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| IALA Guideline |

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# INTRODUCTION

High level principles for the development of the guideline:

* Operational Guideline
* For different levels of automation
  + focus on situations where human is in the loop
* Focus on the digital information exchange between VTS and vessels, incl. ROC
  + allied services not included
  + FAL - Port Call reports not included
* Use of concrete use-case examples, similarly as in GL 1132
* Focus on current technologies and available specifications
  + Giving concrete examples of current best practices, e.g AIS ASM messages, UKC systems, advance reporting.
* No detailed system requirements.

Effective communication is an essential component for operations in the maritime environment and is achieved when the intended meaning of the sender and the perceived meaning of the receiver is the same.

The use of common procedures and standardised technical services for digital communications enables us to communicate quickly and effectively without the risk for misunderstanding.

These principles are essential for the safe and efficient digital communication, noting:

* IMO Resolution *A.1158(32) Guidelines for vessel traffic services* states:

“Effective harmonized data exchange and information-sharing is fundamental to the overall operational efficiency and safety. VTS providers are encouraged to make use of automated reporting where possible.”

* IMO circular *MSC.1/Circ 1595 E-navigation strategy implementation plan – update 1* states:

“As shipping moves into the digital world, e-navigation is expected to provide digital information and infrastructure for the benefit of maritime safety, security and protection of the marine environment, reducing the administrative burden and increasing the efficiency of maritime trade and transport.”

and that of the prioritized e-navigation solutions is:

“improved communication of VTS Service Portfolio (not limited to VTS stations).”

* IMO circular MSC.1/CIRC.1610/rev.1 *Descriptions of maritime services in the context of e-navigation* defines the purpose of MS 1 Vessel traffic Services (VTS):

“The purpose of this digital Maritime Service is to support the provision of VTS to participating ships by providing information in a digital format. Information could be presented in appropriate systems on board and ashore in order to create the means to reduce the administrative burden and information overload, reduce miscommunication due to external interference, simplify work procedures, promote sustainable shipping and increase navigational safety.”

* ADD references to other IALA documentation, such as discussion papers on Future VTS and/or MASS?

# DOCUMENT PURPOSE

# DOCUMENT STRUCTURE

This document consists of four parts:

* Part A sets out the general principles for digital communications;
* Part B provides more general guidance on message composition, delivery and interpretation
* Part C provides guidance to establish globally harmonized standard 'digital phrases for interactions
* Part D identifies a number of current technologies used to exchange VTS information

# PART a general principles of vts digital communications

## Managing a mix of traditional VHF voice, digital communications, and automated data exchange

The digitalisation of information will diversify the communication means between shore authorities and vessels and will affect VTS procedures regarding exchange of information. While VTS interaction with ships has traditionally almost exclusively been via VHF voice communications it is expected that digital communications will largely be replace VHF voice in the future.

In addition to VHF voice communications VTS can provide information in a digital format. The use of digital communication could reduce workload by automating repetitive tasks, which could lead to reduction of the VHF traffic, communication barrier and the risk of misunderstandings. Digital communications will be effective, timely and consistent always making relevant information available for navigators.

Messages can be conveyed to an individual ship or all ships. This not only includes person-to-person but also person-to-machine, machine-to-machine and machine-to-person. The change of communication and interaction to digital can also in many situations utilise automated processes.

However, VTS should remain the primary contact with vessels for urgent and important messages. To mitigate time critical and emergency situations and to ensure the safety of life at sea the use of VHF voice communications will be required in addition to digital communications.

The number of digital services can variate from VTS to VTS. Information on the available digital services from each VTS should be available to the mariners. The digital services should also be discoverable by on-board navigation systems.

It should be noted that not all vessels are capable of receiving information in digital format. Provisions should therefore be made to ensure that less capable vessels are receiving the information they require. At the same time the advent of MASS will bring additional challenges for the communication. VTS interaction with the entity in command of a MASS, such as Remote Control Centres, need to be defined. Not all vessels are capable of processing voice communications (i.e., MASS level 4). Provisions should therefore be made to ensure that these vessels are receiving the information they require by other means.

VTS providers should ensure that VTS operators are aware which vessels have received information provided digitally.

When transitioning to digital communications some of the information provided to vessels today by VTS may be provided directly to vessels from other sources. This can include for example hydrographic and environmental information, Information on AtoN’s and Maritime Safety Information (MSI). It should be ensured that the information provided to the vessels is available to VTS.

