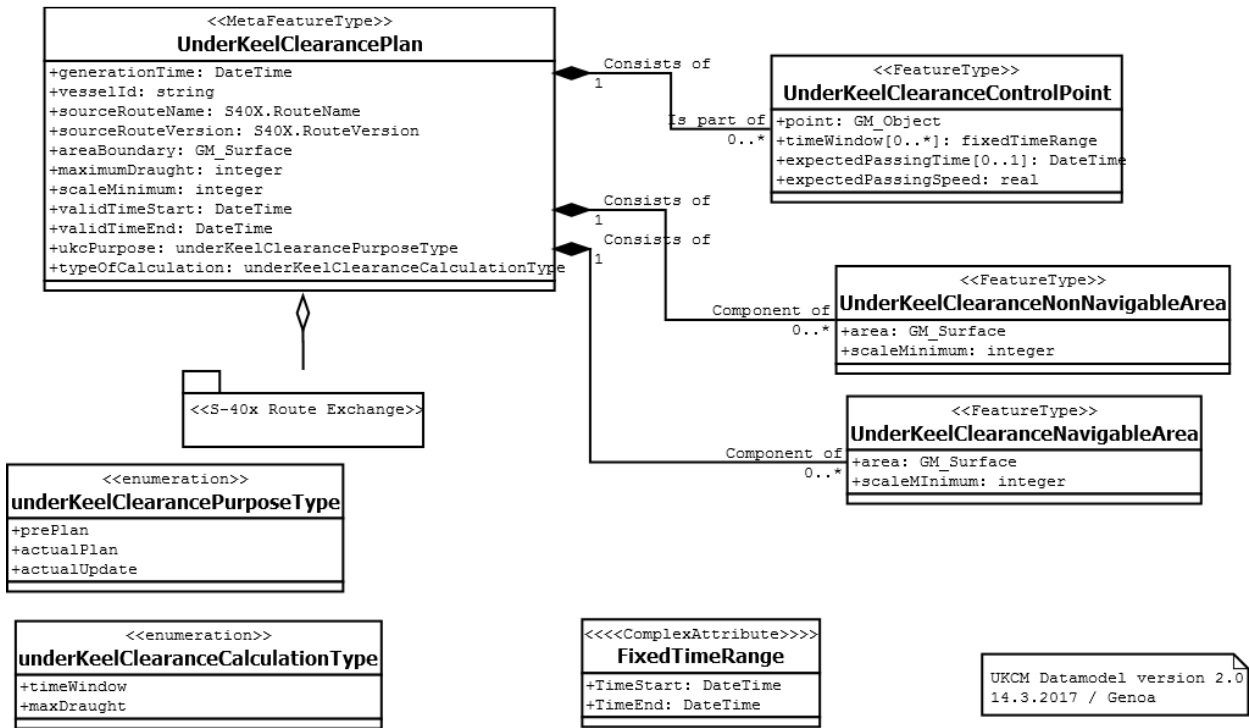
- |     |                            |       |
|-----|----------------------------|-------|
| 7.1 | Data modelling development | (All) |
|-----|----------------------------|-------|

**Session 8 – Tuesday 1450-1700**

- |     |                        |         |
|-----|------------------------|---------|
| 8.1 | Concluding discussions | (All)   |
| 8.2 | Draft meeting report   | (Chair) |



Data model development



## MetaFeatureType

### UnderKeelClearancePlan

Role	Name	Description	Multiplicity	dataType	Remarks
Class	UnderKeelClearancePlan	A UKC plan calculated for a particular vessel and a particular passage		MetaFeatureType	
Attribute	generationTime	Time the plan was generated	1	DateTime	
Attribute	vesselID	Unique identification of the vessel used for the calculation	1	CharacterString	
Attribute	sourceRouteName	Identification of the route used as a source for the calculation	0..1	S40X.RouteName	
Attribute	sourceRouteVersion	Identification of the route used as a source for the calculation	0..1	S40X.RouteVersion	
Attribute	areaBoundary	Boundaries of the Under Keel Clearance management area	1	GM_Surface	
Attribute	maximumDraught	The maximum vessel draught in meters, used as base for the calculation	1	integer	
Attribute	scaleMinimum	Display range for ECDIS	1	integer	

