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Agenda item[[2]](#footnote-2) 9.2

Technical Domain / Task Number2 1.2.5

Author(s) / Submitter(s) China Maritime Safety Administration

Draft Guideline on the implications of maritime autonomous surface ships from a VTS perspective

# summary

Considering the task of 1.2.5 Develop a Guideline on the implications of maritime autonomous surface ships (MASS) from a VTS perspective (VTS Task Plan 2018-2022) will be launched at the VTS 50 meeting. China MSA has conducted research on the problems faced by VTS in the management and service of MASS, proposed the actions that VTS may need to take in response to MASS, provided the draft guideline on the implications of MASS from a VTS perspective.

## 1.1 Purpose of the document

The purpose of this paper is to introduce the work carried out by China MSA in VTS's response to MASS, and to provide input for the VTS Committee to develop Guideline on the implications of maritime autonomous surface ships from a VTS perspective (Task 1.2.5).

## Related documents

VTS49-7.1.1 From VTS48 - VTS Task Plan 2018-2022 (20191010).

# background

In the 98th session (June 2017) of the Maritime Safety Committee (MSC) of the International Maritime Organization (IMO) agreed to include the issue of Marine Autonomous Surface Ships (MASS) on its agenda. In the work programme for 2018-2022 MASS is mentioned in the task plans for the VTS Committee. A summary is given of the IALA workshop on MASS in Tokyo in February 2020. With the development of technology, more and more countries around the world already allow MASS trials within their areas, posing new challenges to maritime traffic safety and VTS area’s traffic organization and service.

# discussion

## Definition of MASS and degrees of autonomy

For the purpose of the regulatory scoping exercise, “Maritime Autonomous Surface Ship (MASS)” is defined as “a ship which, to a varying degree, can operate independently of human interaction”[1] by IMO. In the 100th session of the MSC the degrees of autonomy were identified for the purpose of the scoping exercise are[2]:

* **Degree one:** Ship with automated processes and decision support: Seafarers are on board to operate and control shipboard systems and functions. Some operations may be automated and at times be unsupervised but with seafarers on board ready to take control.
* **Degree two:** Remotely controlled ship with seafarers on board: The ship is controlled and operated from another location. Seafarers are available on board to take control and to operate the shipboard systems and functions.
* **Degree three:** Remotely controlled ship without seafarers on board: The ship is controlled and operated from another location. There are no seafarers on board.
* **Degree four:** Fully autonomous ship: The operating system of the ship is able to make decisions and determine actions by itself.

## The implications of MASS on VTS

The development of MASS puts forward higher requirements on the role of VTS, the operational ability of VTS personnel, the performance of VTS equipment, VTS cyber security, and IALA documents.

1. VTS function. The function of VTS mainly relies on the interaction between VTS personnel and the ship’s crew. However, the arrival of MASS and MASS remote control stations will break this traditional communication method and have an impact on the operation and management of VTS.
2. The capabilities of VTS personnel and equipment. The introduction of MASS puts forward higher requirements on the operation ability of VTS personnel and the performance of VTS equipment. When MASS and conventional ships coexist in VTS area, traditional VTS operation management skills and VTS system performance cannot meet VTS's target requirements of navigation safety and efficiency.
3. VTS cyber security. MASS needs VTS to provide shore-based information support during its navigation in the VTS area. Such information may become the target of hacker when transmitted through the network. Once attacked, it will bring a major threat to the maritime traffic safety and marine environmental protection in the VTS area.
4. VTS responsibilities. The revised IMO resolution A.857(20) VTS Guidelines states that” Decisions concerning the actual navigation and the manoeuvring of the vessel remain with the master. Nothing in this Resolution changes the Master’s ultimate responsibility for all aspects of the operation of the vessel.” The emergence of MASS will challenge this traditional principle.
5. IALA instruments. The existing instruments of IALA are mainly based on the interaction between VTS personnel and seafarers, and the emergence of MASS will have an impact on the formulation of IALA instruments.

## Measures of VTS serving MASS

In response to the impact of MASS on VTS, China MSA thinks that the following actions should be taken:

1. Ensure sufficient risk management of the VTS areas

Competent authorities and VTS providers should focus on potential vulnerabilities and risk points such as information identification and data exchange, and establishing corresponding or higher level security standards, rather than human operation.

Based on the development of MASS, IALA should revise R0127（V-127）VTS Operations and G1141 OPERATIONAL PROCEDURES FOR VESSEL TRAFFIC SERVICES in time to add the MASS safety assessment and emergency response procedures in the VTS area.

1. Ensure that VTS personnel are appropriately trained and qualified

VTS system and operating procedures need to be updated in the process of servicing MASS. Therefore, the Competent authority for VTS should ensure that VTS operators receive training and obtain certificates of competence.

Based on the development of MASS, IALA should develop new model courses to meet the needs of VTS personnel training and certification.

1. Ensure the ship-shore data exchange capability

Competent authorities and VTS providers should introduce the use of VHF Data Exchange System (VDES) and other potential technologies such as 5G to improve ship-shore data exchange capabilities.

Standardization for data exchange, connectivity and automated technologies are required. IALA should develop these standards to meet the data exchange requirements between VTS and MASS and other stakeholders.

1. Ensure cyber security management

When MASS to be allowed in the VTS area, competent authorities and VTS providers shall take appropriate measures to ensure adequate cyber risk management of VTS systems and infrastructure.

IALA needs to consider the implications of MASS on VTS when developing Recommendation on Cyber-Security (task 2.1.2).

1. Optimize the VTS system

VTS system suppliers and stakeholders should continue to optimize the functions of the VTS system based on the development of MASS to meet the needs of VTS serving MASS and ensure the safety and efficiency of ships in the VTS area.

1. Develop advanced decision support tools

Due to the evolution of MASS, IALA should develop new decision support tools in time to guide VTS around the world in dealing with the impact of MASS on VTS.

1. Developed or amend necessary Guidelines and Recommendations on VTS

IALA should pay attention to the development of MASS, and timely revise and adjust relevant documents such as Guidelines, Recommendations, Manuals and Model Courses[3] to meet the requirements of future development.

# REFERENCES

1. IMO. IMO takes first steps to address autonomous ships. Retrieved February 25, 2020, from http://www.imo.org/en/MediaCentre/PressBriefings/Pages/08-MSC-99-MASS-scoping.aspx
2. IMO. MSC, 100th session, 3-7 December 2018. Retrieved February 25, 2020, from http://www.imo.org/en/MediaCentre/MeetingSummaries/MSC/Pages/MSC-100th- session.aspx
3. China MSA. Scoping exercise on the implications of MASS on VTS documents (VTS48-8-2.6)

# ACTION REQUESTED OF THE COMMITTEE

The Committee is requested to：

1. consider the comments provided above in progressing Task 1.2.5 - Develop a Guideline on the implications of maritime autonomous surface ships from a VTS perspective.
2. note the input G-#### on the implications of maritime autonomous surface ships from a VTS perspective.
3. further discuss the impact of MASS on operation and management of VTS, and if it helps, include the actions that VTS may need to take in response to MASS in task plan for work period 2022-2026.

1. Input document number, to be assigned by the Committee Secretary [↑](#footnote-ref-1)
2. Leave open if uncertain [↑](#footnote-ref-2)