## The intent of messages.

The added benefit of digital communication is having the information in standardised structure, ensuring that the same information is available to all actors when required and designed in a way to minimise misinterpretations and to provide common situational awareness. This includes machine-to-machine communications between VTS, vessels and other external sources.

The intent of messages conveyed to actors should be the same, irrespective of whether it is by voice or digital means. Digital communications should have the same procedures as the voice communications. Digital communication should be processed the same way as voice communications, acknowledgement of the messages might be needed in some cases, especially in safety critical situations.

According to IALA G1132 VTS Voice Communications and Phraseology “*Closed-loop communication should be used to confirm that messages from VTS personnel are correctly received and understood”*.

To achieve closed-loop communication in digital communications different levels of acknowledgements can be implemented:

* level 1, general information messages to all vessels. No acknowledgement or action required.
* level 2, information related to one or group of vessels. Acknowledgement of reception of information required.
* level 3, information related to one or group of vessels. Acknowledgement of reception of information and action required.

VTS providers should ensure that the digital services have up-to -date information.

# part b MESSAGE STRUCTURE AND DELIVERY

Thing for consideration:

* Closed loop, when it is needed and how it will be achieved?

Different statuses: 1. received, 2. read, 3. comply

* Ambiguous terminology, differences in speech and text information
* Use of message markers in textual information?
* Differences between regular messages and warning/caution messages - different layers of prioritised messages
* e.g. Geographical positions should always be given in degrees and minutes or in degrees, minutes and decimal minutes in the form:

*Latitude: DD-MMN or DD-MMS Longitude: DDD-MME or DDD-MMW*

*or*

*Latitude: DD-MM.mmN or DD-MM.mmS Longitude: DDD-MM.mmE or DDD-MM.mmW*

*e.g. 07-08N 039-17W 32-18.65S 165-02.81E*

* AIS text messages structure

At present digital VTS services are delivered to vessels through various systems. VTS related information, such as VTS area and reporting requirements, navigational warnings, meteorological data, recommended routes etc. is mostly mainly offered through websites maintained national and reginal authorities. However, in order to ensure harmonisation and interoperability of these services in different regions standardised data models and technical services are required.

Services provided directly to ships may be further subdivided into data intended to be used during navigation and data used during voyage planning phase.

## S-100

The IMO e-navigation strategy implementation plan (MSC.1/Circ.1595) states that IMO Common Maritime Data Structure (CMDS) used for digital maritime services should be based on the IHO S-100 data model.

The S-100 standard is intended for the development of digital products and services for hydrographic, nautical and geographic information communities. It consists of several parts based on geospatial standards developed by ISO Technical Committee 211 (ISO/TC211).

IALA was granted governance the S-200 domain, in co-operation with the IHO. A supervisory structure has been established (IALA Guideline G1087) that uses the range S-201 to S-299 for product specifications compliant with the IHO S-100 standard, covering fields within the IALA remit, including Marine Aids to Navigation (AtoN), Vessel Traffic Services (VTS), positioning systems and communication systems.

The S-100-based services delivered by VTS can be divided into services that provide (almost) real-time, dynamic data and to services that provide static data that is updated less frequently. The information provided by real-time services includes, for example, navigational warnings and discrepancies of AtoN’s, as well as weather observations. Static information can include basic VTS information, such as limits of VTS area and/or reporting requirements.

In November 2022, the IMO MSC approved an update to the ECDIS performance standard, according to which the use of ECDIS compatible with S-100 products as a navigation system on board will be permitted from the beginning of 2026 and mandatory for new installations from the beginning of 2029. The updated Performance Standard also states that ECDIS should be capable to carry out exchanging of route plans in a simple and reliable manner.

However, it is expected that due to the slow renewal of ships' navigation systems, there will not be extensive equipment compatible with S-100 products on board in the next few years. In this case, data may also be presented in other systems intended to support navigation.

Refer to IMO e-nav strategy

ADD reference to Common Shore side e-navigation architecture

ADD picture from WG2 defining architecture for digital VTS services

## AIS/VDES messages

In addition to the S-100 products transmitted over IP connections, digital VTS information can also be delivered to vessels via various subsystems of the globally standardized digital VDES data transmission system operating in the maritime VHF area. More information on VDES, including development roadmap, can be found from IALA G1117 *VHF Data Exchange System (VDES) overview.*

The VDES system consists of subsystems suitable for the transmission of different types of digital information:

* The AIS system, the main purpose is transmitting and receiving static, dynamic, and voyage-related data. AIS can also be used for the following means of digital communications:
  + to broadcast short safety related messages containing important navigational or important meteorological warning. These messages are free form text, but it should be noted that the maximum length of these messages is 161 characters, including the header and the message content.
  + to broadcast virtual Aids to Navigation, which can be used to inform the mariner about dangers to navigation as well as safe waterways, areas in which extra caution may be necessary and areas to be avoided. More information on virtual AtoN’s can be found from IALA G1081 *Provision of virtual marine Aids to Navigation.*
* ASM system, intended to serve as the primary transmission channel for Application-Specific Messages currently sent via AIS.