Attribute	validTimeStart	Validity start time of the current calculation	1	DateTime	
Attribute	validTimeEnd	Validity end time of the current calculation	1	DateTime	
Attribute	ukcPurpose	The purpose of the current calculation	1	underKeelClearancePurposeType	
Attribute	typeOfCalculation	The type of calculation	1	underKeelClearanceCalculationType	

## Feature Type

### UnderKeelClearanceControlPoint

Role	Name	Description	Multiplicity	Data Type	Remarks
Class	UnderKeelClearanceControlPoint	Especially selected critical passage point or line.		FeatureType	
Attribute	point	Point or line geometry describing the critical passage	1	GM_Object	
Attribute	timeWindow	Time windows assigned to vessel for this controlpoint	0..*	FixedTimeRange	Only preplan can have multiple timeWindows.
Attribute	expectedPassingTime	The expected passing time at this point. (Within the timeWindow)	0..1	DateTime	This time shall reflect the schedule used for generating areas
Attribute	expectedPassingSpeed	The planned average speed between consecutive control points.	0..1	real	

### UnderKeelClearanceNonNavigableArea

Role	Name	Description	Multiplicity	dataType	Remarks
Class	<b>UnderKeelClearanceNonNavigableArea</b>	An area of depth less than the calculated safe limit.		FeatureType	The area has a time-dependent dimension

Attribute	area		1	GM_Surface	
Attribute	scaleMinimum		1	integer	

## UnderKeelClearanceNavigableArea

Role	Name	Description	Multiplicity	Data Type	Remarks
Class	<b>UnderKeelClearanceNavigableArea</b>	An area of depth more than the calculated safe limit.		FeatureType	The area has a time-dependent dimension
Attribute	area		1	GM_Surface	
Attribute	scaleMinimum		1	integer	

## ComplexAttribute

### FixedTimeRange

Role	Name	Description	Multiplicity	Data Type	Remarks
Complex	FixedTimeRange				
Attribute	TimeStart		1	DateTime	
Attribute	TimeEnd		1	DateTime	

## Enumerations




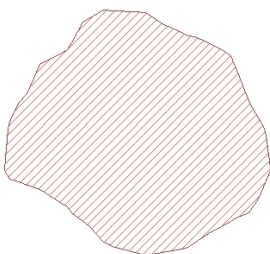

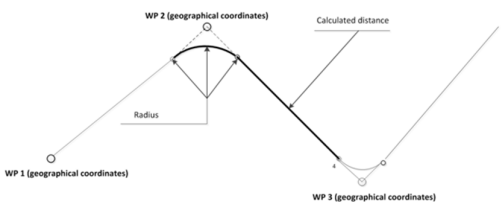
### underKeelClearancePurposeType

Role	Name	Description	Multiplicity	Data Type	Remarks
Enumeration	<b>underKeelClearancePurposeType</b>				
Literal	actualPlan				
Literal	actualUpdate				

### underKeelClearanceCalculationType

Role	Name	Description	Multiplicity	Data Type	Remarks
Enumeration	<b>underKeelClearanceCalculationType</b>	Indication of how the plan was calculated			
Literal	timeWindow	UkcPlan returns available TimeWindow (s) for given draught			
Literal	maxDraught	UkcPlan returns maximum draught for given TimeWindow			

## Portrayal development

Description	Symbology	Notes
Control point		It is proposed to rotate the symbol such that it is perpendicular to the route.
Control point information box	<div style="border: 1px solid black; padding: 5px; display: inline-block;">           Point X            ETA: 08/1235            Open 08/1100            Close: 08/1330         </div>	ETA refers to the projected time of arrival.  Date/time format is dd/hhmm
No-go area (option 1)	Normal  Expired 	The transparent part of the line is inside the no-go area.
No-go area (option 2)		Need to consider SCAMIN/MAX. At certain scales the hash pattern may not be clearly visible.
Go area		To replace the ECDIS safe water area. Normal navigational features to be displayed on top.
Route		As per existing ECDIS standards.  Information box shows planned speed on each leg.

