



D3.4 - Service Specification for the S-124 Service

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1 Introduction

The bulk of work on this document, has been made as a deliverable in the workgroup supporting S124 –correspondence group.

Navigational Warnings (NW) are part of the Maritime Safety Information (MSI) system. Currently, NW's are promulgated in text via SafetyNET, NAVTEX, and is in some countries accessible on the WWW or as voice broadcasts via coastal radio stations.

As part of S-124 workgroup as subgroup of S-124 Correspondence group, a NW model, and promulgation thereof, is being developed and tested. This involves the specification of a S-124 (NW) service and implementation of a s-124 (NW) service instance that can be integrated with the Maritime Connectivity Platform eco system.

1.1 Purpose of the Document

The purpose of this service specification document is to provide a holistic overview of the S124 service 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 S124 service 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

1.2 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 S124 service.

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

1.3 Inputs from Other Projects

An approach to NW-handling and promulgation via AIS was tested during the initial EfficienSea project. The EPD was used to test and evaluate portrayal of NW's on an ECDIS-

like device. This was further developed in the ACCSEAS project, which also developed a combined MSI-NM model and interchange format, see [4], plus an authoring system and promulgation via the Maritime Connectivity Platform Messaging Service (please refer to www.maritimeconnectivity.net). The MSI-NM interchange format devised in the ACCSEAS project was furthermore used as input for IHO, targeting the S-124 NW specification - see [5].

2 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.

The tables below shall be completed.

Name	<i>S-124 Service Specification</i>
ID	<i>urn:mnr:mcp:service:specification:sma:s124</i>
Version	<i>1.0</i>
Description	<i>The S-124 service specification describes a standardized service implementing the corresponding IHO geospatial standard for navigational warnings. S-124 Navigational Warnings are intended to be used in an overlay to ENC within a navigation system.</i>
Keywords	<i>S-124, Navigational Warnings, NW, MSI</i>
Architect(s)	<i>Per Löfbom, Malin Liljenborg, Johan Von Bültzingslöwen</i>
Status	<i>Provisional</i>

3 Operational Context

This section describes the context of the service from an operational perspective.

3.1 Present Day Operational Context

The operational context description should be based on the description of the operational model, consisting of a structure of operational nodes and operational activities. If such an operational model exists, this section shall provide references to it. If no such operational model exists, then its main aspects shall be described in this section.

Optionally, a simple high level use case, described in layman's terms, could be provided as an introduction to this section.

The operational context shall be a description of how the service supports interaction among operational nodes. This can be achieved in two different levels of granularity:

- 1. A description of how the service supports the interaction between operational nodes. This basically consists of an overview about which operational nodes shall provide the service and which operational nodes will consume the service.*
- 2. A more detailed description that indicates what operational activities the service supports in a process model.*

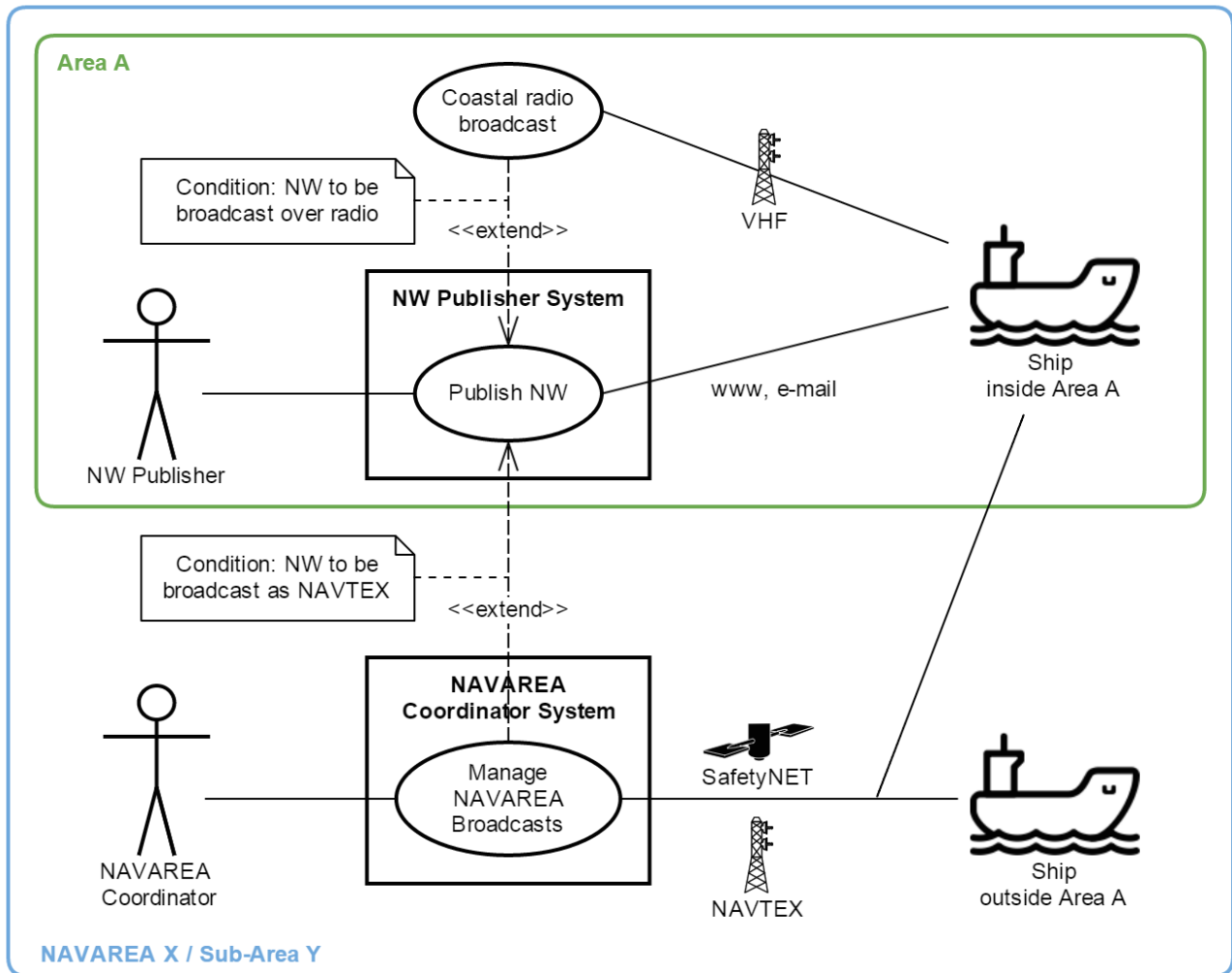
Moreover, the operational context should describe any requirement the service will fulfil or adhere to. This refers to functional as well as non-functional requirements at high level (business/regulatory requirements, system requirements, user requirements). Especially, information exchange requirements are of much interest since the major objective of services is to support interaction between operational nodes.

The source material for the operational context description should ideally be provided by operational users and is normally expressed in dedicated requirements documentation. Ensure that the applicable documents are defined in the References section. If no requirements documents are available, then the basic requirements for the service shall be defined in the dedicated sub-section below.

Architectural elements applicable for this description are:

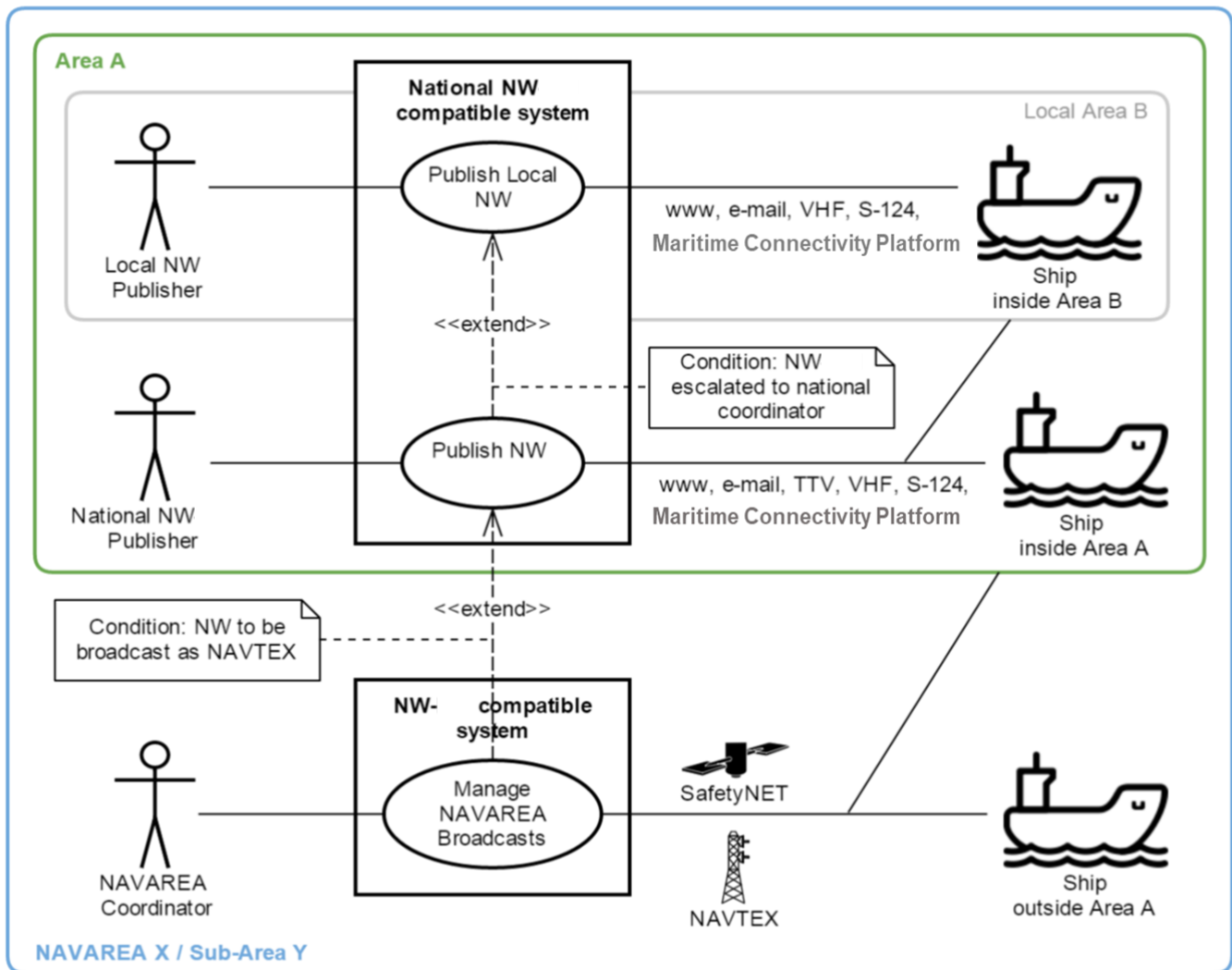
- Service*
- Nodes*
- Operational Activities*
- Information Exchange Requirements*

