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Workplan Task Number / Technical Domain …………………………………

Working Group WG 3 - Radionavigation Services

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Galileo Maritime Safety Information (MSI)

# Summary

Maritime Safety Information (MSI) is defined as “navigational and meteorological warnings, meteorological forecasts and other urgent safety related messages broadcast to ships”.

Any event with an impact on Galileo service performance, that could affect the safety of navigation, is considered urgent information to be communicated to ships in the form of Maritime Safety Information.

The objective of this input paper is to present a proposal for the generation and provision of Galileo related Maritime Safety Information, based in the existing procedures already in place in the maritime domain.

# Background

In 2016 Galileo joined GPS, GLONASS and Beidou as being a part of the World Wide Radio Navigation System (WWRNS). The IMO’s Maritime Safety Committee (MSC), during its 96th session (11-20 May 2016), recognised the Galileo Open and Search and Rescue (SAR) services as part of the WWRNS.

This recognition marks an important milestone for the market uptake of Galileo in the maritime sector, in particular for the use of Galileo in commercial shipping, thus encouraging a broader use of multi-constellation solutions for all users and, by doing so, improving safety at sea.

In line with the operational requirements stated in IMO Resolution A.1046 for WWRNS, and also in order to guarantee safe marine navigation using Galileo Services, a formal Galileo Procedure for the generation and provision of Galileo MSI is to be defined and implemented.

The main MSI characteristics, used as reference for the definition of this procedure are included in this paper.

## Maritime Safety Information

Maritime Safety Information (MSI) is defined in the Safety of Life at Sea (SOLAS) Convention [2], Chapter IV, as comprising “navigational and meteorological warnings, meteorological forecasts and other urgent safety related messages broadcast to ships”.

There are different types of MSI provided to vessels: Notices to Mariners and Navigational warnings:

* **Notices to Mariners (NtM)** mainly provide timely (permanent) information for the correction of navigation charts/publications, and they are consulted by the vessel captain/crew (normally on a weekly basis).
* **Navigational Warnings**, provide information of temporary nature, which are broadcasted to the Global Maritime Distress and Safety System (GMDSS) equipment onboard the vessels (through satellite services, NAVTEX or other communication means). If these warnings remain in force for several weeks, they may be superseded by NtM.

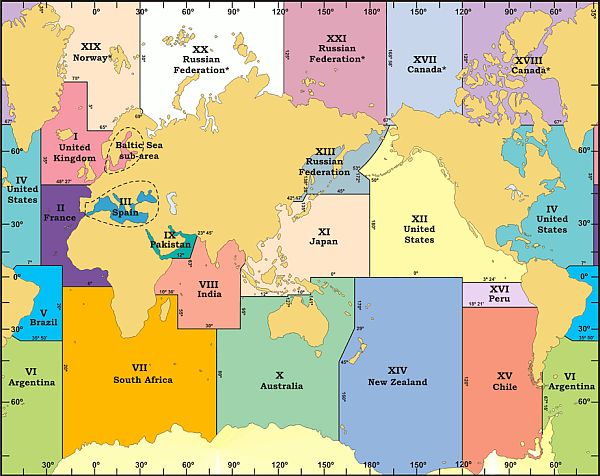
1. NtM and Navigational warnings

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Temporality** | **Consulted/ broadcasted** | **Transmission means** |
| **Notices to Mariners** | **timely (permanent) information** –  mainly related to charts/publications | Information is requested/consulted by the vessel crew | Through mail, official web sites or paper means |
| **Navigational warnings** | **temporary** information  (superseded by NtM if they remain in force for several weeks) | Information is broadcasted to the GMDSS equipment onboard the vessels | Transmitted through satellite services (e.g: SafetyNet), NAVTEX or other means (VHF, voice,…) |

Given the differences presented above, and considering the temporary and immediate nature of the information on Galileo performance degradations to be provided to mariners, this information should be provided to the vessels through **Navigational Warnings**.

The maritime safety information (MSI) is part of the World Wide Navigational Warning Service (WWNWS). The WWNWS is a co-ordinated global service for the promulgation of navigational warnings from official information providers. Under the WWNWS the world's oceans are divided into 21 geographical sea areas, called NAVAREAs (NAVigational AREAs) which are identified by Roman numbers:

1. Figure 3. NAVAREAS and Sub-Areas



The body tasked with gathering and distributing [MSI](https://www.egmdss.com/gmdss-courses/mod/glossary/showentry.php?eid=1315&displayformat=dictionary) to cover the whole of a NAVAREA is known as the NAVAREA coordinator.

The WWNWS comprises 3 levels of Navigational Warnings:

1. Types of Navigational warnings

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Coordinator** | **Transmission means** | **Alternative transmission means** |
| **NAVAREA/ Sub-Area warning** | NAVAREA Coordinator | Satellite Services (e.g: SafetyNet) | High frequency (HF) Narrow-Band Direct Printing (NBDP) |
| **Coastal warnings** | National Coordinator | NAVTEX (NAVigational TEXt Messages) | radio telephony broadcasts |
| **Local warnings** | Local Coordinator | VHF, voice or other alternative local communication means |  |

### Schedule

Navigational warnings should be broadcast as soon as possible or as dictated by the nature and timing of the event. According to the MSI Manual [RD-1], the initial broadcast of the warning should be done as follows:

* For NAVTEX, at the next scheduled broadcast slot, unless circumstances indicate the use of procedures for VITAL or IMPORTANT warnings; and
* For Satellite Services (SafetyNET), within 30 minutes of receipt of original information, or at the next scheduled broadcast.

### Format

Regarding the language, according to IMO Resolution A.706(17), as amended [5], and A.1051(27) as amended [7] , all NAVAREA, Sub-area and coastal warnings and METAREA, Sub-area warnings and other forecasts should be broadcast only in English in the International Satellite (SafetyNET) Services. In addition to the required broadcasts in English, METAREA/NAVAREA, Sub-area and coastal warnings may be broadcast in a national language using a National SafetyNET services.

Regarding the messages format, it is essential to present the information in a consistent format that is clear, unambiguous and brief. And this is ensured by using structured messages in standard formats, as shown in the MSI Manual[RD-1]. The elements (fields) to be included in the messages are indicated in the table below:

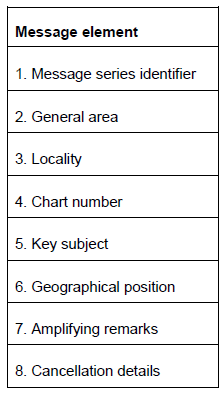


Table 8. Navigational warnings fields

Navigational warnings should be consecutively numbered throughout the calendar year.

The minimum information which a mariner requires to be included in the warnings to avoid danger is Hazard and Position. However, it is usual to include also additional information in the amplifying remarks field, in order to provide sufficient extra details to clearly identify the significance of the hazard and to assist mariners in recognizing and assessing its effect upon their navigation: for example, the time, date and duration of the event, if known.

# Discussion

Based on the established procedures for the provision of MSI, in particular Navigational Warnings, to the mariners, a preliminary approach for the generation and provision of Galileo MSI has been defined.

The proposed approach is presented in the Annex 1 to this paper.

# References

1. Joint IHO/IMO/WMO Manual on Maritime Safety Information (MSI), January 2016 Edition
2. Safety of Life at Sea (SOLAS) Convention, November 1974
3. IMO Resolution A.1046(27) on WorldWide RadioNavigation System, 30 November 2011
4. IMO Resolution MSC.468(101) on Amendments to Promulgation of Maritime Safety Information (Resolution A.705(17)), 14 June 2019
5. IMO resolution A.706(17) on World-wide navigational warning service, November 1991
6. Galileo Open Service – Service Definition Document, Issue 1.1 , May 2019
7. IMO Resolution A.1051(27) - IMO/WMO Worldwide Met-Ocean Information and Warning Service– Guidance Document, 30 November 2011

# Action requested of the Committee

The Committee is requested to:

1. Revise the information provided in Annex 1 to this input paper.
2. Provide feedback and comments on the proposed approach for the generation and provision of Galileo Maritime Safety Information.
3. Consider the possibility to send a Liaison Paper to IHO.
4. GALILEO MARITIME SAFETY INFORMATION (MSI) APPROACH

This Annex presents a preliminary approach for the generation of Galileo related Maritime Safety Information (MSI).

1. Galileo MSI

The Galileo Service related MSI to be communicated to the Vessels will be: any degradation of performances (of a duration of 2 hours of more) with respect to IMO Resolution A.1046 (27) operational requirements for **WWRNS**, which are summarised in the table below:

1. Operational requirements in IMO Resolution A.1046(27)

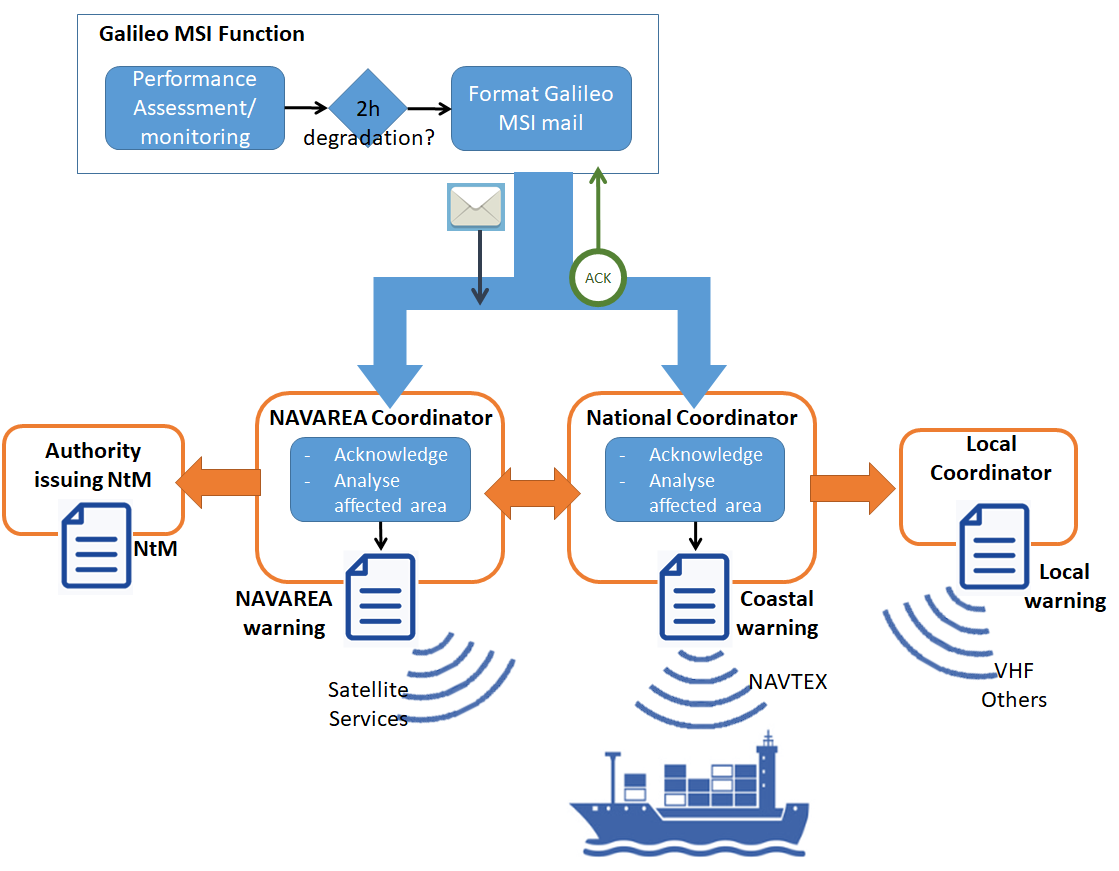
|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Horizontal Accuracy 95%** | **Signal availability** | **Service continuity (over 15min)** | **Position update rate** | **Integrity warnings1** | **System coverage** |
| **Ocean waters** | 100m | 99.8% | - | 2s | MSI as soon as practicable | Adequate2 |
| **Harbour entrances, harbour approaches and coastal waters** | 10m | 99.8% | 99.97% | 2s | 10s | Adequate2 |
| 1Generation of integrity warnings in cases of system malfunctions, non-availability or discontinuities. | | | | | | |
| 2Taking into account the radio frequency environment, the coverage of the system should be adequate to provide position-fixing throughout this phase of navigation. | | | | | | |

The Galileo MSI function will be continuously monitoring the performance of the Galileo Services in order to identify any performance degradation to be notified to the maritime community.

1. Galileo Safety Information Service

The diagram included below presents a proposal for the generation and provision Galileo MSI (the Galileo MSI Service):

1. Galileo MSI Generation and Provision Scheme



* The Galileo MSI function shall monitor the Galileo performance wrt IMO Resolution A.1046 operational requirements.
* The Galileo MSI function shall communicate any degradation of the committed performance of a duration of 2 hours or more to the NAVAREA/Sub-Area Coordinators and National Coordinators.

The scheduling proposed to be followed is in line with the Galileo OS SDD (section 3.6.1)[6].

* + For **scheduled events** affecting the service, the event shall be communicated with at least 24 hours before the service is affected

According to the Manual on MSI [1], whenever possible, warnings concerning scheduled events, should be originated **not less than five days in advance**. However, given the operational procedures in place, the scheduled events will be communicated with at least 24 hours in advance.

* + For **unscheduled outages** or events affecting the service, they shall be notified in less than 72 hours after the event affecting the service is detected.

The Manual on MSI [1]does not establish specific timing requirements for the notification of unscheduled events. Navigational warnings should be broadcast as soon as possible or as dictated by the nature and timing of the event. Thus, these should be communicated as soon as possible, and given the internal operational procedures, this shall be done in less than 72 hours (typically in less than 24 hours since the event is detected).

* A standard mail will be sent containing all the relevant information regarding the Galileo event (additional security and authentication mechanisms are not necessary, but might be implemented in the future). This mail shall be sent to all the NAVAREA/Sub-Area Coordinators and National Coordinators, that would acknowledge the reception within 30 minutes. In case of lack of acknowledgment, a second mail shall be sent to the corresponding Coordinator, including the responsible NAVAREA Coordinator in copy, which will take the appropriate actions.
* The NAVAREA/Sub-Area and National Coordinators, would analyse if the area under their responsibility is impacted. If so, the will issue the corresponding NAVAREA/Coastal warning.
  + In case of permanent information, if needed, the NAVAREA Coordinator would forward the information to the corresponding Authority responsible for the generation and provision of NtM
  + In case of more local information, if needed, the National Coordinator would forward the information to the corresponding Local Authority that would generate and broadcast the corresponding Local warning
* If the Coordinators detect any errors in the information provided through mail, they would either ask for clarifications or decide to issue a Navigational Warning based on their best criteria prioritising the safety of navigation.
* The Coordinators may add some complementary information in the navigational Warning (using the Amplifying Remarks fields) so as to include clarifications for mariners regarding the implications of the unavailability/performance degradation notified.
  1. Galileo MSI Messages Format

Galileo Messages (Mails) will be issued in English and shall contain the following fields (following the Navigational warning’s format included in the Manual on MSI [1]):

1. Galileo MSI Messages format

|  |  |
| --- | --- |
| **Field** | **Content** |
| **Message identifier:** | GALILEOMSG XXX/YY (sequential number) |
| **General Area:** | GALILEO MARITIME SERVICE |
| **General Subject: the nature of the event** | GALILEO NOT AVAILABLE FOR MARITIME NAVIGATION |
| **Geographical Position:** | Area limits/position in WGS84 in degrees and minutes or degrees, minutes and decimal minutes.  Positions listed in a clockwise direction starting from the North West corner. |
| **Amplifying remarks:** | Date, time and duration of the event  FROM: DDHHMM UTC MoMoMo YY;  TO: Unknown or DDHHMM UTC MoMoMo YY  Note: the ending time can be included if known. If not known, a recovery message is needed. |

The NAVAREA/Sub-Area and National Coordinators should be responsible for the issuing and formatting the final Navigational warnings to be sent to the mariners, using the information provided in the fields indicated above.

1. Next steps

The following way forward (open points for discussion/agreement) has been identified in order to proceed with the implementation of the Galileo MSI Service, with the characteristics indicated above.

* Check with the different NAVAREA Coordinators the proposed approach and, in particular, clarify the following points:
  + Given that Galileo is a Global System, the number of PoCs to be used as interface for the provision of Galileo MSI is considerable: 21 NAVAREA Coordinators and the different National Coordinators within each NAVAREA.

It should be assessed with the different Coordinators if the provision of Galileo MSI to all these contacts is the best way to proceed or the information could be centralised by a reduced number of Coordinators that will afterwards forward the information to affected parties.

* + An exhaustive procedure to crosscheck that the PoCs details are up to date should be defined (to be crosschecked more than once a year).
  + To check if the scheduling proposed to be followed is in line with existing MSI procedures and adequate for the provision of Galileo MSI Service.
  + To understand the need for the establishment of a Working Agreement with the different Coordinators for the provision of Galileo MSI Service.