## Further portrayal recommendations

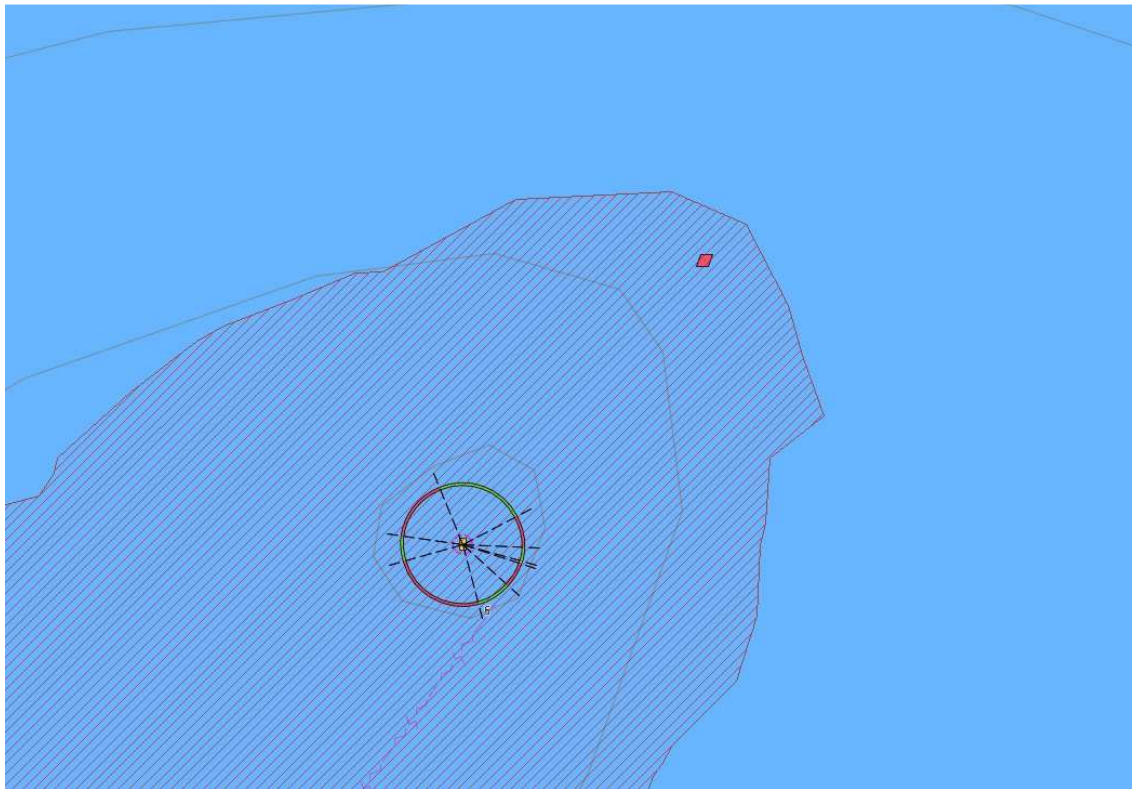
- Go and no-go areas can be toggled on/off by the ECDIS user.
- If a hash fill pattern is used for the no-go area then it is recommended that the no-go area is no longer visible at small scales.

## Portrayal issues/questions

- Will use of the red colour for no-go areas conflict with other red symbology?
- How will very small no-go areas be displayed? If portrayed to scale it may not be visible to the mariner. Should no-go areas have a minimum display size?

