Input paper: [[1]](#footnote-1) VTS57-8.3.1

Input paper for the following Committee(s): Purpose of paper:

**□**ARM **□**ENG **□**PAP **X** Input

**□**DTEC **X**VTS **□** Information

Agenda item[[2]](#footnote-2) 8.3

Technical Domain / Task Number2 1.3.1

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Proposal on the Description and Use Cases of VTS Scheduling and Allocation Service

# Summary

According to the actions required by “Task 1.3.1 Develop guidance on VTS digital communications (operational aspects)” in *Report of VTS56*, China MSA provides a brief description of the new proposed operational service “Scheduling and Allocation Service” and also elaborates use cases by the given template, as well as illustrates its relationship with the proposed “Slot allocation service”.

## Purpose of the document

The document aims at providing input paper for task group of Task 1.3.1 to advance and improve the *Draft Guideline on VTS Digital Communications*.

## Related documents

VTS56-13.1 *Report of VTS56*

IMO MSC.1-circ1610.rev1 *MS services in the context of e-navigation (24-6-2024)*

VTS56 WP *Draft GL on VTS Digital communications WP* for VTS57

# Background

At the meeting of VTS56, China MSA had input a proposal to add a “Scheduling and Allocation Service” in the Draft Guideline on VTS Digital Communications, for VTS work requirements concerning “organizing space allocation” and “establishing a system of voyage or passage plans”. In the meeting report, a few actions were decided by TG of Task 1.3.1 as a reaction on the input. China MSA was asked to:

1. provide a short description of the new proposed operational service “Scheduling and Allocation Service”, and also elaborate a use-case using the template during VTS57.
2. provide input to TG 2.8.1 in regards of the adjacent technical service specifications and product specifications necessary for the proposed operational service “Scheduling and Allocation Service”.
3. The proposed service may have similarities or could be the same as proposed “Slot allocation service” possible differences between the services should be elaborated and if none the services should be merged to one.

China MSA continues to clear up the content of operational service “Scheduling and Allocation Service” as well as compares with the similar operational services in Air Traffic Management of civil aviation. Regarding the 1st and 3rd actions, this document tries to provide a brief description of “Scheduling and Allocation Service” and illustrate its relationship with “Slot allocation service” in this proposal. The annex also provides the relevant use cases written by template. After completing the discussion on these items, the joint task force could promote on the 2nd action.

# Discussion

## Description of “Scheduling and Allocation Service”

Due to the limitations of navigational geographic conditions and capabilities of management and service of VTS authority(s), the vessel traffic capability (including passage capacity, accommodation capacity, and others) within a VTS area is inevitably limited, especially in critical water areas such as harbor entrances, confined waterways, routing fairways, anchorages, etc.. In the situation of intense traffic flow, that is, when the traffic demand approaches or exceeds the upper limit of traffic capability, congestion and conflicts are prone to occur. In order to address the mismatch between traffic demand and traffic capability, and reduce the navigating chaos on site, it is necessary for VTS authority(s) to adopt the management of advance planning to ensure the safety and continuity of traffic. Just the corresponding operational service is "Scheduling and Allocation Service".

The operational service "Scheduling and Allocation Service" corresponds to the planning phase. Before entering the execution phase, VTS authority(s) could approve the vessel to pass through in a time window or anchor within the scheduled time via the operational service “Traffic Clearance Service”. During the execution phase, VTS authority(s) could track the real-time movement of the vessel via the “VTS Reporting Service” or other operational services.

A brief description of the "Scheduling and Allocation Service" is: **Scheduling and allocation refer to in advance coordinate and allocate the designated slot of traffic flow in a certain water area towards the vessel or allocate the use reservation of a certain resource for the vessel, based on the traffic capability that can ensure safety in the VTS area. The Scheduling and Allocation Service provides the vessel with a time window to pass through or a reservation of resource to use. Within this service the VTS authority(s) is responsible for scheduling and allocating traffic and resource plans that can match the actual traffic capability.**

Please note:

* This operational service does not include those related to harbour management.

