STM
SEA TRAFFIC MANAGEMENT

Document No:

Title: Port Information Service Specification

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Authors

Name	Organisation
Per Löfbom	SMA
Mikael Olofsson	SMA
Almir Zerem	Viktoria

Document History

Version	Date	Initials	Description
Version 1.0	2016-05-16	MO, PL, PD	Used in tendering documentation
Version 1.1	2016-09-23	MO, PL, AZ	Updated service interface

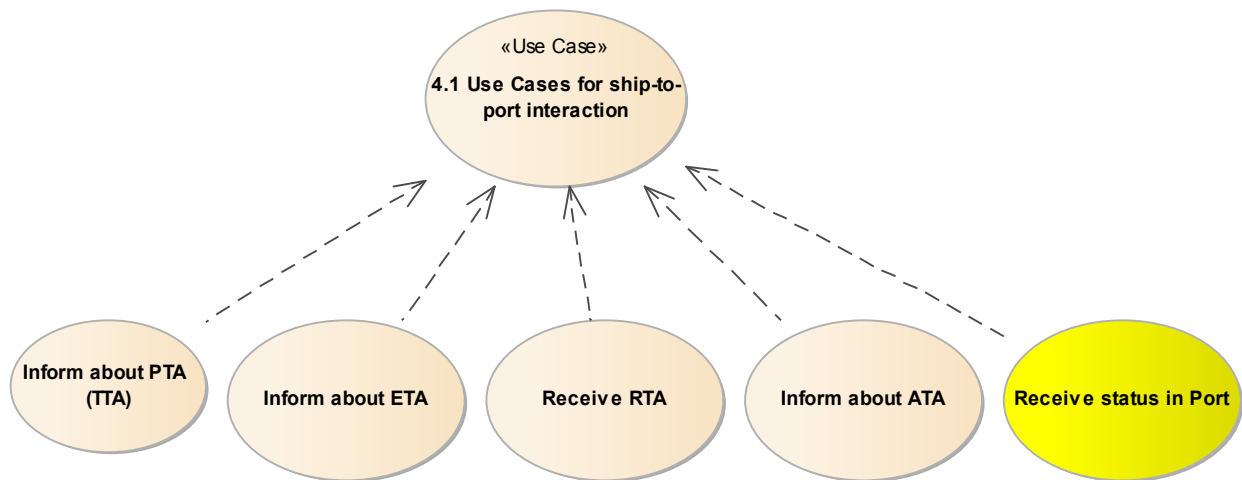Review

Name	Organisation

1   Service identification

Name	Port Information Service
ID	urn:mrnx:stm:service:specification:PIS:STM
Version	1.1
Description	The service supports communication between ship and Port CDM.
Keywords	PIS, Port Information Service, STM Service, PCM,PCMF, Port Call Message
Status	provisional

STM
SEA TRAFFIC MANAGEMENT

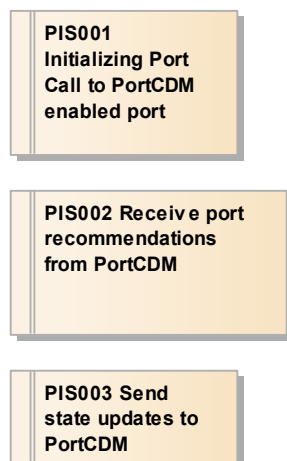Co-financed by the European Union
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2 Operational Context

The main purpose with Port Information Service is support the ships onboard system with communication with PortCDM services in port. The Port Information Service may be integrated in the onboard system or implemented at a shore based location with private network connection to ship.

The main functionality of the Port Information Service is to send updates on schedule (PTA/TTA, ETA, ATA) and receive recommended schedule (RTA).

2.1 Functional and non-functional Requirements

PIS001
Initializing Port
Call to PortCDM
enabled port

PIS002 Receive port
recommendations
from PortCDM

PIS003 Send
state updates to
PortCDM

In designing the Port Information Service (PIS) for the STM Validation project and subsequent test-beds, a reduced scope will be implemented as compared with what will be catered for according to the STM Target Concept. Initially for the test-beds we have decided upon supporting described operational requirements and use cases below. (Refer to document: "*STM Voyage Management operational requirements and use cases*")

Requirement Id	PIS001
Requirement Name	PIS001 Initializing Port Call to PortCDM enabled port
Requirement Text	The ship shall initialize the port call and be given a Port Call Identity in return.
Rationale	
Author	STM
Reference	Use-Case : Ship to port

Requirement Id	PIS003
Requirement Name	PIS003 Send state updates to PortCDM
Requirement Text	The ship shall send updated states to Port, such as Planned Time of Arrival (PTA), Estimated Time of Arrival (ETA).
Rationale	
Author	STM
Reference	Use-Case : Ship to port

| Requirement Id	PIS002
Requirement Name	PIS002 Receive port recommendations from PortCDM
Requirement Text	The ship shall receive recommendations from Port, such as Recommended Time of Arrival (RTA)
Rationale	
Author	STM
Reference	See ref [5] Port Call Message

2.2 Other Constraints

No information.