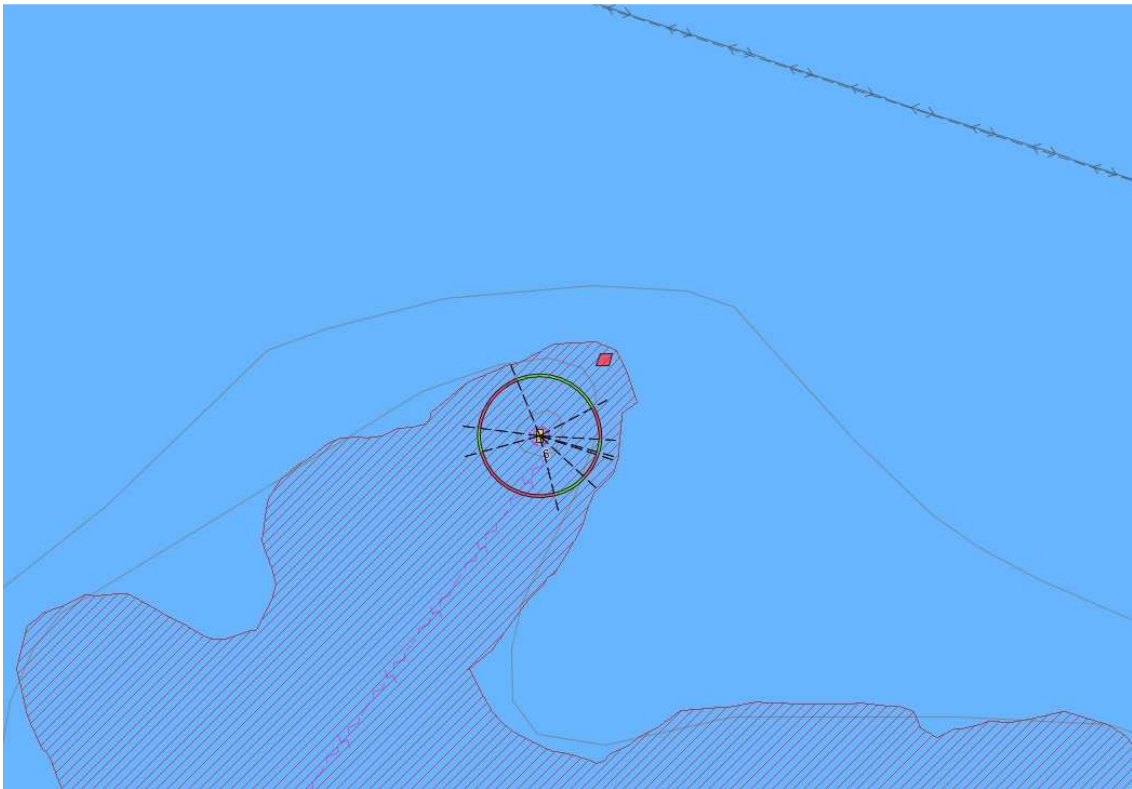
## No-go area (option 2) examples at different scales