The allocation of arrival/departure times at berth of port may have similarities to VTS “Scheduling and Allocation Service”. However, those related to harbour management should not be included in the description and use cases of “Scheduling and Allocation Service”, because they are not within the scope of maritime service description by IALA.

* Traffic capability should be evaluated from a holistic system.

For example, a confined waterway can safely pass through 3 vessels per hour due to the geographical limitation at location A and pass through 4 vessels per hour due to the limitation at location B, and then the passage capability of the confined waterway should not exceed 3 vessels per hour. At this time, the slot of traffic flow of this waterway should be controlled to 20 minutes/vessel. The value of traffic flow slot could be directly related to and considered as an indicator for traffic capability.

* Traffic capability is not invariable.

When construction, traffic control, accident, or other situation occurs, the traffic capability (including passage capacity, accommodation capacity, and others) may change accordingly. At this time, the VTS should adjust the available slots of traffic flow and the resources in a timely manner.

* Suggest setting a deadline for this operational service.

This operational service provides pre-allocated plans for vessels. Without special circumstances, ensuring sufficient time before executing plans could facilitate VTS to formulate traffic schedules in advance and organize vessel movement efficiently; and also could facilitate vessels to optimize their route schedule, calculate economic speed based on the pre-allocated plans.

## Relationship with “Slot Allocation Service”

### Description of “Slot Allocation Service”

It is written in IMO MSC.1/circ1610/rev1 Annex Descriptions of Maritime Services in the Context of E-navigation:

“Slot management: provides vessels digitally with priority of arrival and distance between two vessels.”

And in the table of associated technical services, the description corresponding to “Slot management” is:

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

Since no other relevant content on “Slot allocation” was found, it is assumed that “Slot management” refers to the operational service “Slot allocation”. It can be seen from the IMO document that the operational service “Slot management” is used to arrange two vessels to navigate one after another with a certain distance towards the destination, while its technical service allocates a designated time window for each vessel.

### Replace “Slot Allocation Service” with “Scheduling and Allocation Service”

Meanwhile, provided in the previous chapter, the description of the operational service “Scheduling and Allocation Service” includes two parts:

* Set slots of traffic flow in a water area, and allocate a vessel a designated slot. This part is mainly focused on the planning management of dynamic traffic.
* Allocate a certain resource (such as an anchorage) to a vessel for an expected use in a time span. This part is mainly focused on the planning management of static resources.

It can be seen that, one part of the operational service “Scheduling and Allocation Service” can also enable two vessels to navigate in their respective positions. Besides, one part of its technical service description is also to allocate a time window for vessel. In this regard, the “Scheduling and Allocation Service” and the “Slot Allocation Service” are consistent.

Moreover, the “Scheduling and Allocation Service” includes another part which enables a vessel to use a certain resource in the coming time. That is different from the “Slot Allocation Service”.

In summary, **the operational service "Scheduling and Allocation Service" could cover the "Slot Allocation Service", therefore this document proposes to replace "Slot Allocation Service" with "Scheduling and Allocation Service"**.

# Action requested of the Committee

The Committee is requested to consider the contents of this document and take appropriate action.

# ANNEX

Scheduling and allocation service

Scheduling and allocation refer to in advance coordinate and allocate the designated slot of traffic flow in a certain water area towards the vessel or allocate the use reservation of a certain resource for the vessel, based on the traffic capability that can ensure safety in the VTS area. The Scheduling and Allocation Service provides the vessel with a time window to pass through or a reservation of resource to use. Within this service the VTS authority(s) is responsible for scheduling and allocating traffic and resource plans that can match the actual traffic capability.

Usually, it is necessary to allocate slots of vessel traffic in the following critical water areas:

* Passing through a confined waterway which includes but not limited to:

- narrow waterway

- tidal channel

- unidirectional control waterway

- restricted bridge opening

* Entering/Exiting through the harbour entrance
* Entering the routing fairway through the specific entrance, etc.

