

## IALA GUIDELINE

# G1111-8 PRODUCING REQUIREMENTS FOR LONG RANGE SENSORS

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# DOCUMENT REVISION

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Revisions to this document are to be noted in the table prior to the issue of a revised document.

Date	Details	Approval
December 2022	First issue. Major revision of Guideline G1111 sections, divided into sub-guidelines G1111-1 to G1111-9.	Council 76

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## 1. INTRODUCTION

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This Guideline presents a common source of information to assist VTS providers in the understanding of long range sensors and their contribution to the VTS traffic image (situational awareness) as well as guidance of how the VTS provider should specify the functional and performance requirements. The VTS provider should note that it is important to determine the actual performance requirements of the long range sensors and that it should be clearly defined relative to the area/vessels/targets that are to be monitored.

Copying parameters from a manufacturer's data sheet is not recommended.

Specific maritime security requirements, possibly identified by the International Ship and Port Security code (ISPS), are not considered within this guideline.

### 1.1. THE IALA G1111 GUIDELINE SERIES

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This Guideline is one of the *G1111* series of guideline documents. The purpose of the *G1111* series is to assist the VTS provider in preparing the definition, specification, establishment, operation, and upgrading of a VTS system. The documents in this series address the relationship between the operational requirements and VTS system performance (technical) requirements and how these reflect into the overall system design requirements.

The *G1111* series of guideline documents present system design, sensors, communications, processing, and acceptance, without inferring priority. The guideline documents are numbered and titled as follows:

- G1111 Establishing Functional and Performance Requirements for VTS Systems and Equipment
- G1111-1 Producing Requirements for the Core VTS System
- G1111-2 Producing Requirements for Voice Communications
- G1111-3 Producing Requirements for RADAR
- G1111-4 Producing Requirements for AIS
- G1111-5 Producing Requirements for Environment Monitoring Systems
- G1111-6 Producing Requirements for Electro Optic Sensors
- G1111-7 Producing Requirements for Radio Direction Finders
- G1111-8 Producing Requirements for Long Range Sensors
- G1111-9 Framework for Acceptance of VTS Systems

## 2. OPERATIONAL OVERVIEW

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This guideline is a part of the overall G1111 guideline and considers the operational application of long range sensors. The use of such sensors can assist the VTS operator (VTSO) in understanding the expected time of arrival for visiting ships. "Just in time" arrival of visiting ships is an important part of the IMO Greenhouse Gas (GHG) strategy that aims to reduce emissions from ships to achieve specific goals that have been set for 2030 and 2050. Receiving regular updates throughout a ships voyage in order to validate or update ETAs is expected to be a key factor in the implementation of the Just in Time arrival concept. VTS Providers should consider how they will validate / re-calculate ETAs and the method of connection to third party service where this is applicable.

Long range sensors may also assist in locating vessels that have not arrived on schedule or detect vessels that arrive unannounced. It allows authorities to assess potential security risks or, should the need arise, provide input data for search planning in case of a SAR incident.

Typical long range sensors include:

- Long Range Identification and Tracking (LRIT)
- Satellite AIS
- HF Radar
- Synthetic Aperture Radar (SARSAT)

This section provides an overview of each of the above and identifies the applicability, benefits and limitations of these sensors to VTS Providers.

### **3. PRODUCING FUNCTIONAL AND PERFORMANCE REQUIREMENTS**

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#### **3.1. LONG RANGE IDENTIFICATION AND TRACKING (LRIT)**

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LRIT is a mandatory carriage requirement for SOLAS vessels. It provides a ship position report at regular intervals based upon the area of operation. The normal reporting interval is every 6 hours. LRIT data is received by the International Data Centre (IDCs) and is available to the flag authority and to the maritime authorities of transit and destination countries.

LRIT data can provide enroute information about the progress of incoming vessels that can assist the VTS provider in maintaining an accurate assessment of its time of arrival. When establishing the appropriate time slot for the arrival of a vessel, the LRIT data may be used to determine whether the ship will arrive early or late. In such circumstances, the vessel may be contacted to advise that it should adjust its speed in order to arrive in accordance with the calculated ETA defined as its allocated arrival slot time.

In circumstances where a vessel has arrived unexpectedly or gone missing, the historical LRIT information may provide the additional information needed for a security assessment or the planning of search activities.

LRIT is an established service and, subject to approval by the national maritime authority, the VTS provider can access the IDC and integrate appropriate LRIT data.

It should be noted that LRIT data normally carries an airtime cost per position report and that the IDC may charge for the provision of the data.

As the applications for LRIT data continue to evolve, other uses and benefits may be determined and implemented.