1:200



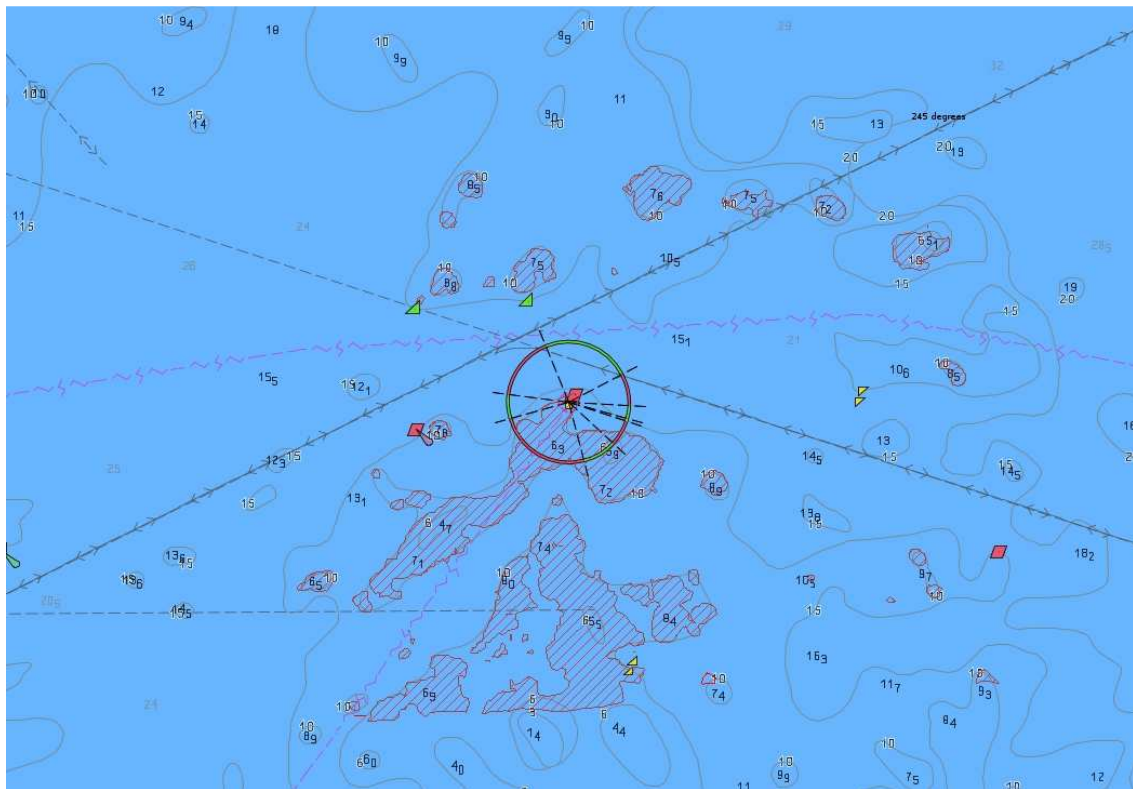


**1:1000**

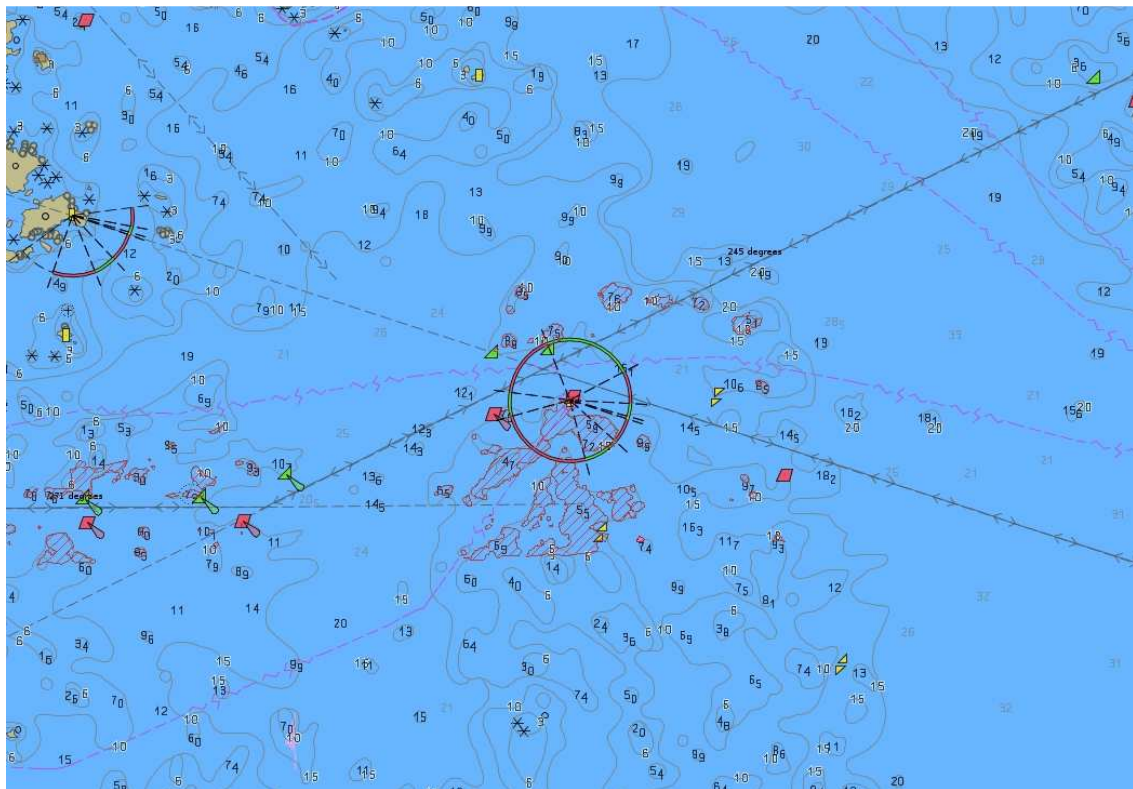


**Version 1.0**

**1:10000**

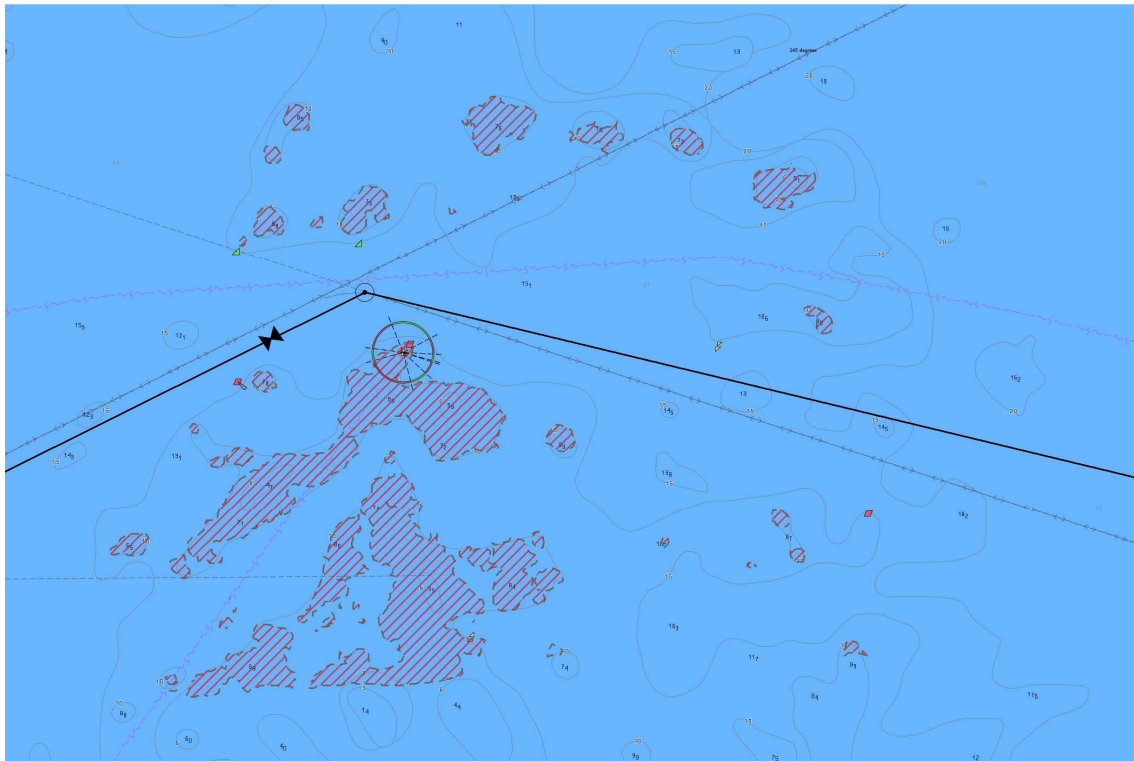


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[illegible]

## Expired no-go area





### VHF Data Exchange System (VDES) - Information brief

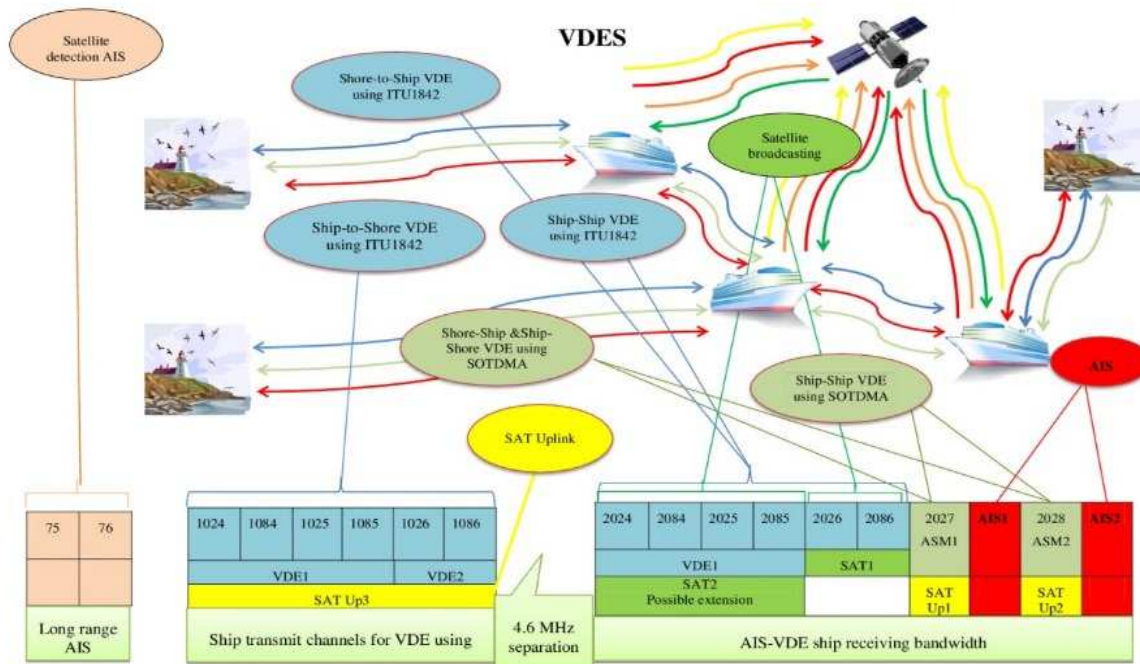
The VHF Data Exchange System (VDES) is intended to be a radio communication system that operates between ships, shore stations and satellites on the Automatic Identification System (AIS), Application Specific Messages (ASM) and VHF Data Exchange (VDE) frequencies in the marine mobile VHF band.

AIS is now well recognized and accepted as an important tool for the safety of navigation and is a carriage requirement for SOLAS vessels. Since its inception the use of AIS has expanded to vessels not required to comply with the carriage requirement and other applications such as aids to navigation, search and rescue transmitters, man over-board units and EPIRB-AIS. This expanding use of AIS technology has caused significant increase in the VHF Data Link (VDL) loading.

At the World Radio Conference 2015 the ITU identified six frequencies in the VHF maritime mobile band for the use of digital data transfer. The frequencies form part of the developing VDES. With the ability to group the new frequencies together to provide a larger band for data transfer, the VDES will enhance digital data functionality.

The VDES will be an effective and efficient use of radio spectrum, building on the capabilities of AIS, to address increasing requirements for data transfer. While VDES will include AIS as it currently exists, new techniques providing higher data rates than those used for AIS is a core element of VDES.

Since VDES has higher speed and robust data exchange capability with potential for worldwide coverage, there may be numerous benefits to AtoN services and VTS. Virtual AtoN could be deployed beyond a limit of VHF range such as the high seas, or remote/polar areas. VTS could exchange more comprehensive data with ships than the present AIS can provide. Machine readable digital data will enable the display of vessel traffic and navigation safety information, assisting to overcome language barriers between VTS operator and mariners. An area not yet fully developed for the VDES is that of ensuring appropriate cyber security measures can be implemented.



UKCM PT 2 – Photos



UKCM PT Attendees



Data model working group



Portrayal working group