*DRAFT 0.01*

*2023-06-15*

Service Specification for VTS Service for the [Digital] exchange of Common Operational Picture

Contents

[1 Introduction 4](#_Toc137821752)

[1.1 Purpose of the Document 4](#_Toc137821753)

[1.2 Intended Readership 4](#_Toc137821754)

[1.3 Inputs from Other Sources 4](#_Toc137821755)

[2 Service Identification 5](#_Toc137821756)

[3 Operational Context 6](#_Toc137821757)

[3.1 Present Day Operational Context 7](#_Toc137821758)

[3.2 Envisioned Operational Context 7](#_Toc137821759)

[3.3 Functional and Non-functional Requirements 11](#_Toc137821760)

[3.4 Other Constraints 13](#_Toc137821761)

[3.4.1 Relevant Industrial Standards 13](#_Toc137821762)

[3.4.2 Operational Nodes 13](#_Toc137821763)

[3.4.3 Operational Activities 13](#_Toc137821764)

Table of figures

[Figure 1: Traffic clearance dataflow 8](#_Toc127525731)

[Figure 3: Upload interface 19](#_Toc127525732)

[Figure 4: Description Interface 23](#_Toc127525733)

[Figure 5: Upload message initiated by service provider with acknowledgement. 25](#_Toc127525734)

List of tables

**Kuvaotsikkoluettelon hakusanoja ei löytynyt.**

# Introduction

This document was produced as part of the work of IALA joint VTS-ENAV task group on development of technical service specifications for VTS. The document is structured according to the IALA Guideline G1128: THE SPECIFICATION OF e-NAVIGATION TECHNICAL SERVICES. The design of the service interfaces was adapted from the standard for Secure communication between ship and shore IEC 63173-2:2022.

## Purpose of the Document

The purpose of this service specification document is to provide a holistic overview of digital VTS exchange of a Common Operational Picture and its building blocks in a technology-independent way, according to the guidelines given in [1]. It describes a well-defined baseline of the service by clearly identifying the service version.

The aim is to document the key aspects of the VTS exchange of the Operational Picture at the logical level:

* the operational and business context of the service
  + requirements for the service (e.g., information exchange requirements)
  + involved nodes: which operational components provide/consume the service
  + operational activities supported by the service
  + relation of the service to other services
* the service description
  + service interface definitions
  + service interface operations
  + service payload definition
  + service dynamic behaviour description
* service provision and validation aspects

## Intended Readership

This service specification is intended to be read by service architects, system engineers and developers in charge of designing and developing an instance of the VTS Common Operational Picture Service.

Furthermore, this service specification is intended to be read by enterprise architects, service architects, information architects, system engineers and developers in pursuing architecting, designing and development activities of other related services.

## Inputs from Other Sources

*This section provides an overview of activities, which are dealing with similar topics and lists already finished ones that provided inputs to this activity.*

To be added short references to IEC 63173-2:2022 -SECOM, as well as S-421

# Service Identification

The purpose of this chapter is to provide a unique identification of the service and describe where the service is in terms of the engineering lifecycle.

|  |  |
| --- | --- |
| Name | VTS Service for the exchange of a common operational picture |
| ID | urn:mrn:iala:techsvc:vts:cop  [not official designation, for example only] |
| Version | 0.1 |
| Description |  |
| Keywords | VTS, MS1, Common Operational Picture, Situational Awareness, Ship Traffic Management, S-421 |
| Architect(s) |  |
| Status | Provisional |

# Operational Context

According to IMO resolution A.1158(32) Guidelines for Vessel Traffic Services one of the purposes of a VTS is to monitor and manage ship traffic to ensure the safety and efficiency of ship movements, including the providing timely and relevant information on factors that may influence ship movements.

IALA Guideline G1089 Provision of a VTS states that the monitoring and management may include among other things forward planning and prioritization of ship movements to prevent congestion or dangerous situations and improve overall efficiency. This by, among other things, providing situational awareness to ships.

Situational Awareness is an essential element of effective decision-making in the maritime environment. In the context of VTS, the concept of situational awareness implies that through whatever means made available to the mariner (e.g., visual, voice, digital, etc.) sufficient information becomes available to enable the mariner to understand their vessel’s current position, operational condition, intended track and actual movement relative to intended track.

However, it is also understood that data whether obtained by visual, voice communications, or digital data exchange may sometimes be incomplete or “insufficient” for the mariner to be fully aware of their vessel’s situation and therefore the best decision or course of action to be taken. In some cases, additional communication vessel-to-vessel or navigational assistance from ashore may resolve this situation. But in other cases, decisions must be taken despite incomplete information to avoid known hazards and safely proceed.

Complete situational awareness is a collective goal to be achieved. In practice, the broader maritime community collaborates to define a consensus regarding:

• the data sufficient to support situational awareness,

• the means for sensing, communicating, and sharing the data,

• effective tools for display and interpretation of the data,

• the training required to prepare mariners to understand and use the data.

Based on this consensus, maritime authorities, standards organizations, shipbuilders and system developers collaborate to regulate, standardize, design, build and install the sensors, displays, networks and communications to provide the mariner with a “Common Operational Picture (COP)” as a means to achieving situational awareness.

The Maritime Service description for MS1 Vessel Traffic Services describes user needs for digital information services for the exchange of VTS information by electronic means between a VTS and vessel. Vessels using MS1 can receive information related to the management of ship traffic in a digital format that can be displayed in the navigational equipment on board.