#### **3.2. SATELLITE AIS**

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An AIS satellite listens to AIS transmissions within its footprint area and stores the data on-board until it passes over a ground station, to which the data can be downloaded. Satellite AIS has a potentially global coverage, particularly now that dedicated VHF channels are allocated to satellite AIS.

Satellite AIS (SAIS) data may also be used to provide enroute information about the progress of incoming vessels that can assist the VTS provider in maintaining an accurate assessment of its time of arrival. When establishing the appropriate time slot for the arrival of a vessel, the SAIS data may be used to determine whether the ship may arrive early or late. In such circumstances, the vessel may be contacted to advise that it should adjust its speed in order to arrive in accordance with the calculated ETA defined as its allocated arrival slot time.

However, AIS satellites may be unable to receive all AIS transmissions, particularly in dense traffic areas where multiple self-organising AIS networks may have been established causing some data to be transmitted simultaneously, resulting in data collisions. Such data collisions may make it impossible to properly decode the individual AIS messages, resulting in inaccurate or completely wrong positions, despite the use of advanced algorithms.

An AIS satellite will only be able to download data when it is in range of a ground station. This means that the data received by the VTS provider will not be real time and may be up to two hours old (or possibly more).

AIS satellite systems comprise several satellites in different constellations, i.e., a polar-orbiting constellation or a mix of equatorial and polar orbiting satellites, resulting in download frequencies based on the number of times SAIS satellites pass over the ground stations. The more frequently the satellite can download the data, the less latency between the received data and the real time position of the actual vessels.

Satellite AIS data is provided through a service provider to which the VTS provider will need to subscribe and is now becoming increasingly available via commercial as well as national government-sponsored satellite AIS operators.

The main difference between the terrestrial and satellite AIS data, besides the geographic coverage, is the data latency, i.e., the age of the AIS message when it is actually received by the VTS system. This is generally not a problem, because the long range data is often used for strategic purposes, where accuracy is less relevant than coverage.

Satellite AIS is an established service that does not require any special design, configuration or installation on the part of the VTS Provider as these are handled by the satellite AIS service providers. Once the VTS provider has subscribed to the AIS satellite service, it will be able to integrate the satellite AIS data as appropriate for its operational requirements.

As the applications for satellite AIS data continues to evolve, other uses and benefits may be determined and implemented.

### **3.3. HF RADAR**

One rarely used technology that can offer long range detection of vessels is HF radar. HF radar has one major advantage over other long range detection technologies in that it does not require cooperation from the vessels to be detected.

Realistically, however, HF radar systems are not used for VTS purposes.

### **3.4. SYNTHETIC APERTURE RADAR (SARSAT)**

Satellite-based Synthetic Aperture Radar (SARSAT) can provide vessel target information at ranges beyond that of shore-based sensors, including HF Radar. However, such services will probably only provide a single image of a specific area once per day through orbiting satellites. Images are stored on-board the satellite until they can be downloaded as the satellite passes over a ground station. The image is processed, following download from the satellite, to detect ships within the area and target information (without identity) can be derived and can be used to recognize the type of vessel. This type of service is for analysis of vessel movement and not for any form of near real time monitoring. In addition to the latency between the required image capture and the download when passing over a ground station, there is also a further latency related to the processing of the received data.

SARSAT may, for example, be useful for detecting illegal fishing activity in remote areas of a country's EEZ and for detecting oil spills and pollution.

SARSAT is available from a variety of established service providers and does not require any special design, configuration or installation on the part of the VTS provider. The VTS provider will need to subscribe to a SARSAT image service and costs are involved on a per image basis. Once access to such a service has been established, the VTS provider will be able to integrate the SARSAT target data as appropriate for his operational requirements.

## 4. DEFINITIONS

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The definitions of terms used in this Guideline can be found in the *International Dictionary of Marine Aids to Navigation* (IALA Dictionary) and were checked as correct at the time of going to print. Where conflict arises, the IALA Dictionary should be considered as the authoritative source of definitions used in IALA documents.

## 5. ABBREVIATIONS

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Please refer to IALA *G1111 Establishing Functional and Performance Requirements for VTS Systems* for an extensive list of abbreviations and acronyms covering the entire G1111 series. This section identifies abbreviations that are related to Long Range Sensors only.

AIS	Automatic Identification of Ships
EEZ	Exclusive Economic Zone
ETA	Estimated Time of Arrival
GHG	Greenhouse Gas
HF	High Frequency
IDC	International Data Centre
ISPS	International Ship and Port Security code
LRIT	Long Range Identification & Tracking
SAIS	Satellite AIS
SAR	Search & Rescue
SARSAT	Synthetic Aperture Radar Satellite
SOLAS	Safety of Life at Sea convention

## 6. REFERENCES

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- [1] IMO - Greenhouse Gas Strategy