ASM may be used to exchange important information between ships and shore stations, for example shore stations may report navigation information, conditions, and warnings; and ship reporting may be simplified. IMO *SN.1/Circ 289 Guidance on the use of AIS Application-Specific Messages* provides an overview of the purpose and scope of AIS ASM. *IALA G1095 Harmonized implementation of Application-Specific Messages (ASM)* describes how ASM should be implemented in a harmonized manner.

* The VDE-TER /SAT system, the purpose of which is to provide a communication channel allowing free-form data transfer, both between ship to ship, ship to shore including satellite.

## Route exchange

Some of the S-100-based product specifications can also be used in a variety of services. The most significant of these is the ECDIS Route Plan Product Specification S-421 (IEC 63173-1) & published by IEC.

Planned services utilizing the S-421 include:

• route cross check

• Traffic management

• Ice navigation

• Under keel clearance management

• Route optimization

• Search and Rescue

The updated Performance Standard also states that ECDIS should be capable to carry out exchanging of route plans in a simple and reliable manner. This means that primary navigation system on board can be capable for route exchange from the beginning of 2026 and makis the functionality mandatory for new installations from the beginning of 2029.

[More to be added]

Add something on SECOM (IEC 63173-2)?

## Technical services

This section will include the operational descriptions and use cases for the potential technical services identified in the description for Maritime Service for VTS.

If needed further technical services can be added.

Consideration should also be on the timeframe when the services can be implemented, including the potential use of intermediate solutions before standardised technical services, based on S-100 product specifications, are available.

The description for Maritime Service 1 - Vessel traffic service (VTS) list several different potential Technical Services associated with the Maritime Service. These Technical Services can be divided into VTS-specific services and services developed within other Maritime Services.

Technical services are needed to coordinate a seamless combination between different product specifications. Information provided using S-100 based product specifications is brought together by technical services to deliver a Maritime Service. IALA G1128 gives guidance on how to make specifications of e-Navigation Technical Services. A Maritime Service (MS) can be implemented by one or more e-Navigation Technical Services.

### VTS Specific Technical Services

Currently identified VTS specific Technical Services are:

* **Voyage Information Service**

The service supports exchange of voyage plans, text messages and area messages

* **Route Information Service (or Route Reference Service?)**

The service provides route recommendations and/or route validation for ships.

* **Slot management Service**

The service allocates ships in a time window to ensure safe voyages in the VTS area.

* **Traffic clearance Service**

The service provides vessels with permission to proceed, impose conditions or deny clearance.

* **Anchorage assignment Service**

The service assists ships into anchorage positions by assigning anchorage areas/positions.

* **VTS route exchange**

The service is used to exchange route plans between vessels and VTS. Route exchange can be used as part of other technical services.

* **Route Monitoring**

The service is used to monitor that the vessel stays within the planned schedule and corridor as defined in the route plan or in the VTS system.

* **Common Traffic image**

The service is used for sharing common operational traffic image between vessels and VTS

* **Advanced route /track exchange/monitoring**

### Other Technical Services associated with Maritime Service 1 – Vessel Traffic Services (VTS)

* **Meteorology Service**

The service supports the provision of information which could include the speed and direction of the prevailing wind, direction and height of the waves, visibility, atmospheric pressure, the formation of ice, etc.

* **Meteorological warnings Service**

The service supports the provision of warnings concerning gale, storm, tsunami, restricted visibility, etc.

* **Hydrographic Service**

The service supports the provision of information which could include factors such as the stability of the seabed, sea depth, the accuracy of surveys, tidal ranges, tidal streams, prevailing currents and swell, etc.

* **AtoN information Service**

The service supports the provision of Aids to Navigation information for end-users (primarily navigators).

* **Navigational warning service**

The service supports the provision of safety-related messages such as dangerous wrecks, obstacles not otherwise promulgated, diving operations, vessels not under command, etc.