## Present Day Operational Context

One of the main tasks for VTS is to monitor and manage vessel traffic, including establishing a system for providing situational awareness. Many VTS providers use an advanced coastal sensor system based on radar and AIS signals. Supporting information provided by the VTS operator does have even more sources, like camera’s, weather and current sensors and Port administrations systems. Destination and intentions of a ship within the area thus part of these integrated information systems and gives VTS an overall situational awareness

Traditionally VTS communication and interaction with ships is almost exclusively undertaken by VHF voice communications. The move to digital communications will reduce the amount of VHF communication and provide timely information in to the ship systems which will improve safe and efficient ship traffic and pave the way to future system to system communication.

VTS authorities are able to exchange data on the enriched track via the IVEF protocol, making objects detected in adjacent VTS areas available to VTS.

## Envisioned Operational Context

Within the context of VTS, situational awareness will be about sufficient information that must be available to the VTS provider to advise and enable the “Mariner”, whether a master, mate, pilot, or future remote operator, algorithmic or artificial intelligence machine, to understand and act on that information.

Digital exchange of the operational picture, including ship intentions, leads to increased safety, reduced administrative burden and more efficient operations, combined with reduced environmental impact. It will provide a common understanding of nearby ship intentions, ensure intended vessel route compatibility and a clear understanding for the mariner.

The exchange of the operational picture will improve safety at the prior to entering and when sailing in a VTS area by automated provision of digital information about the current traffic situation and ship intentions. The interaction with the ships will lead to less confusion and timely will help ships to avoid collisions and other accidents, which can be especially important in busy or congested areas.

With all efforts on MASS and Artifical Inteligent systems on board and in line with the prospects that systems will become more complex and connected, technologies will become more advanced and the role for technology within the development will increase. To create a common perception of elements and understanding of the current situation and the exchange of their perception of future status, it is likely that for Aid to Navigation ATON, incl the provision of VTS, a Systemic Situational Awareness Approach will be needed.

System interfaces for digital exchange of information related to a Common Operational Picture are not standardised. This document starts descripting these standardisations with use cases.

NOTE: Common Operation Picture needs to be defined

**Use Case 1**

Use-case (name): Operational Picture

Description: VTS shares the operational picture

Actors: Mariner, ECDIS/ECS, VTS

Frequency of Use: Typically triggered before or when entering VTS area or leaves berth. The information is constantly updated during transit within 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 ECDIS.

Ordinary Sequence: 1. The vessel enters VTS area / leaves berth

2. The ECDIS/ECS sends requests to VTS for an operational picture

3. The service directly:

a. answers the request with timely and relevant operational picture

b. request the vessel to inform VTS about “unknown” and “not received” objects.

4. VTS receives additional information by the vessel about the for the Ship ”unknown” objects and “not received” objects.

5. The common operational picture is rendered and displayed on ECDIS/ECS 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. ECDIS/ECS can “layered” show

**Use Case 2**

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

Description: VTS shares the intended/expected track that vessel will sail in its area based on the track pilot data of vessels and/or expected prediction by historical behaviour and exchanged route plan.

Actors: Mariner, ECDIS/ECS, VTS

Frequency of Use: Typically triggered before or when entering VTS area or leaves berth. The information is updated during transit within the VTS area.

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

Ordinary Sequence: 1. The vessel enters VTS area / leaves berth.

2. The ECDIS/ECS sends requests VTS navigational information from the service.

3. The service directly:

a. request the vessel to inform VTS about its destination and (when available) intended track.

b. 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

## Functional and Non-functional Requirements

*This section lists all (functional and non-functional) requirements applicable to the service being described. A tabular list of requirements shall be added here. If external requirements documents are available, then the tables shall refer to these requirements, otherwise the requirements shall be documented here.*

*The service must be linked to at least one requirement. At least one of the following tables shall be presented in this section. The first table lists references to requirements available from external documents. Make sure you document the sources from where the requirements are coming from. The second table lists new requirements defined for the first time in this service specification document.*

The table below lists applicable existing requirements for the XXX service.

Table X: Requirements Tracing

|  |  |  |  |
| --- | --- | --- | --- |
| Requirement Id | Requirement Name | Requirement Text | References |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

Functional requirements

|  |  |
| --- | --- |
| Requirement Id |  |
| **Requirement Name** |  |
| **Requirement Text** |  |
| **Rationale** |  |
| **Author** |  |

|  |  |
| --- | --- |
| Requirement Id |  |
| **Requirement Name** |  |
| **Requirement Text** |  |
| **Rationale** |  |
| **Author** |  |

|  |  |
| --- | --- |
| Requirement Id |  |
| **Requirement Name** |  |
| **Requirement Text** |  |
| **Rationale** |  |
| **Author** |  |

Non-functional requirements

|  |  |
| --- | --- |
| Requirement Id |  |
| **Requirement Name** |  |
| **Requirement Text** |  |
| **Rationale** |  |
| **Author** |  |

|  |  |
| --- | --- |
| Requirement Id |  |
| **Requirement Name** |  |
| **Requirement Text** |  |
| **Rationale** |  |
| **Author** |  |

## Other Constraints

### Relevant Industrial Standards

*To be added a table of applicable industrial standards*

### Operational Nodes

The following tables describe the operational nodes of the service.

Table x: Operational Nodes providing the XYZ service

|  |  |
| --- | --- |
| Operational Node | Remarks |
|  |  |
|  |  |

### Operational Activities

*Optional. If an operational model exists and provides sufficient details about operational activities, then this section shall include a mapping of the service to the relevant operational activities.*

Table x: Operational Activities supported by the *XYZ* service

|  |  |
| --- | --- |
| Operational Activity | Remarks |
|  |  |