Today's NW broadcast regime, i.e. the operational context of NW promulgation at the component level, is depicted below:



System interfaces between NW publishers, NAVAREA (or Sub-Area) coordinator and broadcast service are not standardized, and may rely on manual processes involving e-mail, telephone, voice radio transmissions, fax, telex and manual re-entering of information from one system to another, or much more advanced solutions. Provision of NW via web is not standardized. **NAVTEX and SafetyNET cannot transport structured data formats for a joint NW-NM solution.**

3.2 Envisaged Operational Context



This Scenario depicts an envisaged future NW promulgation regime, as explored in EfficienSea 2 and furthermore in STM validation.

Based on a standardized structured NW format, compatible NW systems will be able to exchange NW seamlessly. As depicted, each country may have a national NW system, used by local authorities (e.g. harbor and port authorities) as well as the national authorities and agencies (e.g. national maritime safety agencies or hydrographic offices).

Local authorities will administer and publish local NW for their area of responsibility, whereas the national authorities will cater for NW on the national level. Local authorities should have the ability to escalate NW to the national coordinator.

The NW received by ships will thus depend on the promulgation method of choice. If, say, a ship targets the website of a specific port authority; it may see the local NW published by this authority. If, however, the ship query for NW via the Maritime Connectivity Platform, it will receive NW from national and local authorities relevant to its current position and planned routes.

The S-124 Service detailed in this specification only caters for a small part of this promulgation regime. It exposes multiple service operations for machine to machine consumptions of all currently published NW messages from the targeted authority. It may be used by any client, such as a ship, a website or an app.

3.3 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 functional requirements for the S-124 service.

Table 1: Requirements Tracing

Requirement Id	Requirement Name	Requirement Text	References
S124R001	New dataset	Dataset with a new warning or notice. The dataset is valid till a cancellation dataset is issued.	
S124R002	New dataset self-cancelling	Dataset with a new warning or notice that include a cancellation date.	
S124R003	New dataset with cancellation	Dataset used to cancel previous warning or notice. May include updated information related to the warning or notice that is being cancelled	
S124R004	New dataset with cancellation self-cancelling	Dataset used to cancel previous warning or notice. May include updated information related to the warning or notice that is being cancelled. Includes a cancellation date.	
S124R005	In force-bulletin	Dataset used to send in force NW or NM i.e. active.	

The table below defines additional requirements for the S-124 service.

Table 2: Requirements Definition

Requirement Id	
Requirement Name	
Requirement Text	

Rationale	
Author	

The table below defines non-functional requirements for the S-124 service.

Table 3: Requirements Definition

Requirement Id	S124NF001
Requirement Name	Interoperability
Requirement Text	
Rationale	Interoperability catalogue S-98 look into that (Eywind)
Author	

Requirement Id	S124NF002
Requirement Name	Confidentiality
Requirement Text	
Rationale	
Author	

Requirement Id	S124NF003
Requirement Name	Authenticity
Requirement Text	
Rationale	
Author	

Requirement Id	S124NF004
Requirement Name	Integrity
Requirement Text	
Rationale	
Author	

Requirement Id	S124NF005
Requirement Name	Availability
Requirement Text	
Rationale	
Author	

Requirement Id	S124NF006
Requirement Name	Performance – Time behavior
Requirement Text	
Rationale	
Author	

Requirement Id	S124NF007
Requirement Name	Operability
Requirement Text	
Rationale	
Author	

Requirement Id	S124NF008
Requirement Name	Modularity
Requirement Text	
Rationale	
Author	

3.4 Other Constraints

3.4.1 Relevant Industrial Standards

- ISO 25010 software product quality

3.4.2 Operational Nodes

If an operational model exists in external documents, then this section just shows the Service to Nodes mapping by providing two tables as described below.

If no external operational model exists, then the relevant operational nodes and their context shall be briefly described here before listing them in the tables of service providers and consumers.

Table 4: Operational Nodes providing the XYZ service

Operational Node	Remarks
Navigational Warning Coordination Centre	The Baltic Navigational Warning Coordination Centre collects all NAVTEX Navigational warnings from countries along the Baltic Sea coastline and distributes according to depicted NAVAREA.

Table 5: Operational Nodes consuming the XYZ service

Operational Node	Remarks
Ships	Ships sailing in the Baltic Sea
VTS centres	VTS centres with service coverage area in the Baltic Sea.

3.4.3 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 6: Operational Activities supported by the XYZ service

Operational Activity	Remarks

4 Service Overview

4.1 Service Interfaces

In below description the service interfaces for the S-124 service is shown.

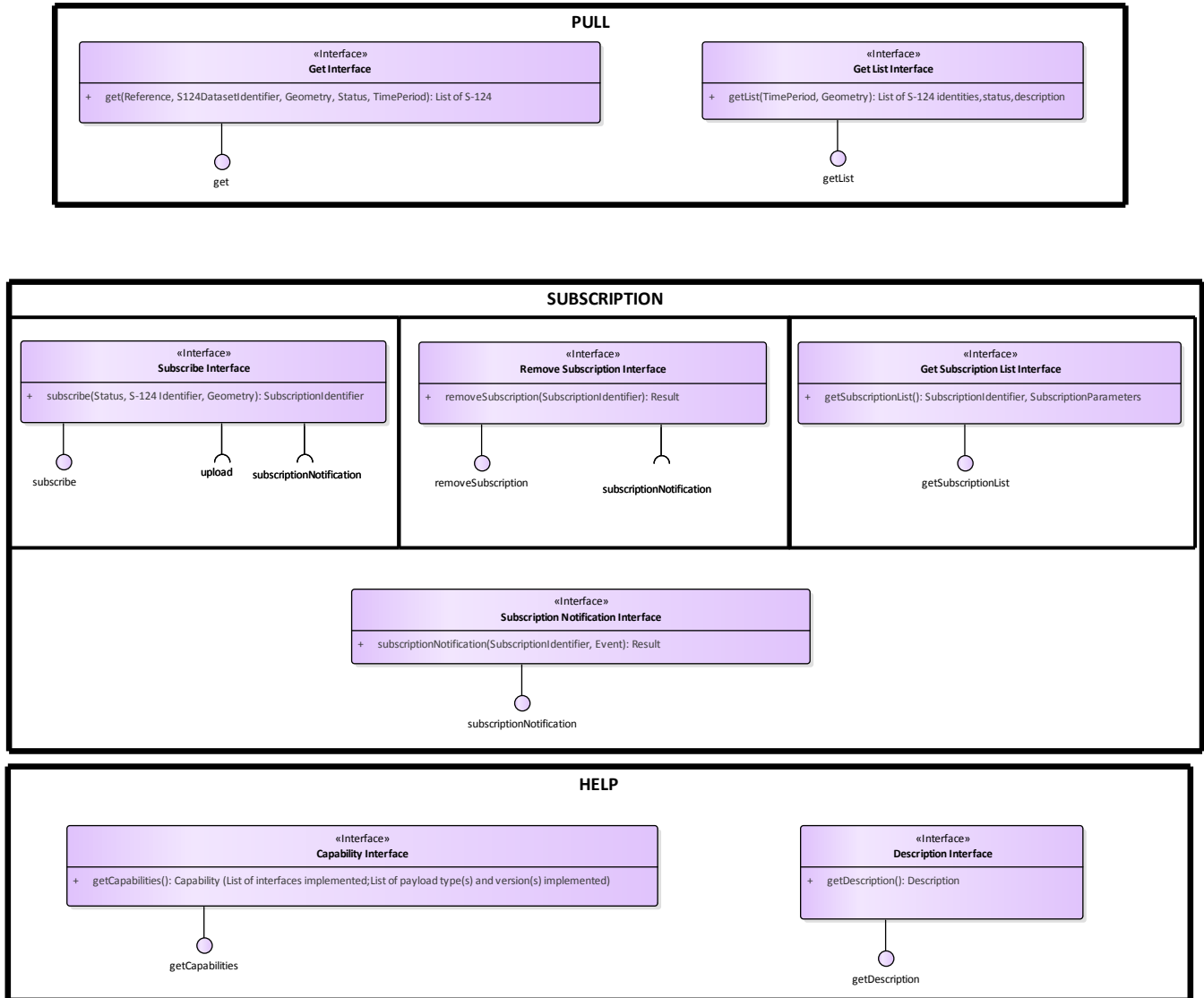


Figure 1: S-124 service Interface Definition diagram

Table 7: Service Interfaces

ServiceInterface	Role (from service provider point of view)	ServiceOperation
Get	Provided	get
Get List	Provided	getList
Subscribe	Provided	subscribe
Remove Subscription	Provided	removeSubscription
Get Subscription List	Provided	getSubscriptionList
Subscription Notification	Provided	subscriptionNotification
Capability	Provided	getCapabilities
Description	Provided	getDescription