2.2.1 Relevant Industrial Standards

No information.

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2.3 Operational Nodes
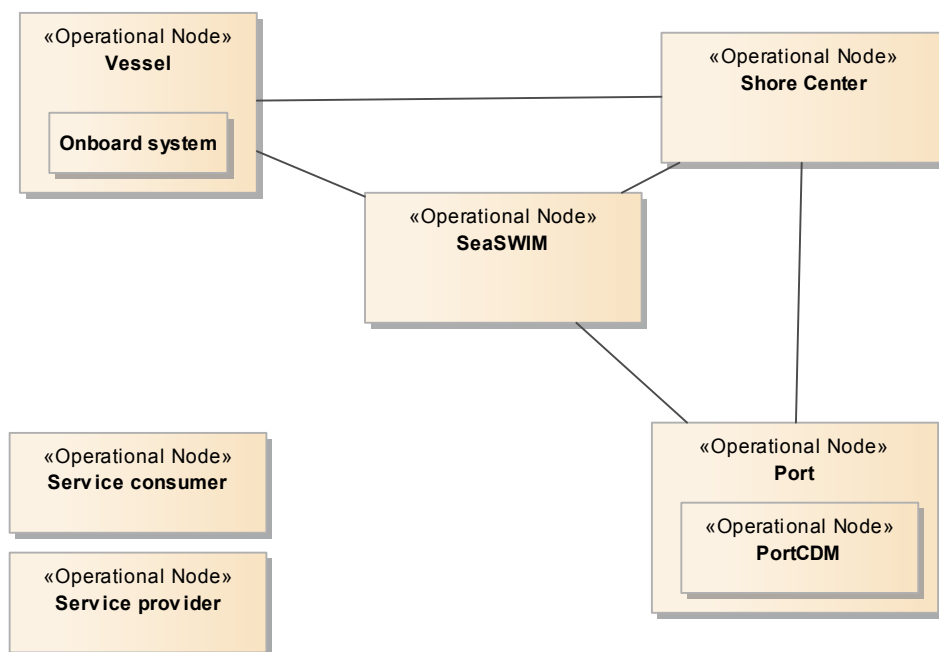
| Operational Node/Activity	Remarks
Vessel	Collection of services, activities and procedures of Vessel. For ships with a permanent internet connection like V-SAT the VIS instance can be provided from the vessel itself.
Onboard system	Collection of services, activities and procedures for ship onboard system
Service provider	Organizations/ authorities offering e.g. route optimization services possible consumers of voyage plans provided by a vessel or a representation thereof. SMHI (Swedish Metrological & Hydrological Institute) is one example.
Shore Center	Collection of services, activities and procedures of Shore Center Refers to entities offering services such as route check and/ or enhanced monitoring.
Service consumer	All sorts of clients can be envisaged to consume the published VIS messages. Examples may be an ECDIS on a ship or any STM compliant application.
Port	Collection of services, activities and procedures in port.
PortCDM	Collection of services, activities and procedures in PortCDM.
SeaSWIM	Collection of services, activities and procedures of SeaSWIM.

2.4 Operational Activities

```
«Operational Activity»
Port Call Synchronization
```

Operational Activities supported by the Port Information service

Operational Node/Activity	Remarks
Port Call Synchronization	Ship and port synchronize their efforts in enabling just-in-time operations. From the ship's point of view this means a possibility to save fuel by green steaming, in order to arrive just-in-time and enable just-in-time operations.

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3   Service Overview
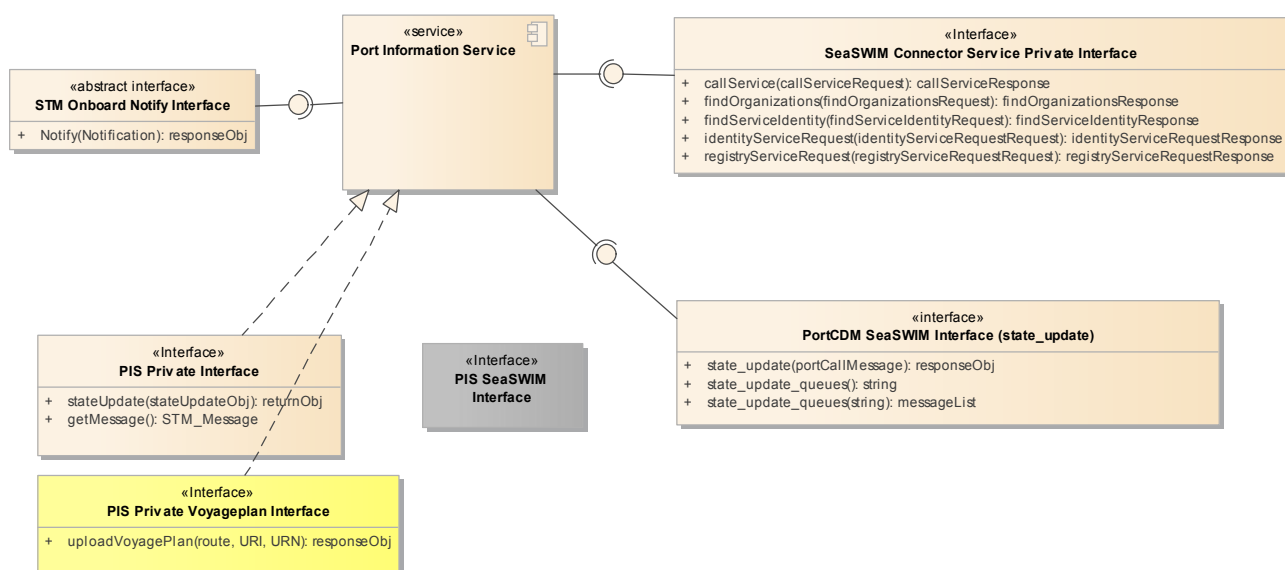
3.1   Service Interfaces