The table below lists potential elements associated with use cases. The list may be updated.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Preconditions** | **Trigger** | **Response subject** | **Response content** | **Routes** |
| When the allocation schedules change | publish by VTS | service | Synchronously updates the allocation schedules | VTS—service |
|  | receive the query message | service | feedback query result | message source—service—message source |
| Prior to the arrival of the vessel | receive the request message | VTS | 1.allocate a slot of traffic flow | message source—service—VTS—service—message source |
| 2. allocates an anchorage |
| Due to changes in vessel’s voyage plan or route plan | receive the cancel message | VTS | cancel the allocated schedule | message source—service—VTS—service—message source |
| Due to special cases | receive a cancellation notice by VTS | VTS | cancel the allocated schedule | VTS—service—vessel |
| Due to external influences | launch freezing by VTS | VTS | freeze the allocation schedules after a certain point in time | VTS—service—vessel（the affected） |
| When external influences are eliminated | launch unfreezing by VTS | VTS | 1. reallocate slots of traffic flow | VTS—service—vessel（the affected） |
| 2. send prompt messages on the allocated anchorage |
| Due to changes in vessel’s route schedule | receive the modification message | service | distribute into “request” and ”cancel” | message source—service—VTS—service—message source |

Use Case 1 – Publishing the allocation schedules by VTS

Description: When the allocation schedules change, VTS synchronously publishes to the service.

*Note: The unallocated items in the allocation schedules refer to the available resource plans for vessels to request. (The same below)*

Typical sequence:

1. VTS system publishes the latest allocation schedules (full or incremental) to the “Scheduling and Allocation Service”
2. “Scheduling and Allocation Service” acknowledges automatically upon receipt

Use Case 2 – Querying the allocation schedules

Description: The service receives a query message and feedback on the query result.

Typical sequence:

1. “Scheduling and Allocation Service” acknowledges automatically upon receiving the query message
2. “Scheduling and Allocation Service” generates the query result message based on the allocation schedules
3. “Scheduling and Allocation Service” sends the generated message to the initial receiving path

Use Case 3 – Allocating a slot of traffic flow

Description: Prior to the arrival of the vessel, the service receives the vessel's request message of passage, and VTS allocates a time window for the vessel.

Typical sequence:

1. “Scheduling and Allocation Service” acknowledges automatically upon receiving the vessel's request message of passage (ETA at starting point)
2. “Scheduling and Allocation Service” compares:

* If the request is suitable for the published available resource plans [go to step 3]
* If the request is not suitable, the service automatically generates a prompt message [go to step 8]

1. “Scheduling and Allocation Service” sends the request message to VTS system
2. VTS system acknowledges automatically upon receipt
3. VTS system automatically or VTS personnel manually allocates a traffic slot for the vessel to pass through, and updates the allocation schedules of traffic slots
4. VTS system publishes the latest allocation schedules of traffic slots via use case 1
5. “Scheduling and Allocation Service” generates the allocation message (a time window) based on the latest allocation schedules
6. “Scheduling and Allocation Service” sends the generated message to the initial receiving path

Use Case 4 – Allocating an anchorage

Description: Prior to the arrival of the vessel, the service receives the vessel’s request message of an anchorage, and VTS allocates an anchorage space and a time period for the vessel to use.

Typical sequence:

1. “Scheduling and Allocation Service” acknowledges automatically upon receiving the vessel’s request message of an anchorage (ETA and ETD at anchorage)
2. “Scheduling and Allocation Service” compares:

* If the request is suitable for the published available resource plans [go to step 3]
* If the request is not suitable, the service automatically generates a prompt message [go to step 8]

1. “Scheduling and Allocation Service” sends the request message to VTS system
2. VTS system acknowledges automatically upon receipt
3. VTS system automatically or VTS personnel manually allocates a vacancy with a time period for the vessel to anchor, and updates the allocation schedules of anchorage
4. VTS system publishes the latest allocation schedules of anchorage via use case 1
5. “Scheduling and Allocation Service” generates the allocation message (start and end times of anchorage reservation) based on the latest allocation schedules
6. “Scheduling and Allocation Service” sends the generated message to the initial receiving path

Use Case 5 – Cancelling the allocated schedule from vessel

Description: Due to changes in vessel’s voyage plan or route plan, the service receives the vessel’s cancel message, and VTS cancels the allocated schedule for the vessel.

Typical sequence:

1. “Scheduling and Allocation Service” acknowledges automatically upon receiving the vessel’s cancel message
2. “Scheduling and Allocation Service” sends the request message to VTS system
3. VTS system acknowledges automatically upon receipt
4. VTS system automatically or VTS personnel manually cancels the allocated slot or anchorage for the vessel, and updates the corresponding allocation schedules
5. VTS system publishes the latest allocation schedules via use case 1
6. “Scheduling and Allocation Service” generates the feedback message (cancellation completed) based on the latest allocation schedules
7. “Scheduling and Allocation Service” sends the generated message to the initial receiving path

Use Case 6 – Cancelling the allocated schedule by VTS

Description: Due to special cases, such as receiving a cancellation notice from the relevant department, VTS cancels the allocated schedule for the vessel.

Typical sequence:

1. VTS system automatically or VTS personnel manually cancels the allocated slot or anchorage for the vessel, and updates the corresponding allocation schedules
2. VTS system publishes the latest allocation schedules via use case 1
3. “Scheduling and Allocation Service” generates the notification message (cancelled schedule) based on the latest allocation schedules
4. “Scheduling and Allocation Service” sends the generated message to the vessel

Use Case 7 – Freezing the allocation schedules by VTS

Description: Due to external influences, like weather conditions, traffic control or occurring hazardous situation, VTS freezes the allocation schedules after a certain point in time.

Typical sequence:

1. VTS system automatically or VTS personnel manually freezes the allocation schedules after a certain moment
2. VTS system publishes the latest allocation schedules via use case 1
3. “Scheduling and Allocation Service” generates the messages (notification of frozen) based on the latest allocation schedules
4. “Scheduling and Allocation Service” sends the generated messages to the affected (the allocated schedule are frozen) vessels

* If the vessel does not want to wait, it could cancel the allocated schedule via use case 5

Use Case 8 – Reallocating slots of traffic flow

Description: When external influences are eliminated, VTS unfreezes the allocation schedules and reallocates traffic slots for those waiting vessels.

Typical sequence:

1. VTS system automatically or VTS personnel manually unfreezes the allocation schedules of traffic slots
2. VTS system automatically or VTS personnel manually reallocates passage slots for those waiting vessels, and updates the allocation schedules of traffic slots
3. VTS system publishes the latest allocation schedules of traffic slots via use case 1
4. “Scheduling and Allocation Service” generates the re-allocation messages corresponding to vessels based on the latest allocation schedules
5. “Scheduling and Allocation Service” sends the generated messages to the relevant vessels

Use Case 9 – Unfreezing the anchorage

Description: When external influences are eliminated, VTS unfreezes the allocation schedules of anchorage and sends prompt messages to the affected (the allocated schedule are frozen) vessels.

Typical sequence:

1. VTS system automatically or VTS personnel manually unfreezes the allocation schedules of anchorage
2. VTS system publishes the latest allocation schedules of anchorage via use case 1
3. “Scheduling and Allocation Service” generates the prompt messages corresponding to vessels based on the latest allocation schedules

* The prompt content may include: the reservation time missed, how much time left, attention to the start time, etc.

1. “Scheduling and Allocation Service” sends the generated messages to the relevant vessels

Use Case 10 – Modifying the allocated schedule from vessel

Description: Due to changes in vessel’s route schedule, the service receives the vessel’s modification message, and VTS cancels the allocated schedule for the vessel, and then allocates a new traffic slot or an anchorage resource.

Typical sequence:

1. “Scheduling and Allocation Service” acknowledges automatically upon receiving the vessel’s modification message (new ETA/ETA and ETD)
2. “Scheduling and Allocation Service” distributes the modification message, allocates new schedule via use case 3 or use case 4, and cancels the allocated schedule via use case 5.

1. Input document number, to be assigned by the Committee Secretary [↑](#footnote-ref-1)
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