5.2 Navigational Warning Features and Information types

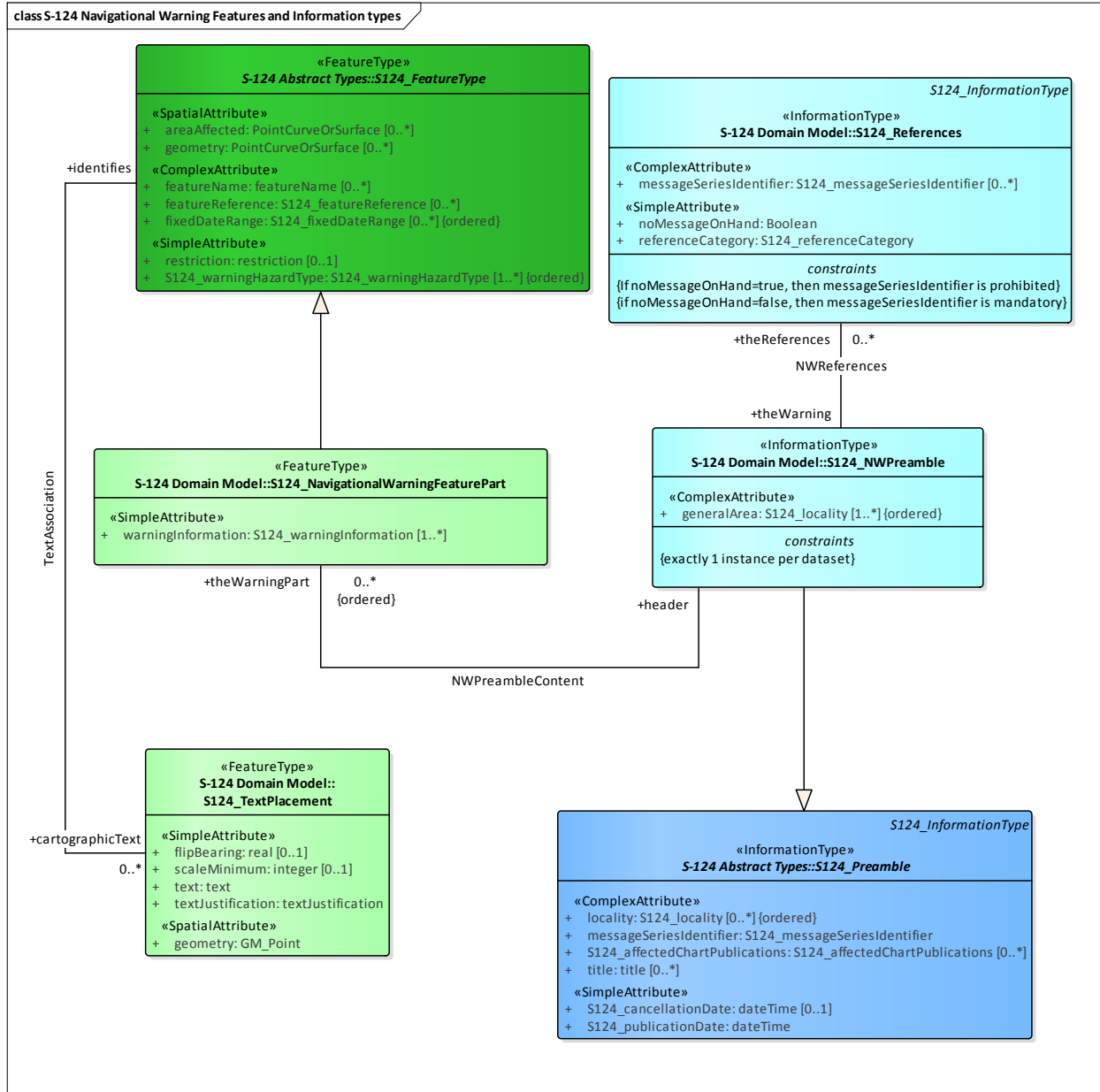


Figure 3 Navigational Warning Data Model

5.3 Enumerations

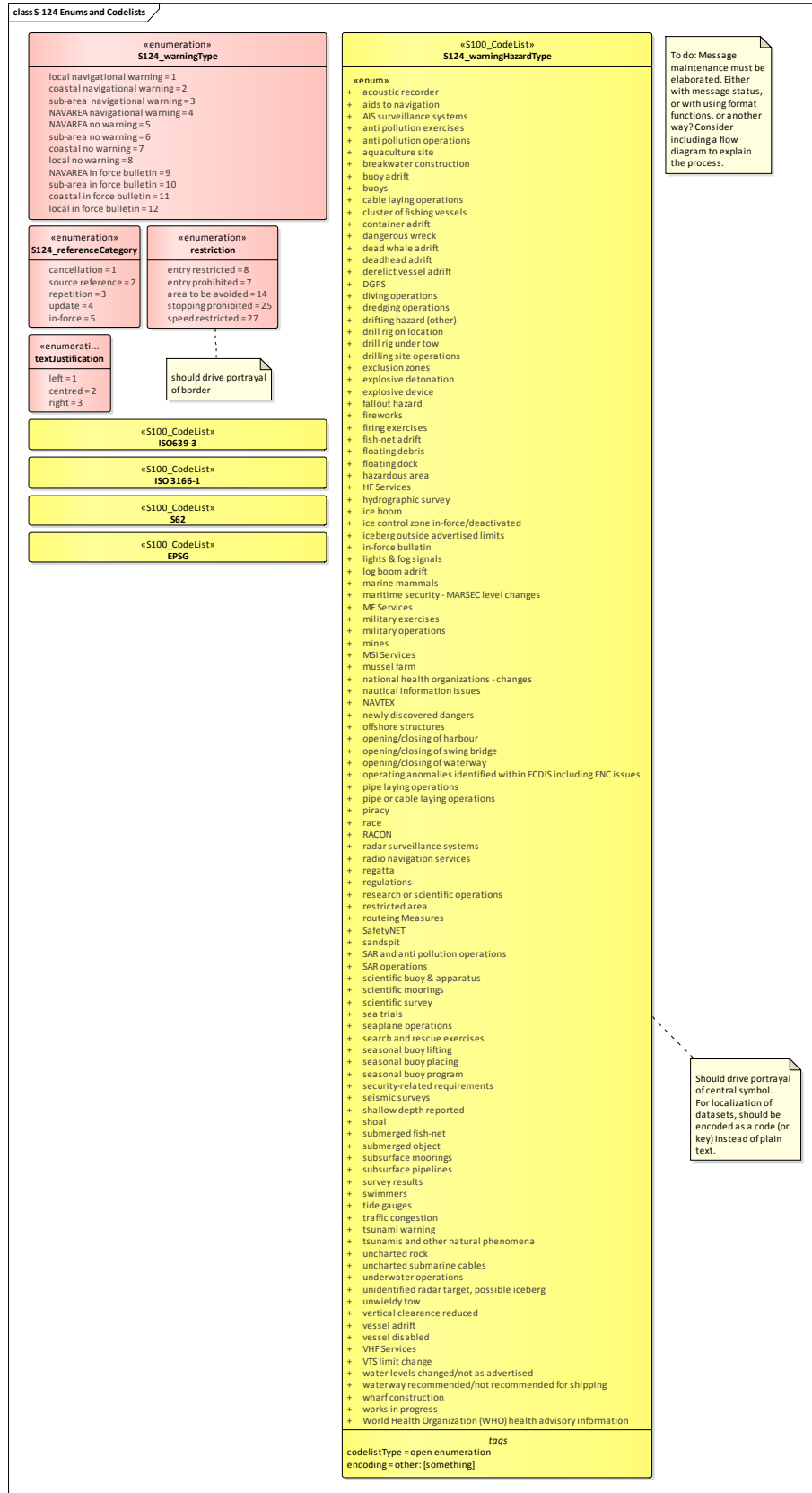


Figure 4 Enumerations 0.2.4

5.4 Complex Attributes

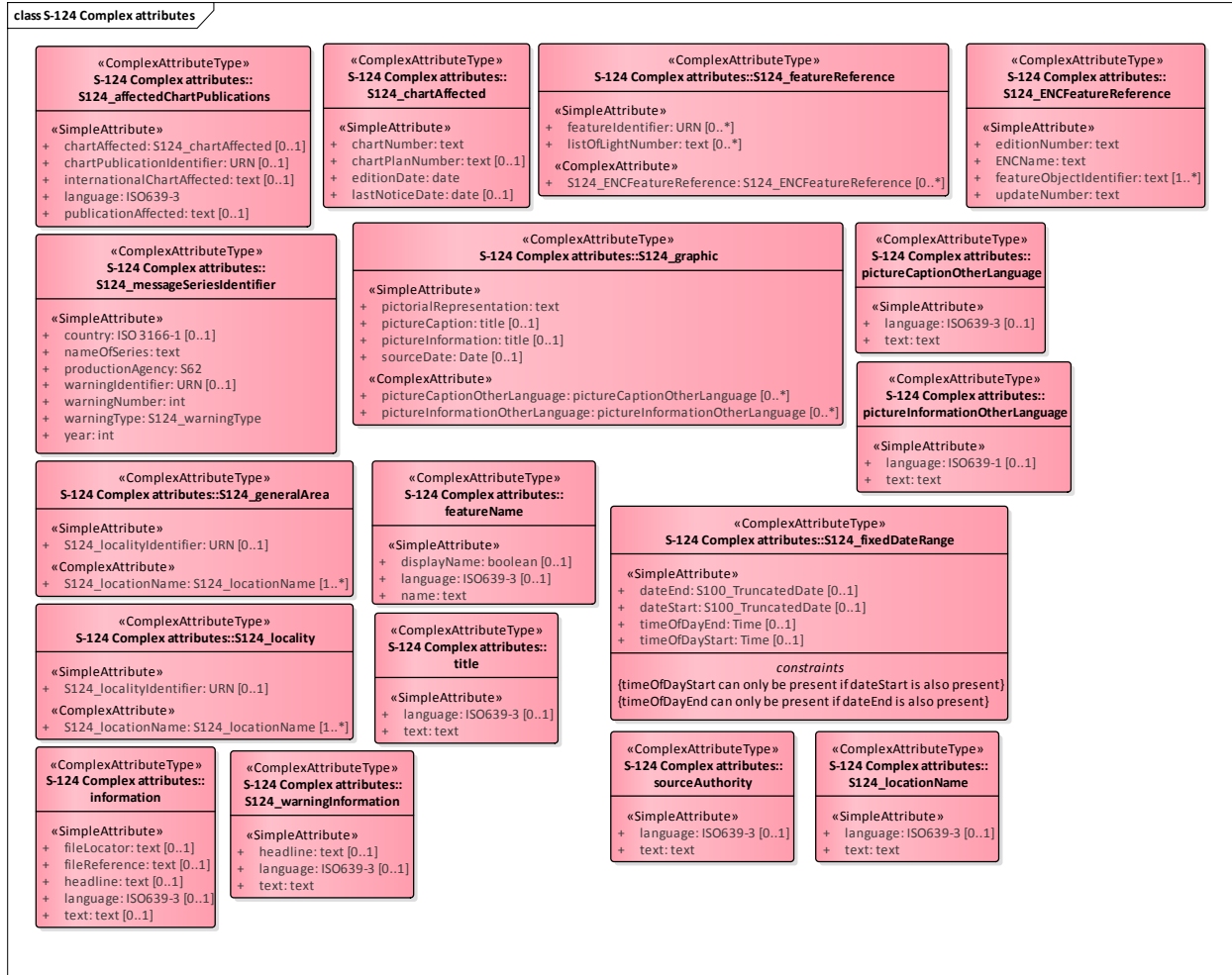


Figure 5 S-124 Complex Attributes

5.5 Service Internal Data Model (optional)

Not to be included.

6 Service Interface Specifications

This chapter describes the details of each service interface. One sub-chapter is provided for each Service Interface.

The Service Interface specification covers only the static design description while the dynamic design (behaviour) is described in chapter 7.

6.1 Get Interface

The Get interface is used for pulling Navigation warnings from a service producer i.e. NAVAREA Coordinator. The owner of the information (producer) is responsible for authorization procedure before returning information. The consumer can filter for navigational Warnings by its reference, identifier, status, geometry and time.

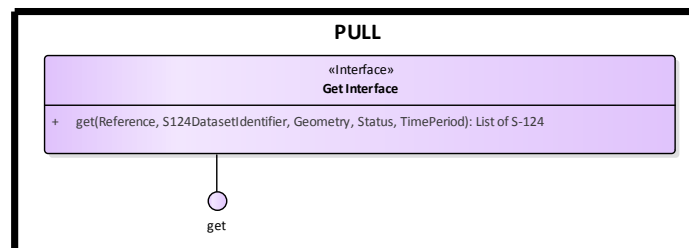
ConsumerInterface

No interface consumed

ExchangePattern

REQUEST_RESPONSE

6.1.1 Operation



6.1.2 Operation Functionality

The operation shall be used for retrieving Navigational warnings from producer. If no parameters are given, the return is either an empty list or all navigational warnings the consumer has been given access to by the NAVAREA Coordinator filtered according to chosen parameters.

6.1.3 Operation Parameters

Parameter	Encoding	Type	Direction	Mult.	Description
Reference	UUID	string	Input	0..1	Reference to information object e.g. from Get List result.

S124DataSetIdentifier		string	Input		Optional Identity can be provided as search criteria. A list of identities can be retrieved via Get List interface. If no identity provided, it's up to the service to decide what to return. It's up to the service to apply relevant authorization procedure and access control to information.
Status		string	Input		Optional Status can be provided as search criteria. If no identity provided, it's up to the service to decide what to return. It's up to the service to apply relevant authorization procedure and access control to information.
Geometry		string	Input		Optional A geometry in WKT can be provided as search criteria.

Return	Direction	Type	Description
	Output	List of <payload>	List of messages, zero to many

6.1.4 Dependency

Don't consumes any other interface

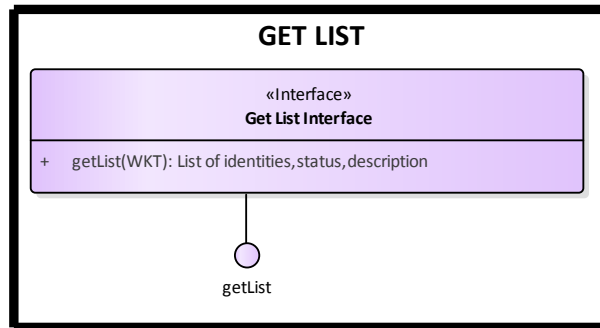