# PART C Standard *'DIGITAL'* phrases

to establish globally harmonized standard 'digital phrases for interactions.

Make reference to VTS voice communications - SMCP

# part D current technologies used for the exchange VTS information

## IALA GUIDELINEs

G1081 Provision of virtual Aids to Navigation

G1155 The development of a description of a Maritime Service in the context of e‐ navigation

G1157 Web service based S-100 data exchange

G1143 Unique identifiers for maritime resources

## IHO

S-100 …

[S-127, S-129?]

## IEC

IEC 63173-2 Secure exchange and communication of S-100 based products (SECOM)

## IMO

SN.1/Circ.289 Guidance on the use of AIS application-specific messages

# DEFINITIONS

The definitions of terms used in this Guideline can be found in the *International Dictionary of Marine Aids to Navigation* (IALA dictionary) at <http://www.iala-aism.org/wiki/dictionary> and were checked as correct at the time of going to print. Where conflict arises, the IALA Dictionary should be considered as the authoritative source of definitions used in IALA documents.

# abbreviations

This section should be typed with the **Abbreviations** style. The acronym or initialism is typed and then tab is pressed so that the style inserts the appropriate tabs and paragraph spacings e.g.:

NGO Non-governmental organization

VTS Vessel Traffic Services

The list should be typed in alphabetical order. The text automatically aligns as an indented paragraph until carriage return is hit and then the next term can be entered.

# references

References are sources directly referred to in the running text and should be given a sequential number, starting at 1. The reference number should be included as close to the referenced text as possible and included as a number within square brackets.

The reference should be listed in the References section in the following syntax using the **Reference** **list** style:

[Author surname,] <space> [initial.] <space> [year] <space> [title.]

For example:

“Hawking also suggests ways that quantum mechanics can be combined with the theory of special relativity [1]. This text builds on his discussion of the instability of black holes described in *A Brief History of Time* [2].”

should be included in the reference list as follows:

1. Hawking, S. (2001) The Universe in a Nutshell.
2. Hawking, S. (1988) A Brief History of Time.

The **Reference list** style will add a number for the reference as soon as you start typing the text and the paragraph will automatically align with the first line of text. Press return to enter a new reference in the list.

# Further reading

Any texts that are recommended to the reader without direct reference in the text should be listed within this section using the same syntax as the reference list. Sources should be listed using the **Further reading** style.

1. Einstein, A. (1905) Relativity: The Special and General Theory of Relativity
2. Idle, E. (1984) The Galaxy Song

# Index

**No index entries found.**

1. Draft Use Cases FOR technical services

The following use cases are examples to provide input for the development of technical service specifications (WG2).

General descriptions on exchange of routes in the S-421 format in described in the Annex of S-421 description in detail.   
  
The below Use Cases include examples of data needed, consult document *VTS51-9.1.6.1 - Appendix 1, MS 1 - 3, Information requirements* for further possible datasets needed.

**Use Case 1**

Use-case (name): Pre-arrival route reporting

Description: Vessel sends prior to its arrival the intended route through the VTS area to the VTS. VTS validates the intended route or sends a recommended route to the vessel. Vessel approves the recommended route.

Actors: Vessel, ECDIS/other on board systems , VTS

Frequency of Use: Typically triggered before or when entering VTS area.

Pre-conditions: The service instance is known to the ECDIS/ECS, or the ECDIS/ECS has access to a service registry in which the service instance can be discovered.

Ordinary Sequence:

1. The route is planned in ECDIS/ECS by the mariner
2. The ECDIS sends intended route, which includes the schedule [including ETA], to VTS
3. VTS validates the route
4. If the route is recommendable, VTS acknowledges the received route
5. If the route deviates from recommendations, VTS sends new recommended route to the ECDIS/ECS, including justified reason for the changes.
6. The new recommended route is accepted or denied on-board
7. The data is rendered and displayed to the user.

Post-conditions: The vessel's intended route is incorporated in the VTS system.

If the route cannot be agreed, VTS operator contacts the vessel by VHF.

**Use Case 2**

Use-case (name): Pre-arrival / arrival notification

Description: Vessel sends pre-arrival report with information relevant to the VTS/destination

Actors: Vessel, ECDIS/other on board systems , VTS

Frequency of Use: Typically triggered once or when the information changes.

Pre-conditions: The service instance is known to the on-board system, or the on board system has access to a service registry in which the service instance can be discovered.