Service Interface	Role	Service Operation
PIS SeaSWIM Interface	Provided	
PIS Private Interface	Provided	stateUpdate getMessage
PIS Private Voyageplan Interface	Provided	uploadVoyagePlan (optional)

4 Service Data Model

4.1 Service Data Exchange Model

Input objects   Return objects

stateUpdate

stateUpdateObj
- endpoint: URI
- Port_un_locode: string
- message: portCallMessage

portCallMessage
- portCallId: pcm:PortCallIdentifier
- messageId: pcm:PortCallMessageIdentifier
- groupWith: pcm:PortCallMessageIdentifier
- reportedAt: dateTime
- reportedBy: string
- timeType: pcm:TimeType
- time: dateTime
- comment: string
- locationState: LocationState
- serviceState: ServiceState

«Interface»
PIS Private Interface
- + stateUpdate(stateUpdateObj): returnObj
- + getMessage(): STM_Message

getMessage() : Messages

From VIS Data model

Messages
- numberOfMessages: int
- remainingNumberOfMessages: int

0..*

Message
- id: string
- receivedAt: dateTime
- from: URN
- messageType: messageType
- message: STMMessage

«abstract interface»
STM Onboard Notify Interface
- + Notify(Notification): responseObj

From VIS Data model

Notification
- id: string
- notificationType: enumNotificationType
- notificationCreatedAt: dateTime
- fromId: string
- fromName: string
- receivedAt: dateTime
- messageWaiting: int
- subject: string
- body: string [0..1]

«enumeration»
enumNotificationType

MESSAGE_WAITING = 1
VOYAGEPLAN_REQUESTED = 2
AUTHORIZATION_REQUESTED = 3
ERROR_MESSAGE = 4

4.1.1 stateUpdateObj

Relations to:

Relations from:

Element Name	Attributes		
stateUpdateObj	**Name**	**Type**	**Description**
	endpoint	URI	
	Port_un_locode	string	
	message	portCallMessage	

4.1.2 portCallMessage

Relations to:

Relations from:
· LocationState
· ServiceState

Element Name	Attributes		
portCallMessage	**Name**	**Type**	**Description**
	portCallId	pcm:PortCallIdentifier	
	messageId	pcm:PortCallMessageIdentifier	
	groupWith	pcm:PortCallMessageIdentifier	
	reportedAt	dateTime	
	reportedBy	string	
	timeType	pcm:TimeType	
	time	dateTime	
	comment	string	
	locationState	LocationState	
	serviceState	ServiceState	

4.1.3 Notification

To inside application, such as STM Module

Relations to:
· enumNotificationType

Relations from:

Element Name	Attributes		
Notification	**Name**	**Type**	**Description**
	id	string	Identity of the notification, mandatory
	notificationType	enumNotificationType	Type of notification by enumeration
	notificationCreatedAt	dateTime	Notification created at date and time, mandatory
	fromId	string	Source of notification and source for retrieving the complete message, mandatory
	fromName	string	Friendly name of sender for presentation
	receivedAt	dateTime	Date and time for the reception of the message.
	messageWaiting	int	>0 if a message is waiting in server, otherwise 0, mandatory
	subject	string	Notification subject, mandatory
	body	string	Notification body, optional If message less than X bytes, the message (XML) can be sent in the body of the notification. Needs to be aligned with STM Module and ship operator configuration and policies

4.1.4 enumNotificationType

Types of notifications

Relations to:

Relations from:
· Notification

Element Name	Attributes		
enumNotificationType	**Name**	**Type**	**Description**
	MESSAGE_WAITING	int	
	VOYAGEPLAN_REQUESTED	int	
	AUTHORIZATION_REQUESTED	int	
	ERROR_MESSAGE	int	

4.1.5 Message

Message to the STM Module

Relations to:
· Messages
· messageType
· STMMessage

Relations from:

Element Name	Attributes		
Message	**Name**	**Type**	**Description**
	id	string	Identity of the message
	receivedAt	dateTime	Date and time of reception
	from	URN	Identity of the message source
	messageType	messageType	Type of STM message
	message	STMMessage	The message of any STM format

4.1.6 Messages

Container for messages to STM Module

Relations to:

Relations from:
· Message

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Element Name	Attributes			
Messages	**Name**	**Type**	**Description**	
	numberOfMessages	int	Total number of messages in this container	
	remainingNumberOfMessages	int	Remaining messages waiting to be retrieved	