Relies on infrastructure to retrieve identity of caller for authentication and authorization procedures.

Relies on infrastructure for optional data encryption

6.2 Get List Interface

A list of accessible information is returned from this interface. The list contains reference to the identity it can be retrieved through the Get interface, a status and a short description.

6.2.1 Operation



6.2.2 Operation Functionality

6.2.3 Operation Parameters

Parameter	Type	Direction	Description
WKT	string	Input	Optional Geometry as search parameter in WKT format

Return	Direction	Type	Description
	Output	List of identities, status, description	List of information objects available (with access), identified by identity, status and short description

6.2.4 Dependency

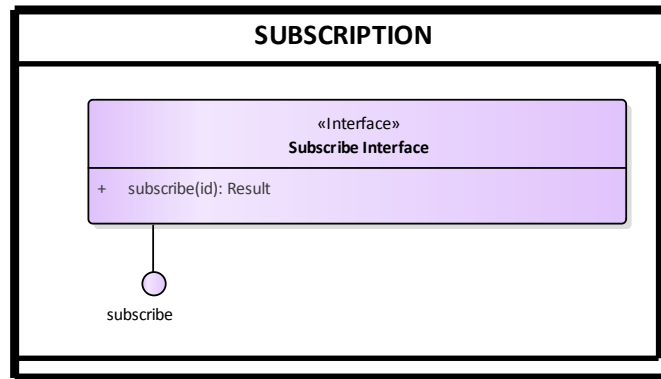
Don't consumes any other interface.

Relies on infrastructure to retrieve identity of caller for authentication and authorization procedures.

6.3 Subscribe Interface

The purpose of the interface is to request subscription on information, either on specific identity, or the information decided upon by information provider.

6.3.1 Operation



6.3.2 Operation Functionality

6.3.3 Operation Parameters

Parameter	Type	Direction	Description
id	string	Input	Optional Specific identity of the information object to subscribe on. Can be retrieved from Get List interface

Return	Direction	Type	Description
	Output	Result	Confirmation or error message

6.3.4 Dependency

Consumes the following interfaces

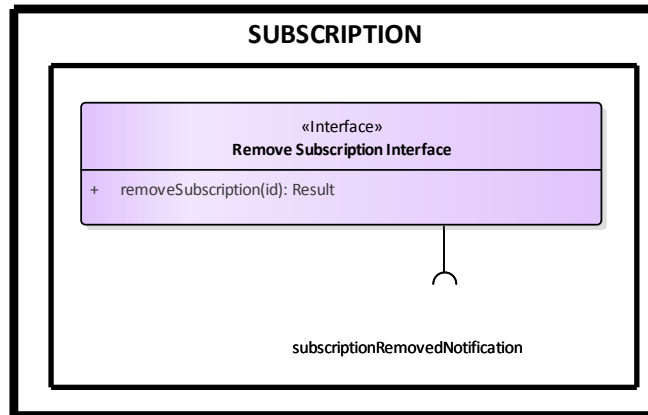
- Upload
- subscription Created Notification
- subscription Removed Notification

Relies on infrastructure to retrieve identity of caller for authentication and authorization procedures.

6.4 Remove Subscription Interface

Subscriptions is removed either internally by information owner, or externally by the consumer with this interface.

6.4.1 Operation



6.4.2 Operation Functionality

6.4.3 Operation Parameters

Parameter	Type	Direction	Description
id	string	Input	Optional Specific identity of the information object to remove subscription for. If no id entity provided, all subscriptions for the caller is removed

Return	Direction	Type	Description
	Output	Result	Confirmation or error message

6.4.4 Dependency

Consumes the following interfaces

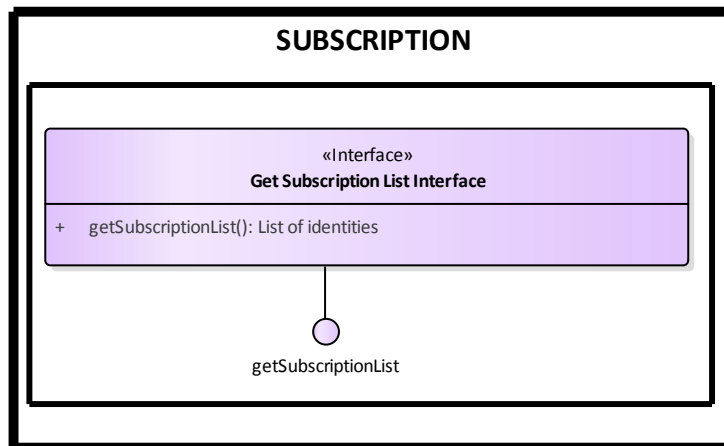
- subscription Removed Notification

Relies on infrastructure to retrieve identity of caller for authentication and authorization procedures.

6.5 Get Subscription List Interface

A list of active subscriptions can be retrieved through this interface.

6.5.1 Operation



6.5.2 Operation Functionality

6.5.3 Operation Parameters

Return	Direction	Type	Description
	Output	List of identities, status and description	Error message or list of identities currently subscribing on

6.5.4 Dependency

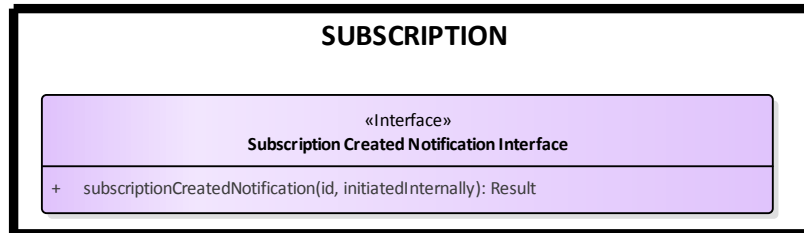
Don't consumes any other interface

Relies on infrastructure to retrieve identity of caller for authentication and authorization procedures.

6.6 Subscription Created Notification Interface

The interface provides notifications when subscription is created, either internally by information owner, or externally on request.

6.6.1 Operation



6.6.2 Operation Functionality

6.6.3 Operation Parameters

Parameter	Type	Direction	Description
id	string	Input	Mandatory Identity of the information object the notification concern
initiatedInternally	bool	Input	Mandatory True if the subscription was created by information owner internally False if the subscription was created by external request

Return	Direction	Type	Description
	Output	Result	Confirmation or error message

6.6.4 Dependency

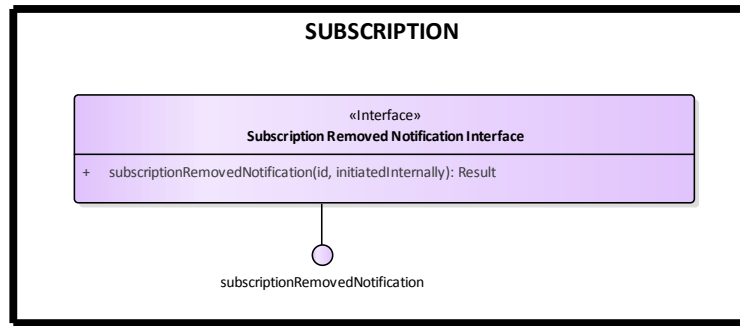
Don't consumes any other interface

Relies on infrastructure to retrieve identity of caller for authentication and authorization procedures.

6.7 Subscription Removed Notification Interface

The interface provides notifications when subscription is removed, either internally by information owner, or externally on request.

6.7.1 Operation



6.7.2 Operation Functionality

6.7.3 Operation Parameters

Parameter	Type	Direction	Description
id	string	Input	Mandatory Identity of the information object the notification concern
initiatedInternally	bool	Input	Mandatory True if the subscription was removed by information owner internally False if the subscription was removed by external request

Return	Direction	Type	Description
	Output	Result	Confirmation or error message

6.7.4 Dependency

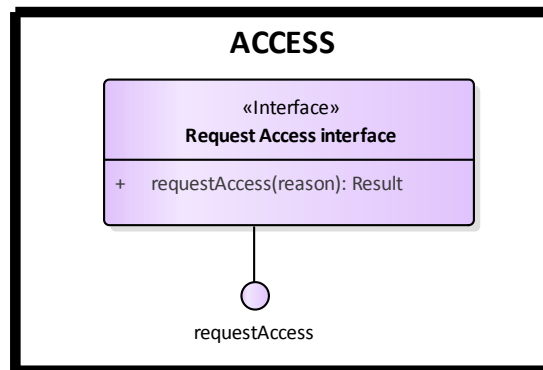
Don't consumes any other interface

Relies on infrastructure to retrieve identity of caller for authentication and authorization procedures.

6.8 Request Access interface

Access to information can be requested through the Access interface. Depending on application, the result is sent synchronous in the response, or asynchronous through the Access Notification interface.

6.8.1 Operation



6.8.2 Operation Functionality

6.8.3 Operation Parameters

Parameter	Type	Direction	Description
reason	string	Input	Mandatory Description of reason for requesting access to information

Return	Direction	Type	Description
	Output	Result	Confirmation or error message. Result from request can be synchronous in the result back, or asynchronous through Access Notification interface.

6.8.4 Dependency

Consumes the following interfaces

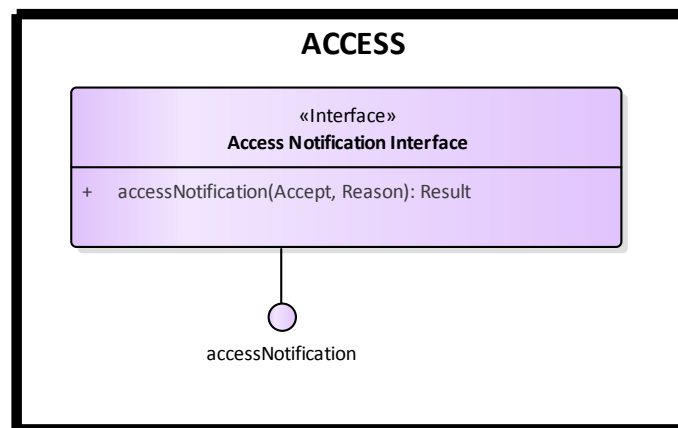
- subscription Removed Notification

Relies on infrastructure to retrieve identity of caller for authentication and authorization procedures.

6.9 Access Notification Interface

Result from an Access Request is sent asynchronous through this interface

6.9.1 Operation



6.9.2 Operation Functionality

6.9.3 Operation Parameters

Parameter	Type	Direction	Description
Accept	bool	Input	Mandatory Result from the request for access; True or False
Reason	string	Input	Optional

			Reason for decision on access request
--	--	--	---------------------------------------

Return	Direction	Type	Description
	Output	Result	Confirmation or error message

6.9.4 Dependency

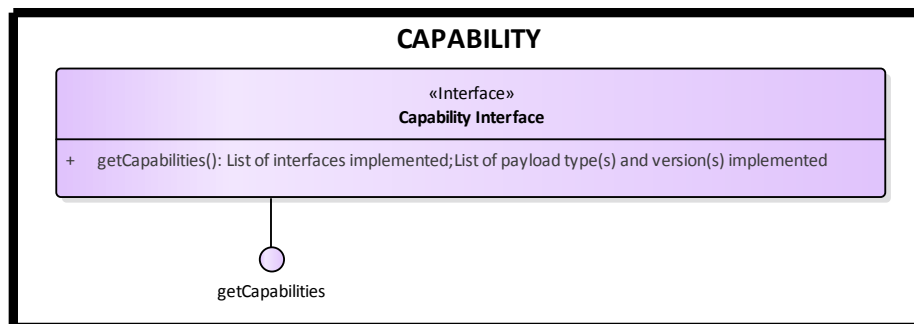
Don't consumes any other interface

Relies on infrastructure to retrieve identity of caller for authentication and authorization procedures.

6.10 Capability Interface

The purpose of the interface is to provide a dynamic method to ask a service instance at runtime what interfaces that are accessible and what payload formats and version that are valid.

6.10.1 Operation



6.10.2 Operation Functionality

6.10.3 Operation Parameters

Return	Direction	Type	Description
--------	-----------	------	-------------

	Output	List of interfaces implemented; List of payload type(s) and version(s) implemented	Description of service capabilities; Which interfaces that are valid for the specific service instance, the accepted payload format and version, and specific requirements in payload etc. TBD: Need to be defined
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6.10.4 Dependency

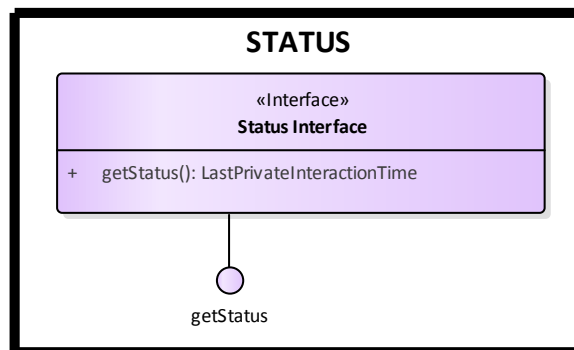
Don't consumes any other interface

Relies on infrastructure to retrieve identity of caller for authentication and authorization procedures.

6.11 Status Interface

The purpose of the interface is to provide a dynamic method to ask for status on the service and the application behind the service.

6.11.1 Operation



6.11.2 Operation Functionality

6.11.3 Operation Parameters

Return	Direction	Type	Description
	Output	LastPrivateInteractionTime	Status on service and the latest activity on private side. TBD: Need to be defined

6.11.4 Dependency

Don't consumes any other interface

Relies on infrastructure to retrieve identity of caller for authentication and authorization procedures.

7 Service Dynamic Behaviour

This chapter describes the interactive behaviour between service interfaces (interaction specification) and, if required, between different services (orchestration). Architectural elements applicable for this description are:

- Service Interaction Specifications
- Service State machines
- Service orchestration

Following types of views and UML diagrams can be used to describe the dynamic behaviour¹:

- Sequence diagrams
- Interaction diagrams
- State machine diagrams

7.1 Service Interface <Interface Name>

Include some information about the dynamic aspects of the service interface; each operation should be exposed on at least one diagram.

An example sequence diagram is given below.

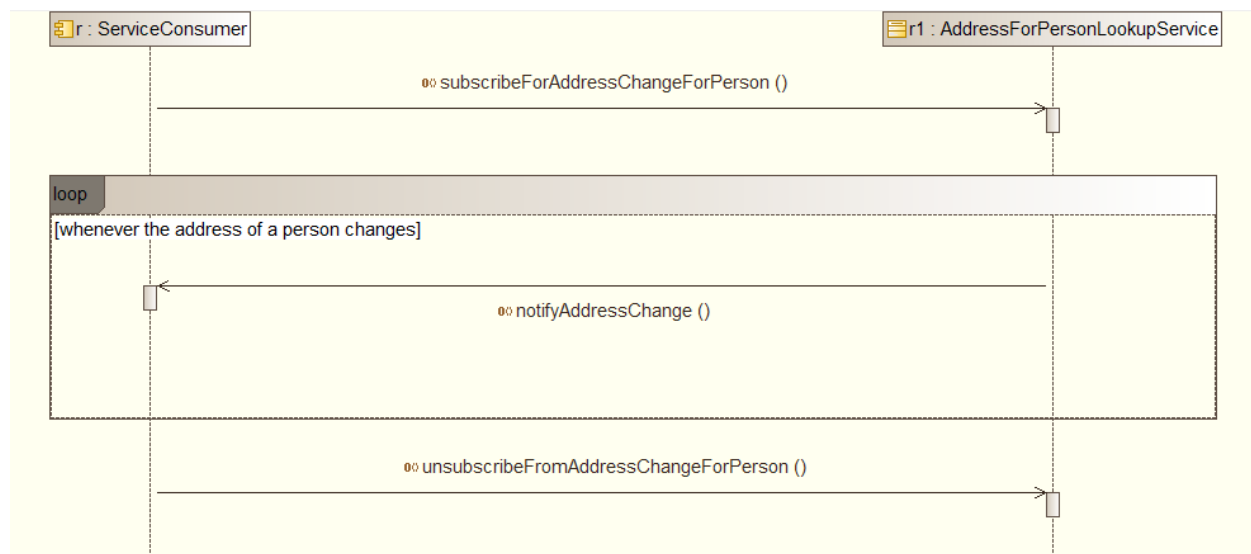


Figure 6: <Service Name> Operation Sequence Diagram

7.2 Service Interface <Interface Name>

Repeat previous section for each service interface

¹ e.g., in NATO Architectural Framework (NAF), state model and interaction specification (NAF3.1) or NSOV-5 Service constraints, state model could be used.

1.1 Upload Interface

Usage of upload interface is shown for two use cases (perspectives) below;

- Upload message initiated from external service to service in focus (Figure 7), hence service in focus acts as information consumer
- Upload message initiated from private application in service in focus to external service (Figure 8), hence the service in focus acts as information producer

The external service producer uploads the S-124 message to the service in focus, hence the service in focus acts as information consumer.

The service in focus retrieves the identity of the external service from the service infrastructure and performs authentication procedure. If not authenticated, the service request is rejected. The specific authentication procedure is out of scope of the service specification. Reference to underlying infrastructure platform?

The service in focus uses the retrieved identity of the external service and performs authorization procedure. If not authorized, the service request is rejected. The specific authentication procedure is out of scope of the service specification. Reference to underlying infrastructure platform?

The external service producer may request acknowledgement, which is sent by the service in focus when the private end application has retrieved the uploaded message. The acknowledgement contains reference to the messageID given in the upload request.

The external service producer also indicates whether the uploaded message is within a subscription in the external service, or if it is a one-time upload of data, hence no updates can be expected if not within a subscription.

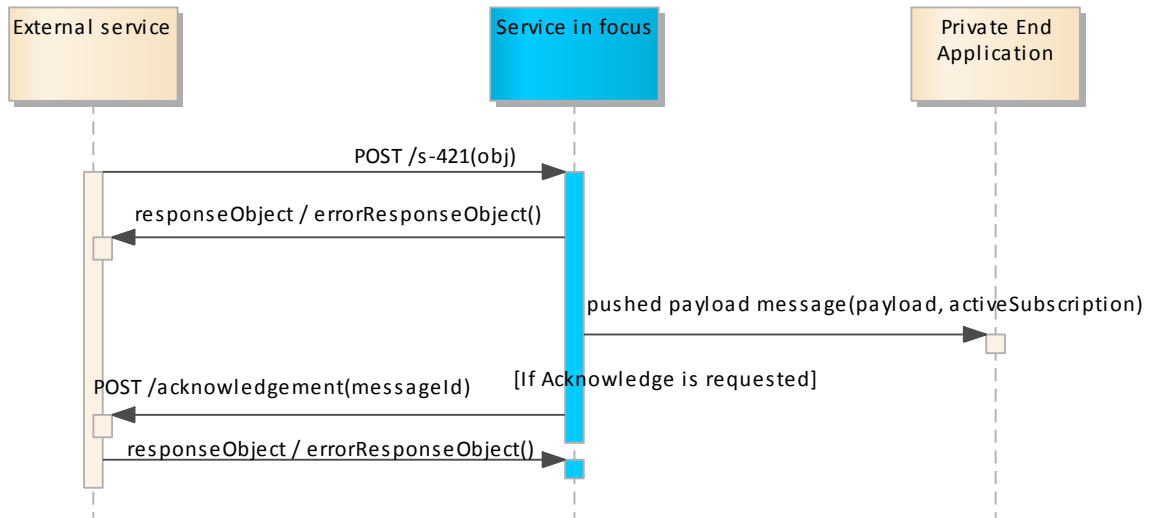


Figure 7 Upload message initiated by external service

The S-124 message can also be initiated by the private end application, hence the service in focus then acts as the information producer.

The service in focus may retrieve the identity of the external service from the service infrastructure and perform authentication procedure. If not authenticated, the service request is not fulfilled. The external service may also perform an authentication procedure and may reject the request if not authenticated. **The specific authentication procedure is out of scope of the service specification. Reference to underlying infrastructure platform?**

The external service may perform authorization procedure and may reject the request if not authorized. **The specific authentication procedure is out of scope of the service specification. Reference to underlying infrastructure platform?**

Acknowledgement may be requested by the service in focus, which is then expected when the external service has delivered the message to its private end application. The acknowledgement contains reference to the messageID given in the upload request. The handling if no acknowledgement is received within a certain time is up to the private end application.

The service in focus also indicates whether the external service is a subscriber to information in the service in focus.

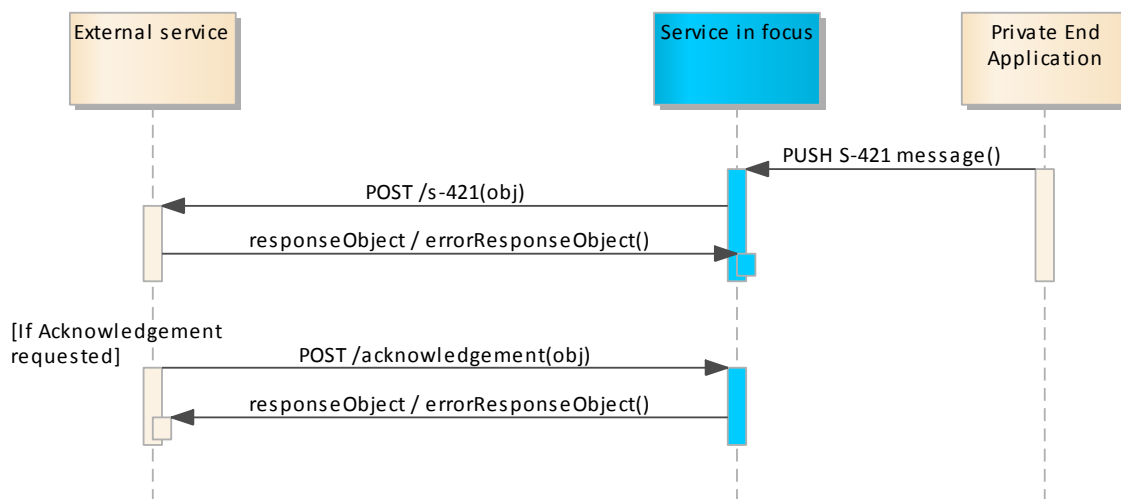


Figure 8 Push initiated by private application

1.2 PULL interface

The external service may anytime make a request for information to service in focus.

The service in focus retrieves the identity of the external service from the service infrastructure and performs authentication procedure. If not authenticated, the service request is rejected. The specific authentication procedure is out of scope of the service specification. Reference to underlying infrastructure platform?

The service in focus search for information according to optional input parameters (identity, status, area in WKT format).

If any found, the service in focus uses the retrieved the identity of the external service and performs authorization procedure. If not authorized, the service request is rejected. The specific authentication procedure is out of scope of the service specification. Reference to underlying infrastructure platform?

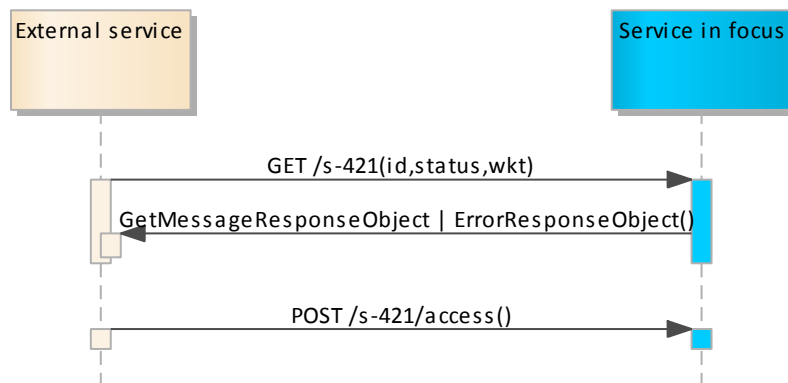


Figure 9 Pull (get) interface

1.3 GET LIST interface

The external service asks for a list of information objects that are accessible by the external service.

The service in focus retrieves the identity of the external service from the service infrastructure and performs authentication procedure. If not authenticated, the service request is rejected. **The specific authentication procedure is out of scope of the service specification. Reference to underlying infrastructure platform?**

The service in focus search for information according to optional input parameter (area in WKT format).

If any found, the service in focus uses the retrieved the identity of the external service and performs authorization procedure. If not authorized, the service request is rejected. **The specific authentication procedure is out of scope of the service specification. Reference to underlying infrastructure platform?** The service in focus returns a list of information descriptions for the accessible information.

QUESTION: Return error or empty list if there is no accessible information?

The external service can use the given identity in pull (get) interface to retrieve the complete information object. Or use the given identity to request subscription of the information object.

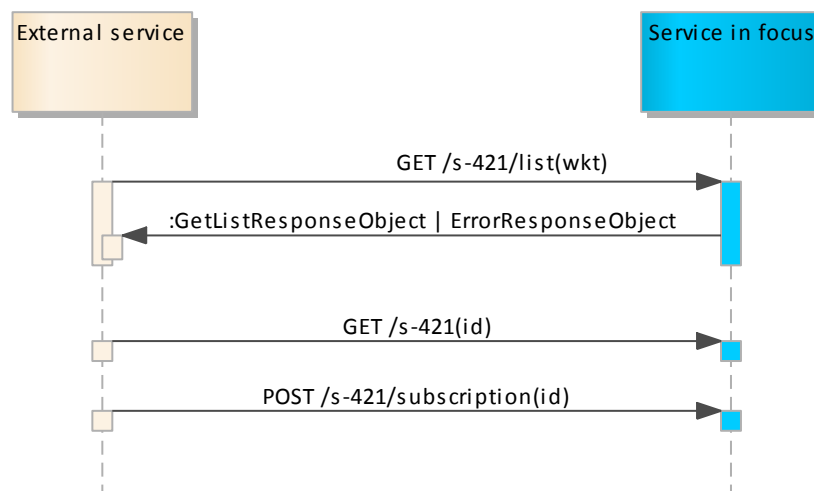


Figure 10 Get List interface

1.4 ACCESS and ACCESS NOTIFICATION interface

The external service asks the service in focus for access to its information. The external service provides the reason for the request.

The service in focus retrieves the identity of the external service from the service infrastructure and performs authentication procedure. If not authenticated, the service request is rejected. **The specific authentication procedure is out of scope of the service technical design. Reference to SeaSWIM Connector?**

The service in focus uses the retrieved the identity of the external service and performs authorization procedure. **The specific authorization procedure is out of scope of the service technical design. Reference to SeaSWIM Connector?**

The service in focus respond with 202 for asynchronous response if external service has no access to any information.

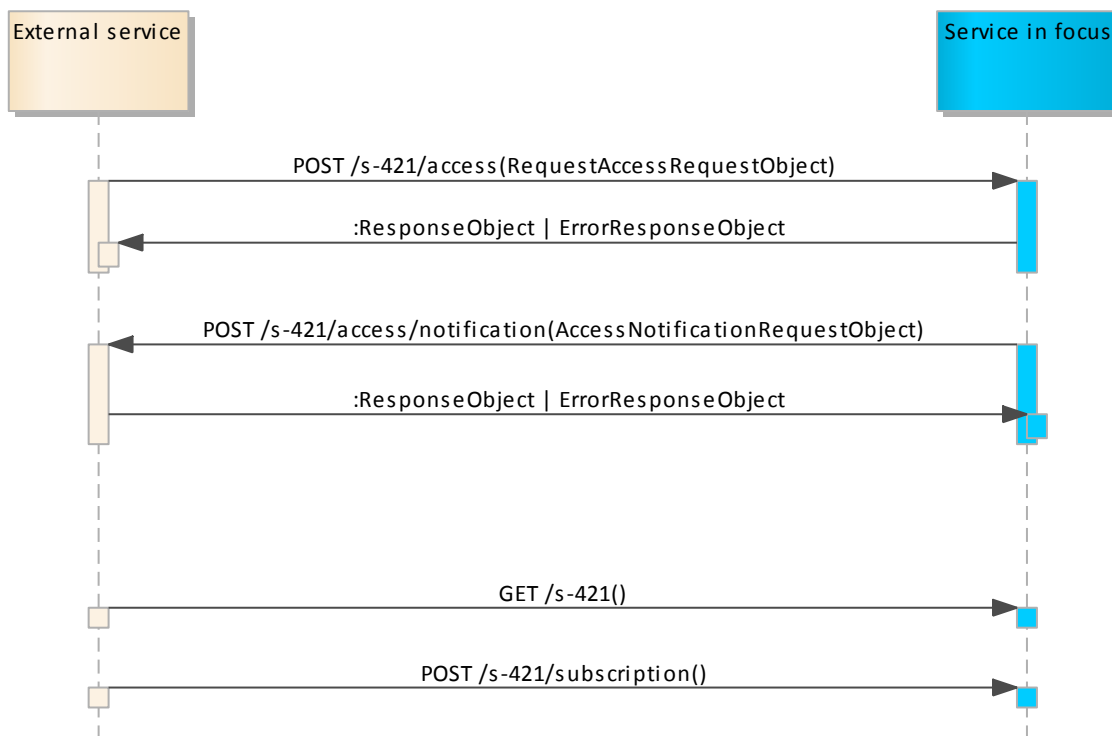


Figure 11 Access request interface

1.5 SUBSCRIPTION and SUBSCRIPTION NOTIFICATION interface

Similar to the Push interface, there are two use cases with different initiations of subscription;

- Subscription requested from external service
- External service nominated as subscriber from private application of service in focus

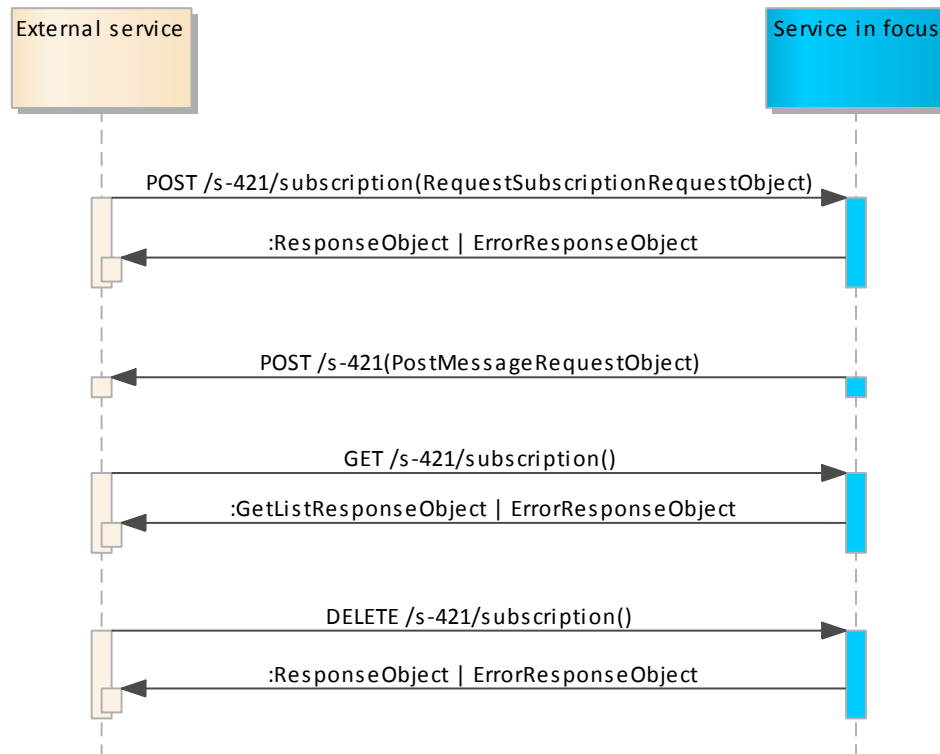


Figure 12 Subscription requested by external service

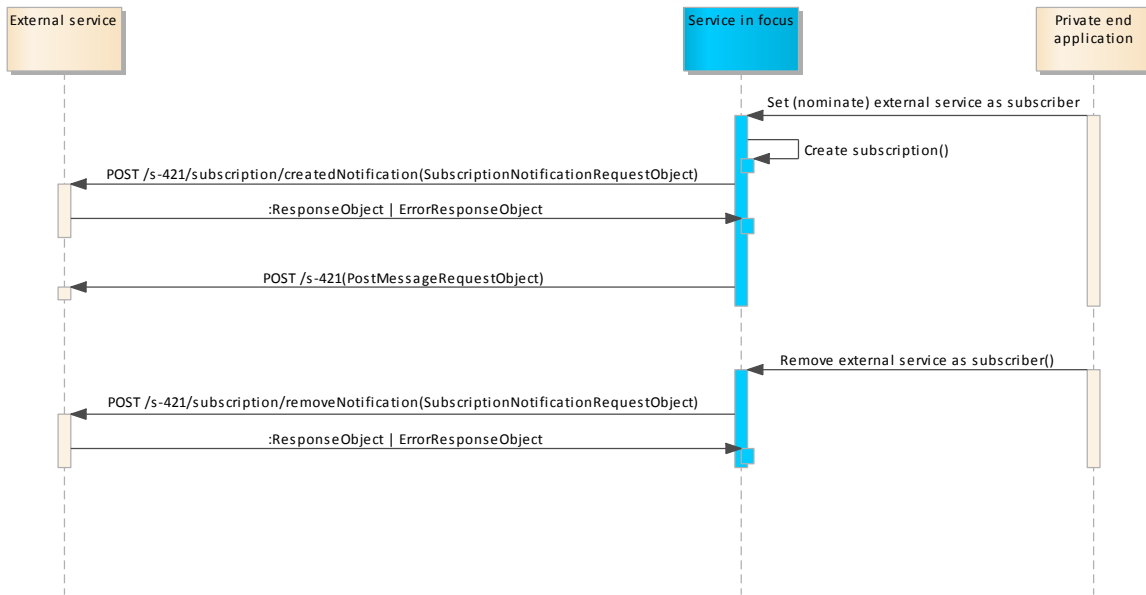


Figure 13 Subscription initiated internally

1.6 CAPABILITY interface

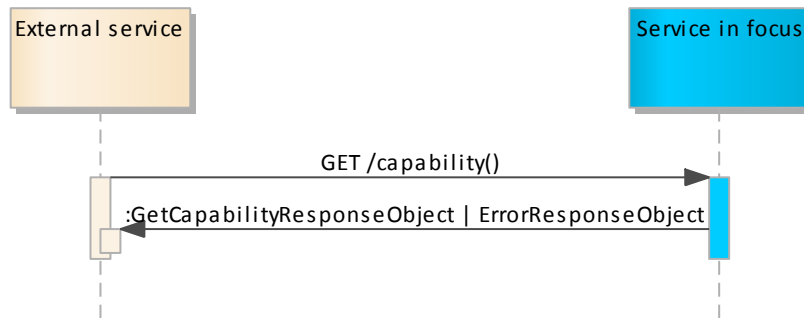


Figure 14 Capability interface

1.7 STATUS interface

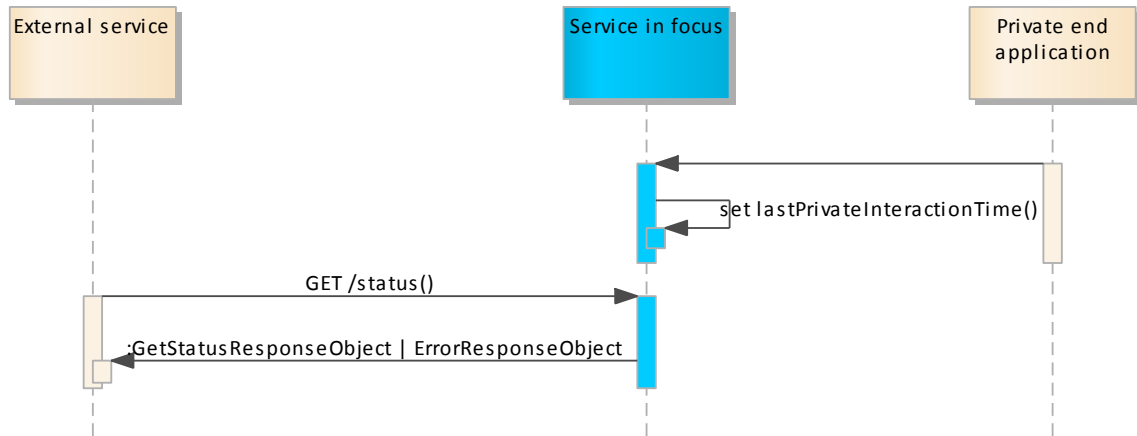


Figure 15 Status interface

8 Service Provisioning (optional)

This chapter should describe the way services are planned to be provided and consumed. It is labelled optional since one of the key aspects of service-orientation is to increase flexibility of the overall system by separating the definition of services from their implementation. This means that a service can be provided in several different contexts that are not necessarily known at the time, when the service is designed.

9 References

This chapter shall include all references used when designing the service. Specifically, the applicable steering and requirements documents shall be listed.

Nr.	Version	Reference
[1] Service Documentation Guidelines	01.00	SG_Annex_A_Service_Documentation_Guidelines
[3] Maritime Resource Name		Maritime Resource Name, ENAV17-n.n.n
[4] S-100 Universal Hydrographic Data Model	2.0.0	S-100 – UNIVERSAL HYDROGRAPHIC DATA MODEL http://www.iho.int/iho_pubs/standard/S-100/S-100_Ed_2/S_100_V2.0.0_June-2015.pdf

10 Acronyms and Terminology

10.1 Acronyms

Term	Definition
API	Application Programming Interface
MC	Maritime Cloud
MEP	Message Exchange Pattern
MRN	Maritime Resource Name
NAF	NATO Architectural Framework
REST	Representational State Transfer
SOA	Service Oriented Architecture
SOAP	Simple Object Access Protocol
SSD	Service Specification Document
UML	Unified Modelling Language
URL	Uniform Resource Locator
VTS	Vessel Traffic Service
WSDL	Web Service Definition Language
XML	Extendible Mark-up Language
XSD	XML Schema Definition

10.2 Terminology

Term	Definition
External Data Model	Describes the semantics of the “maritime world” (or a significant part thereof) by defining data structures and their relations. This could be at logical level (e.g., in UML) or at physical level (e.g., in XSD schema definitions), as for example standard data models, or S-100 based data produce specifications.
Message Exchange Pattern	Describes the principles how two different parts of a message passing system (in our case: the service provider and the service consumer) interact and communicate with each other. Examples: In the Request/Response MEP, the service consumer sends a request to the service provider in order to obtain certain information; the service provider provides the requested information in a dedicated response. In the Publish/Subscribe MEP, the service consumer establishes a subscription with the service provider in order to obtain certain information; the service provider publishes information (either in regular intervals or upon change) to all subscribed service consumers.
Operational Activity	An activity performed by an operational node. Examples of operational activities in the maritime context are: Route Planning, Route Optimization, Logistics, Safety, Weather Forecast Provision, ...
Operational Model	A structure of operational nodes and associated operational activities and their inter-relations in a process model.
Operational Node	A logical entity that performs activities. Note: nodes are specified independently of any physical realisation.

	<p>Examples of operational nodes in the maritime context are: Maritime Control Center, Maritime Authority, Ship, Port, Weather Information Provider, ...</p>
Service	<p>The provision of something (a non-physical object), by one, for the use of one or more others, regulated by formal definitions and mutual agreements. Services involve interactions between providers and consumers, which may be performed in a digital form (data exchanges) or through voice communication or written processes and procedures.</p>
Service Consumer	<p>A service consumer uses service instances provided by service providers. All users within the maritime domain can be service customers, e.g., ships and their crew, authorities, VTS stations, organizations (e.g., meteorological), commercial service providers, etc.</p>
Service Data Model	<p>Formal description of one dedicated service at logical level. The service data model is part of the service specification. Is typically defined in UML and/or XSD. If an external data model exists (e.g., a standard data model), then the service data model shall refer to it: each data item of the service data model shall be mapped to a data item defined in the external data model.</p>
Service Design Description	<p>Documents the details of a service technical design (most likely documented by the service implementer). The service design description includes (but is not limited to) a service physical data model and describes the used technology, transport mechanism, quality of service, etc.</p>
Service Implementation	<p>The provider side implementation of a dedicated service technical design (i.e., implementation of a dedicated service in a dedicated technology).</p>
Service Implementer	<p>Implementers of services from the service provider side and/or the service consumer side. Anybody can be a service implementer but mainly this will be commercial companies implementing solutions for shore and ship.</p>
Service Instance	<p>One service implementation may be deployed at several places by same or different service providers; each such deployment represents a different service instance, being accessible via different URLs.</p>
Service Instance Description	<p>Documents the details of a service implementation (most likely documented by the service implementer) and deployment (most likely documented by the service provider). The service instance description includes (but is not limited to) service technical design reference, service provider reference, service access information, service coverage information, etc.</p>
Service Interface	<p>The communication mechanism of the service, i.e., interaction mechanism between service provider and service consumer. A service interface is characterised by a message exchange pattern and consists of service operations that are either allocated to the provider or the consumer of the service.</p>
Service Operation	<p>Functions or procedure which enables programmatic communication with a service via a service interface.</p>
Service Physical Data Model	<p>Describes the realisation of a dedicated service data model in a dedicated technology. This includes a detailed description of the data S-124 to be exchanged using the chosen technology. The actual format of the service physical data model depends on the</p>

chosen technology. Examples may be WSDL and XSD files (e.g., for SOAP services) or swagger (Open API) specifications (e.g., for REST services). If an external data model exists (e.g., a standard data model), then the service physical data model shall refer to it: each data item of the service physical data model shall be mapped to a data item defined in the external data model.

In order to prove correct implementation of the service specification, there shall exist a mapping between the service physical data model and the service data model. This means, each data item used in the service physical data model shall be mapped to a corresponding data item of the service data model. (In case of existing mappings to a common external (standard) data model from both the service data model and the service physical data model, such a mapping is implicitly given.)

Service Provider

A service provider provides instances of services according to a service specification and service instance description. All users within the maritime domain can be service providers, e.g., authorities, VTS stations, organizations (e.g., meteorological), commercial service providers, etc.

Service Specification

Describes one dedicated service at logical level. The Service Specification is technology-agnostic. The Service Specification includes (but is not limited to) a description of the Service Interfaces and Service Operations with their data S-124. The data S-124 description may be formally defined by a Service Data Model.

Service Specification Producer

Producers of service specifications in accordance with the service documentation guidelines.

Service Technical Design

The technical design of a dedicated service in a dedicated technology. One service specification may result in several technical service designs, realising the service with different or same technologies.

Service Technology Catalogue

List and specifications of allowed technologies for service implementations. Currently, SOAP and REST are envisaged to be allowed service technologies. The service technology catalogue shall describe in detail the allowed service profiles, e.g., by listing communication standards, security standards, stacks, bindings, etc.

Spatial Exclusiveness

A service specification is characterised as “spatially exclusive”, if in any geographical region just one service instance of that specification is allowed to be registered per technology. The decision, which service instance (out of a number of available spatially exclusive services) shall be registered for a certain geographical region, is a governance issue.

Appendix A Service Specification XML

This appendix contains the formal definition of the service specification.

It is up to the author whether the service specification xml file (which includes the XSD definition of the service data model) is presented in full text or just as an embedded file.

An example service specification xml file is added below.



AddressForPersonLookupServiceSpecification.xml