Ordinary Sequence:

1. The on-board system requests reporting requirements from the VTS
2. The VTS provides the requirements automatically, including what are the mandatory elements
3. On-board system compiles the information required
4. On-board system sends the report with all of mandatory information to VTS
5. VTS validates the information
6. In case of failure VTS asks for revised information
7. if succeeded, VTS acknowledges the received report

Post-conditions: The status of vessels report, and validated reporting information is incorporated in the VTS system and if needed shared to other stakeholders.

**Use Case 3**

Use-case (name): Retrieve VTS Navigational Information.

Description: When entering the VTS area ship-user requests navigational information from the VTS using ECDIS/ECS.

Actors: Mariner, ECDIS/ECS, VTS

Frequency of Use: Typically triggered before vessel enters VTS area or leaves berth and the information is updated until leaves the VTS area.

Pre-conditions: The service instance is known to the ECDIS/ECS.

Ordinary Sequence:

1. The vessel enters VTS area.
2. The ECDIS/ECS requests VTS navigational information from the service.
3. The service directly answers the request with timely and relevant information on factors that may influence the vessel's movements during the passage in the VTS area.

Information elements may include:

1. Navigational warnings
2. Navigational situations (including traffic and route information)
3. Status on AtoN's
4. VTS traffic image of vessels and their movements in a VTS area
5. Restrictions and limitations along in the fairways (UKC, Restricted area, speed limits)
6. Changes in the delivery of other services (pilots, tugs, ports)
7. VTS receives acknowledgement that information is received by the vessel
8. The data is rendered and displayed to the user on board.
9. When information changes VTS sends update to the ECDIS/ECS

Post-conditions: The correct VTS navigational information is displayed on the ECDIS/ECS.

**Use Case 4**

Use-case (name): Retrieve VTS Meteorological Information.

Description: Ship based user requests meteorological information from the VTS using ECDIS/ECS.

Actors: Vessel, ECDIS/other on board systems, VTS

Frequency of Use: Typically triggered once before vessel enters VTS area or leaves berth and the information is updated until leaves the VTS area.

Pre-conditions: The service instance is known to the ECDIS/ECS.

Ordinary Sequence:

1. The vessel is approaching the VTS area or is leaving the berth.
2. The ECDIS/ECS requests VTS meteorological information from the service.
3. The service directly answers the request with timely and relevant information on meteorological and/or hydrological conditions in the VTS area.

Information elements may include:

1. Meteorological: wind, visibility, temperature etc.
2. Meteorological warnings
3. Hydrographical; tide, water level, waves etc.
4. VTS receives acknowledgement that information is received by the vessel
5. The data is rendered and displayed to the user.
6. When information changes VTS sends update to the ECDIS/ECS

Post-conditions: The correct VTS meteorological information is displayed on the ECDIS/ECS.

**Use Case 5**

Use-case (name): Retrieve information related to the management of ship traffic.

Description: VTS provides vessel permission to proceed, impose conditions or deny entry.

Actors: Mariner, ECDIS/ECS, VTS

Frequency of Use: Typically triggered once before vessel enters VTS area or leaves berth.

Pre-conditions: The service instance is known to the ECDIS/ECS.

Ordinary Sequence #1:

1. Vessel wants to leave berth
2. The mariner sends ETD through ECDIS/ECS to the service and requests permission to leave berth.
3. VTS sends response which may include conditions on when vessel can leave the berth
4. Service delivers response to ECDIS/ECS
5. The mariner acknowledges revised ETD in ECDIS/ECS and send response to the VTS.

Ordinary Sequence #2:

1. The vessel enters VTS area
2. The ECDIS/ECS requests permission to proceed from the service
3. Vessel's planned ETA is suitable. VTS sends new recommended ETA to ECDIS/ECS of the vessel through the service
4. The mariner acknowledges to reach the ETA in ECDIS/ECS and sends response to the service.
5. New ETA is confirmed by the VTS

Ordinary Sequence #3, including route plan:

1. Vessel wants to leave berth
2. The mariner sends in route plan with schedule through ECDIS/ECS to the service. The schedule includes the planned ETD.
3. VTS sends response which may acknowledge the ETD or include new ETD
4. Service delivers response to ECDIS/ECS
5. The mariner acknowledges revised ETD in ECDIS/ECS and send updated route plan with schedule to the VTS.