5   Service Interface Specification
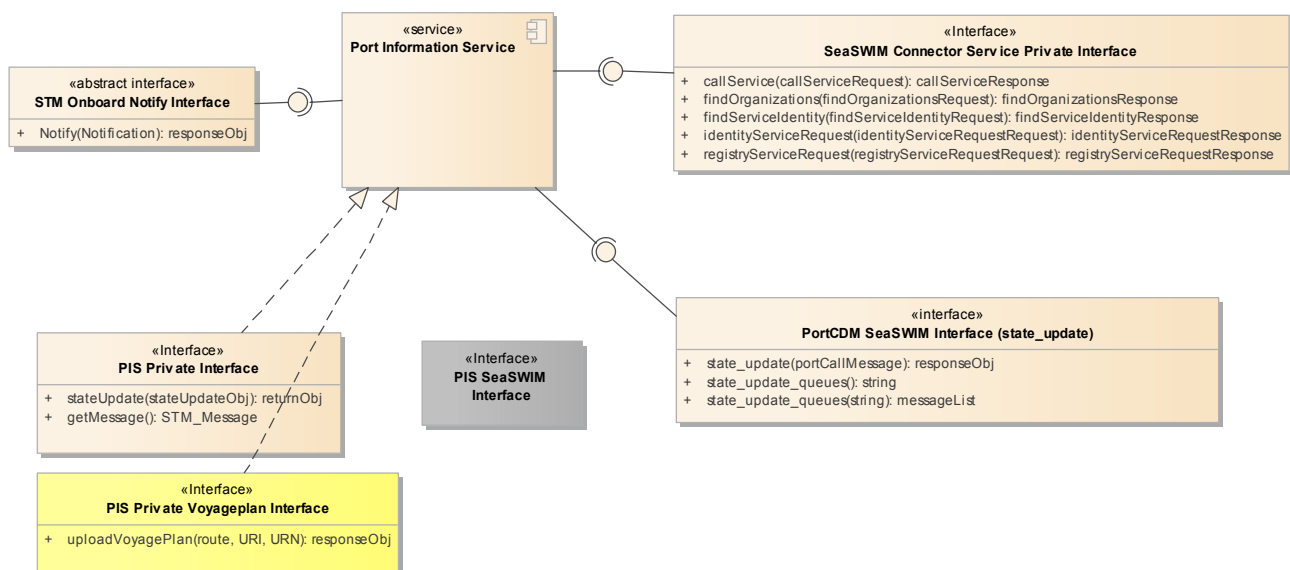
5.1 Port Information Service

The Port Information Service provides a private interface for communication to ship onboard system regarding informing the port regarding voyage plan schedule (PTA, ETA etc.) and receive recommendations from port (RTA etc.).

5.1.1 PIS SeaSWIM Interface

Port Information Service provides no interface for consumption on SeaSWIM. The Port Information Service only consumes other services (VIS and PortCDM).

5.1.2 PIS Private Interface

Private interface where the ship onboard system sends and receives information to/from PortCDM.

5.1.2.1   stateUpdate()

Send information to PortCDM regarding time on location in PCM format.

Operation functionality
Create call to stateUpdate service
Check if queue exists in port, if not, create queue and start polling of queue
Call stateUpdate service

Operation Parameters

Parameter Name	Direction	Data Type	Description
stateUpdateObj	Input	stateUpdateObj	State update message in PCM format

Return	Direction	Data Type	Description
	Return	returnObj	

5.1.2.2   getMessage()

The purpose is to retrieve message(s) that arrived during disconnect or too big to be sent in the notification.

getMessage can be called anytime and can return an empty list.

getMessage should be payload transparent and it's the receivers responsibility to validate the content.

The return is
- metadata related to the message
 - source Identity
 - received time
- the message

Operation functionality

Operation Parameters

Return	Direction	Data Type	Description
	Return	STM_Message	

5.1.3 PIS Private Voyageplan Interface

Interface where VoyagePlan (RTZ/RTZP) can be uploaded which will then be used to make stateUpdate calls to identified ports.

5.1.3.1   uploadVoyagePlan() - optional

Upload a Voyage Plan to initiate a Port Call in PortCDM and update states.
Can be called by STM onboard system directly or by VIS in a subscription.

Operation functionality

Operation Parameters

Parameter Name	Direction	Data Type	Description
route	Input	route	Route/voyage plan in RTZ format
AckEndpoint	Input	URI	
UVID	Input	URN	

Return	Direction	Data Type	Description
	Return	responseObj	

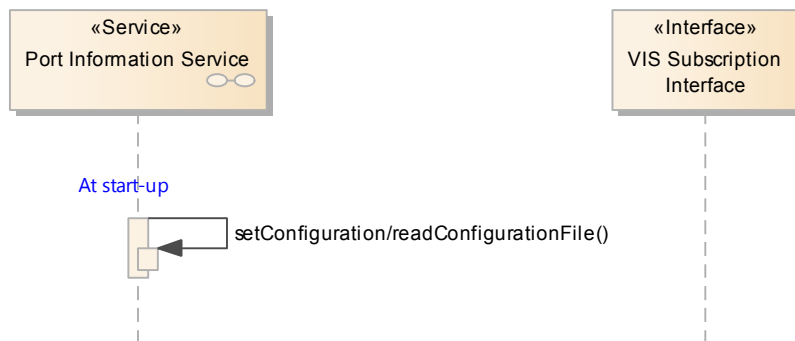# 6 Service Dynamic Behaviour

6.1 Service State Model

No information.

6.2 Service Interactions

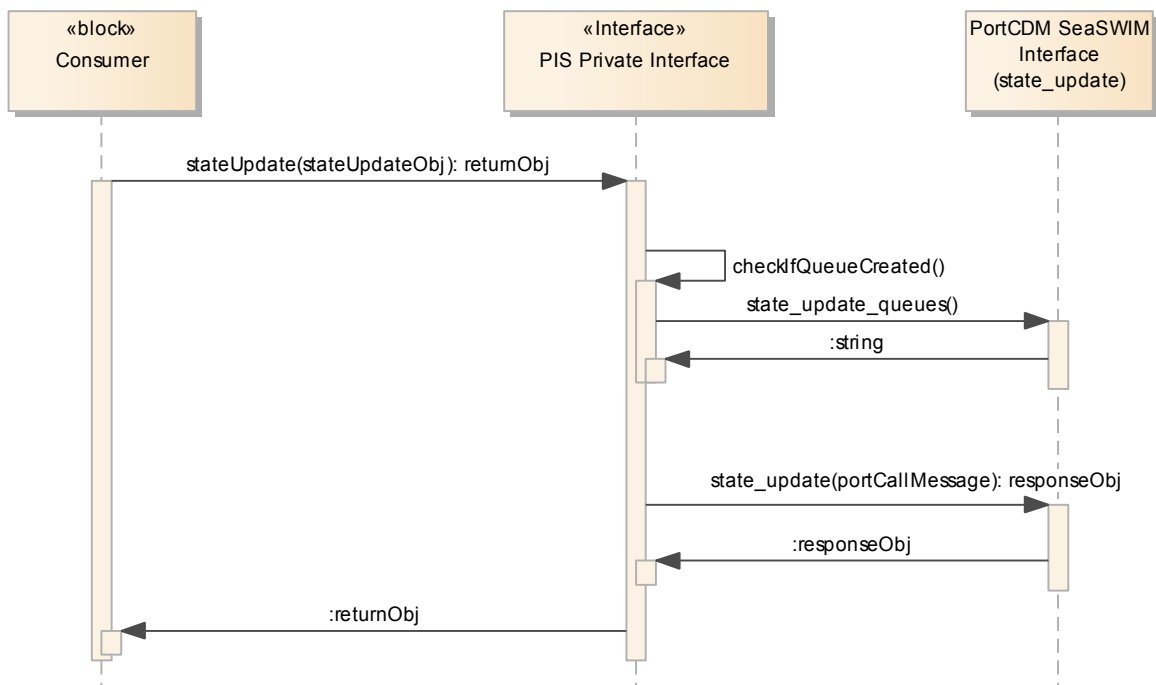This section contains interaction diagrams (sequence diagrams) to show the interactions to PIS interface.

6.2.1 Service Orchestration - <start-up>
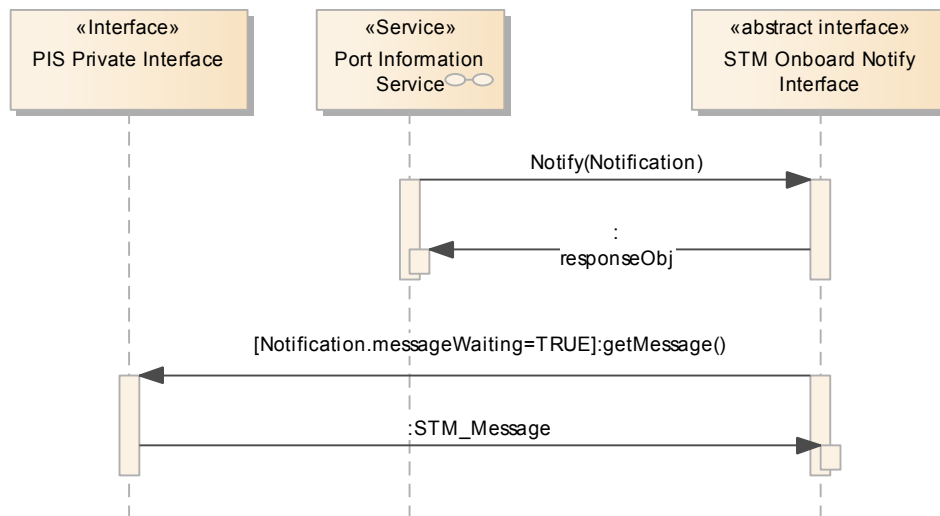
Shows the service interactions at start-up

6.2.2 Interaction stateUpdate
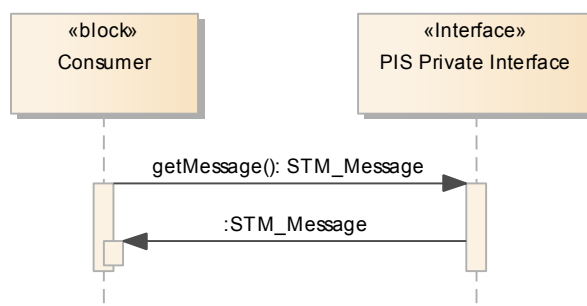
Shows the interaction to the interface operation.

6.2.3 Interaction Notify

Shows the interaction to the interface operation.

«Interface» PIS Private Interface	«Service» Port Information Service	«abstract interface» STM Onboard Notify Interface

Notify(Notification)

: responseObj

[Notification.messageWaiting=TRUE]:getMessage()

:STM_Message

6.2.4 Interaction getMessage

Shows the interaction to the interface operation.

«block» Consumer	«Interface» PIS Private Interface

getMessage(): STM_Message

:STM_Message

6.2.5 Service orchestration - Poll PortCDM queue (Get RTA)

Shows the interactions when a timer event is fired and the PortCDM queues is polled. Messages in PortCDM queue will be forwarded to the ship.
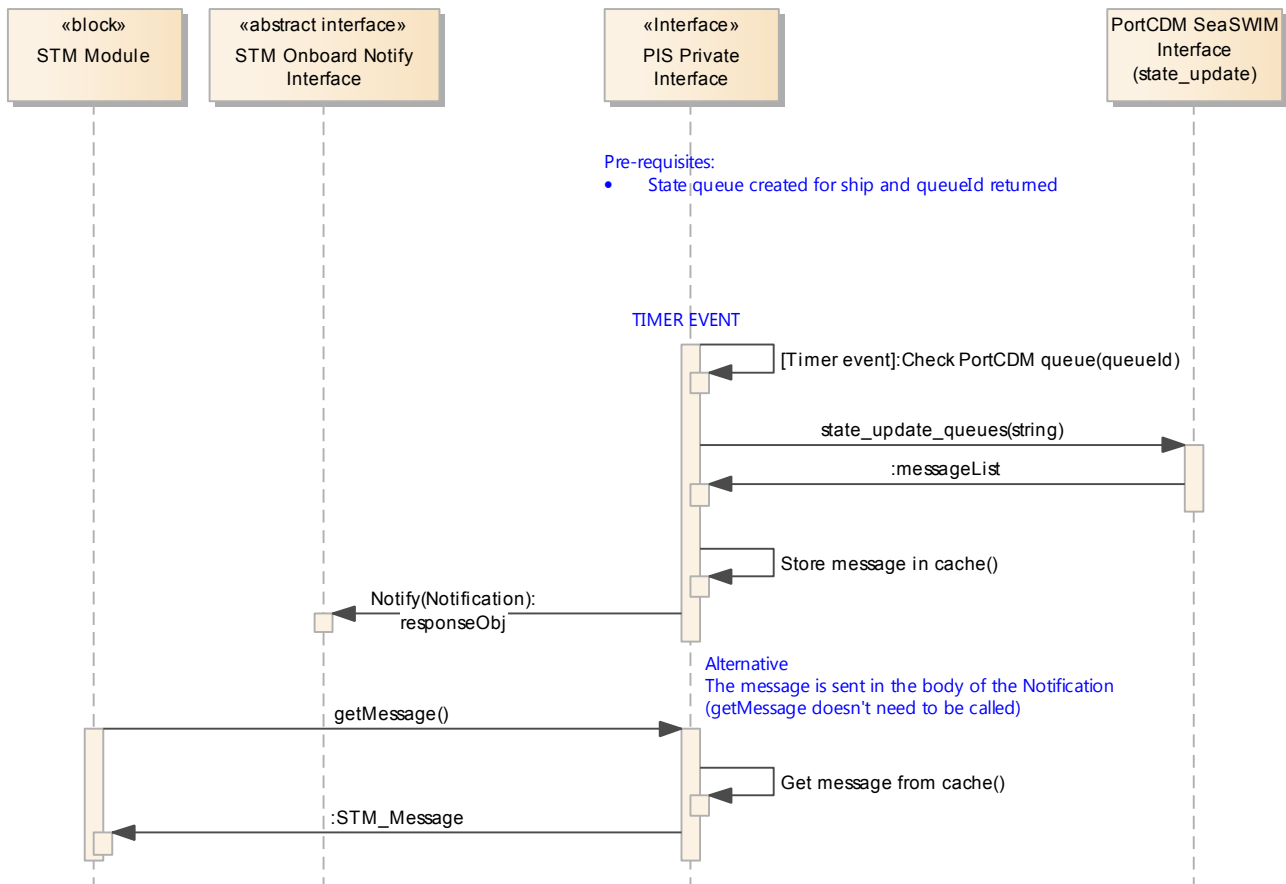
7   Service Provisioning
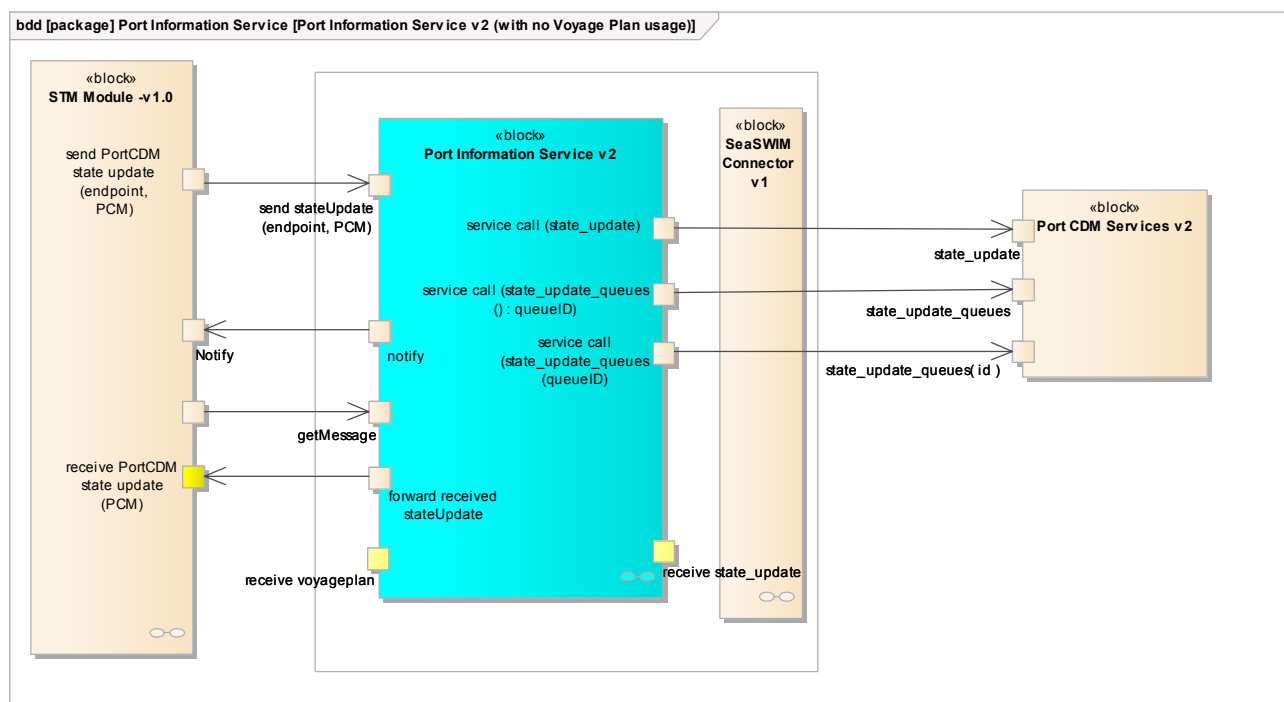
The diagram describes the relationships between the STM Module, the Port Information Service, the corresponding SeaSWIM Connector and the PortCDM.

The STM Module may be located at another site than the Port Information Service.
The SeaSWIM Connector should always be co-located with the Port Information Service.
PortCDM services are assumed to be registered in Service Registry and have a SeaSWIM Connector installed.

bdd [block] Port Information Service v2 [Manage Port Call]
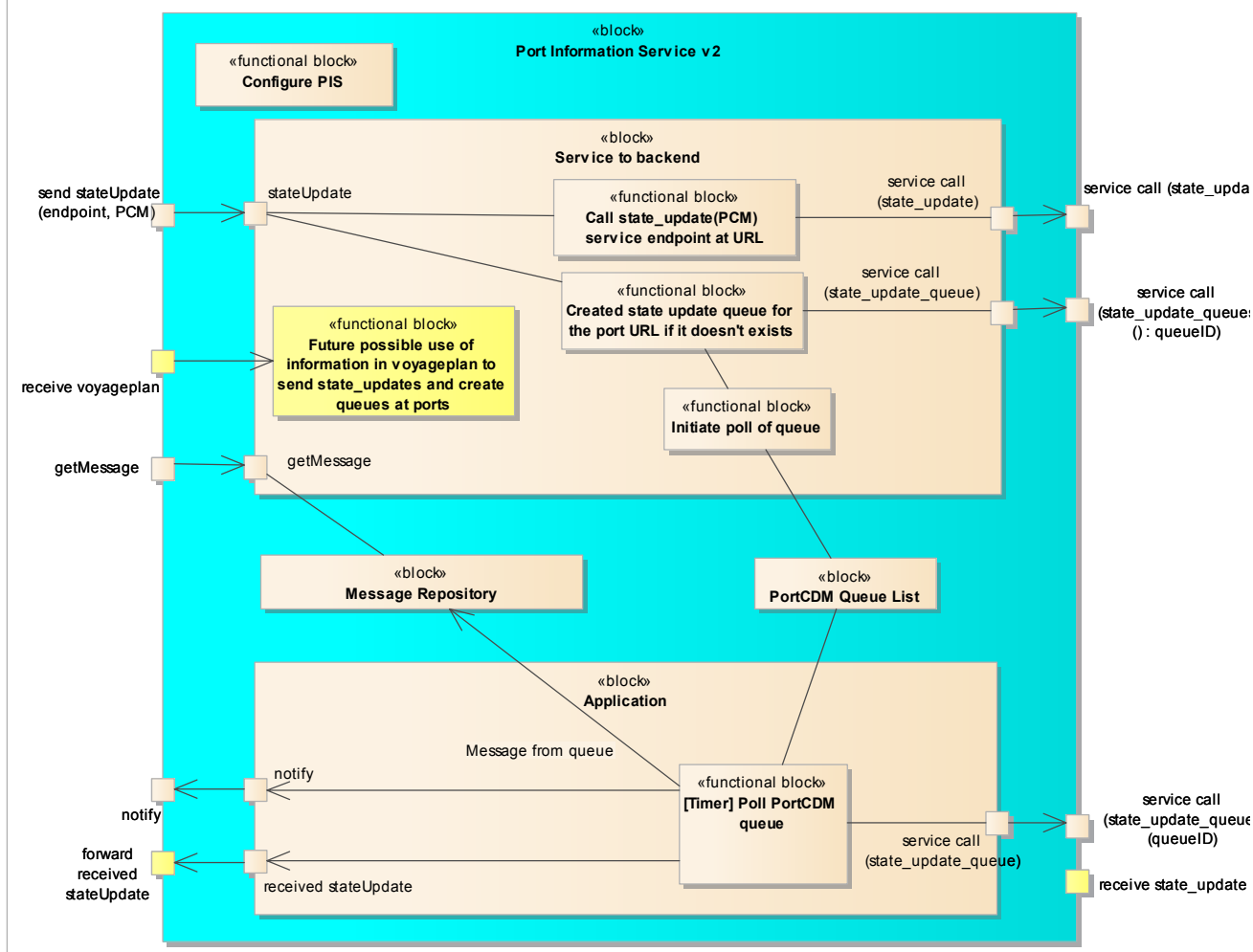
The diagram describes the expected internal functionality of the Port Information Service based on present decisions. Yellow parts is still under discussions and shall be seen as future possibilities.

8   References

9   Acronyms and Terminology

Type	Term	Definition/Description
Acronym	API	Application Programming Interface
Architectural	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.
General	LoST	Location-to-Service Translation Protocol [https://tools.ietf.org/html/rfc5222]
Acronym	MC	Maritime Cloud
Acronym	MEP	Message Exchange Pattern

Architectural	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, …
Architectural	Operational Model	A structure of operational nodes and associated operational activities and their inter-relations in a process model.
Architectural	Operational Node	A logical entity that performs activities. Note: nodes are specified independently of any physical realisation. Examples of operational nodes in the maritime context are: Maritime Control Center, Maritime Authority, Ship, Port, Weather Information Provider, …
Acronym	PIS	Port Information Service
Maritime	Port Information service	Service supporting the ship in communication with port.
Acronym	REST	Representational State Transfer
Acronym	RTA	Recommended Time of Arrival
Acronym	SC	Shore Center
Acronym	SeaSWIM	Sea System Wide Information Management
Service Orientation	Service	The contractual provision of something (a non-physical object), by one, for the use of one or more others. 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.
Service Orientation	Service Consumer	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.
Service Orientation	Service Data Model	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.
Service Orientation	Service Implementer	Implementers of services from the service provider side and/or the service consumer side. Everybody can be a service implementer but mainly this will be commercial companies implementing solutions for shore and ship.
Service Orientation	Service Instance	The implementation of a dedicated service in a dedicated technology. One service specification may result in several service instances, being implemented with different or same technologies.
Service Orientation	Service Instance Description	Documents the details of a service instance (most likely documented by the service implementer). The service instance description includes (but is not limited to) a service instance model and describes the used technology, transport mechanism, quality of service, etc.
Service Orientation	Service Instance Model	Describes the implementation of a dedicated service instance in a dedicated technology. This includes a detailed description of the data payload to be exchanged by this service instance. The actual format of the service instance model depends on the 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 instance model shall refer to it: each data item of the service instance 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 instance model and the service data model. This means, each data item used in the service instance 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 instance model, such a mapping is implicitly given.)
Service Orientation	Service Interface	The mechanism by which a service communicates.
Service Orientation	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 Orientation	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 payload. The data payload description may be formally defined by a Service Data Model.
Service Orientation	Service Specification Producer	Producers of service specifications in accordance with the service description guidelines.
Service Orientation	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.
Acronym	SOAP	Simple Object Access Protocol
Acronym	UML	Unified Modelling Language
Maritime	Unique Port Call ID	Unique identifier within PortCDM
Acronym	UPCID	Unique Port Call ID
Acronym	URL	Uniform Resource Locator
Acronym	UVID	Unique Voyage Plan Identity
Maritime	Voyage Information Service	
Acronym	VTS	Vessel Traffic Service
Acronym	WSDL	Web Service Definition Language
Acronym	XML	Extendible Mark-up Language
Acronym	XSD	XML Schema Definition