Ordinary Sequence #4, including route plan:

1. VTS uses intended route and schedule from prearrival information provided by the vessel
2. Vessel's planned ETA is suitable. VTS sends new updated route plan which includes recommended ETA to ECDIS/ECS of the vessel through the service
3. The mariner acknowledges to reach the ETA in ECDIS/ECS send updated route plan with schedule to the VTS.
4. New ETA is confirmed by the VTS

Post-conditions: The correct traffic management information is displayed on the ECDIS/ECS and VTS equipment

**Use Case 6**

Use-case (name): Risk of grounding

Description: In addition to voice communications, the vessel can be provided with an electronic route recommendation or waypoint.

Actors: Mariner, ECDIS/ECS, VTS

Frequency of Use: Typically triggered when unsafe situation is observed by VTS

Pre-conditions: The available digital communication methods of the vessel is known to the VTS.

Ordinary Sequence:

1. VTS detects a potential grounding situation
2. VTS system will alert the VTS operator about the situation
3. VTS system sends information automatically or triggered by the VTS operator to ECDIS
4. No navigational changes are detected by the VTS, or vessel has not acknowledged information from VTS
5. If the risk of grounding is not avoided, VTS send route recommendation, waypoint or course to the vessel
6. VTS operator will contact the vessel by VHF
7. Vessel alters course and updates its route plan

Post-conditions: Vessel continues voyage safely

**Use Case 7**

Use-case (name): Providing VTS route

Description:

Actors: Mariner, ECDIS/ECS, VTS

Frequency of Use:

Pre-conditions:

Ordinary Sequence:

Post-conditions:

**Use Case 8**

Use-case (name): Regulation violations

Description: VTS send information when vessel violates the rules in the VTS area, such as COLREG 10 and VTS act

Actors: Mariner, ECDIS/ECS, VTS

Frequency of Use:

Pre-conditions:

Ordinary Sequence:

Post-conditions:

**Use Case 9**

Use-case (name): Sharing vessel intention by (intended) tracks (up to 10 min)

Description: VTS sends the intended/expected track that vessel will sail in its area based on the (intended) trackpilot data of vessels and/or (expected) prediction by historical behaviour.

Actors: Mariner, ECDIS/ECS, VTS

Frequency of Use: Typically triggered once before vessel enters VTS area or leaves berth and the information is updated until leaves the VTS area.

Pre-conditions: The available digital communication methods of the vessel is known to the VTS. Vessels with automated trackpilots will share their track intentions

Ordinary Sequence: Step-by-step description of the process.

1. The vessel enters VTS area / leaves berth.
2. The ECDIS/ECS sends requests VTS navigational information from the service.
3. The service directly:
   * + - 1. request the vessel to inform VTS about its destination and (when available) intended track.
         2. answers the request with timely and relevant information on intended and expected vessel movements in the VTS area (up to 10 min).
4. VTS receives additional information on intentions and the acknowledgement that information is received by the vessel
5. The track and destination data is rendered and displayed on VTS equipment.
6. The track data is rendered and displayed to the user on board.
7. When information changes VTS sends update to the vessel
8. When destination and track changes vessel sends update to VTS

Post-conditions: The correct track and destination information is displayed on the ECDIS/ECS and VTS equipment

**Use Case 10**

Use-case (name): Creating a Common Operational Picture

Description: VTS and Ship shares the operational picture

Actors: Mariner, ECDIS/ECS, VTS

Frequency of Use: Typically triggered once before vessel enters VTS area or leaves berth and the information is updated until leaves the VTS area.

Pre-conditions: The available digital communication methods of the vessel is known to the VTS. Vessels with automated use the operational picture within ENC

Ordinary Sequence: Step-by-step description of the process.

1. The vessel enters VTS area / leaves berth.
2. The ECDIS/ECS sends requests to VTS for an operational picture
3. The service directly:
   * + - 1. answers the request with timely and relevant operational picture
         2. request the vessel to inform VTS about “unknown” objects
4. VTS receives additional information by the vessel about the for the Ship ”unknown” objects and “not received” objects.
5. The operational picture is rendered and displayed on ENC equipment.
6. VTS sends timely and relevant update on the “unknown” objects to the vessel.
7. VTS sends every minute a full operational picture and request the vessel to inform VTS about ”unknown” objects and “not received” objects.

Post-conditions: The operational picture is displayed on the ECDIS/ECS

**Use Case 11**

Use-case (name): Flow Management

Description: Fredrik describes….

Actors: Mariner, ECDIS/ECS, VTS

Frequency of Use:

Pre-conditions:

Ordinary Sequence:

Post-conditions: