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| **Liaison Statement** | | |
| **Title:** | | ETSI TGMARINE reply to IALA LS on Radar Standards |
| Date: | |  |
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| **From** (source): | | ERM TGMARINE |
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| Response to: (if applicable) | | LIAISON NOTE TO ETSI TGMARINE On Radar standards  Reference: C72-13.2.1 |
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| Attachments:  (if applicable) | * Questionnaire concerning future Solid-State navigational radar system * “FVT Lab tests on the suppression of interferences from other radar installations” * “Study on frequency sharing of 9GHz band solid-state radar for ships” * “Compatibility problems related with pulsecompression, solid-state marine radars” * “Method for Evaluating Solid-State Marine Radar Interference in Magnetron Marine Radars” | |
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## 1 INTRODUCTION

ETSI ERM TGMARINE thanks IALA for the liaison note of 11 December 2020 requesting an update on the work carried out to date on standards for solid-state radars for use on inland waterways.

## 2 HARMONIZED STANDARDS

ETSI ERM TGMARINE recognizes that new solid-state radars utilize different kind of intra pulse modulations and longer pulse lengths, resulting in a different spectrum compared with conventional radar, using unmodulated, very short pulses. To comply with the requirements of the Radio Equipment Directive 2014/53/EU, ETSI ERM TGMARINE develops harmonised standards for navigational radar equipment used on inland waterways and for radar equipment for use on non-SOLAS vessels:

- ETSI EN 302 194-1: Conventional navigational radar equipment used on inland waterways;   
Harmonised Standard for access to radio spectrum

- ETSI EN 302 194-2: Solid-state navigational radar equipment used on inland waterways;  
Harmonised Standard for access to radio spectrum

- ETSI EN 302 248-1: Conventional navigation radar for use on non-SOLAS vessels;  
 Harmonised Standard for access to radio spectrum

- ETSI EN 302 248-2: Solid-state navigational radar equipment for use on non-SOLAS vessels;   
 Harmonised Standard for access to radio spectrum

Note: Radar used on SOLAS vessels are not subject to the work of ETSI ERM TGMARINE as it falls  
 under the Maritime Equipment Directive 2014/90/EU.

## 3 STUDIES, REPORTS and RECOMMENDATIONS

ETSI ERM TGMARINE also recognizes that solid-state radars may interfere with conventional radars. Conventional radars have built-in interference rejection (IR) functionality. However, due to the much longer pulse length of most solid-state radars, IR might not be capable to supress these interferences.

ETSI ERM TGMARINE conducted an inquiry, kindly supported by CIRM, and asked manufacturer of radar equipment about their approaches to overcome the problem of mutual interferences. Unfortunately, none of the manufacturer was able to provide own studies. The result of the questionnaire is attached.

ETSI ERM TGMARINE is aware of the following studies/reports and recommendations regarding the possible interferences from solid-state radars:

* Questionnaire concerning future Solid-State navigational radar systems, completed by TGMARINE; answers were collected by CIRM.
* “Lab tests on the suppression of interferences from other radar installations”,  
   Mario Walterfang, Fachstelle der WSV für Verkehrstechniken, Koblenz, 25.09.2018.
* “Study on frequency sharing of 9GHz band solid-state radar for ships”,  
   available in Japanese language only.
* Recommendation ITU-R M.1460-2 (02/2015): “Technical and operational characteristics and protection criteria of radiodetermination radars in the frequency band 2 900-3 100 MHz”, Annex 3 Results of interference susceptibility tests.
* Recommendation ITU-R M.1796-2 (02/2014): “Characteristics of and protection criteria for
* terrestrial radars operating in the radiodetermination service in the frequency band 8 500-10 680 MHz - Annex 3 Results of interference trials.
* Recommendation ITU-R M.1461-2 (01/2018): “Procedures for determining the potential for interference between radars operating in the radiodetermination service and systems in other services”.
* Recommendation ITU-R M.1372-1: “Efficient use of the radio spectrum by radar stations
* in the radiodetermination service”, Annex 1 “Interference suppression techniques”.
* “Compatibility problems related with pulsecompression, solid-state marine radars”,   
  The Institution of Engineering and Technology (IET), Gaspare Galati, Gabriele Pavan, Francesco De Palo, Department of Electronic Engineering, Tor Vergata University, via del Politecnico 1, Rome, Italy, July 24th 2015.
* “Method for Evaluating Solid-State Marine Radar Interference in Magnetron Marine Radars”,   
  MS PowerPoint presentation by Robert Achatz, ntia, April 24th 2019.

## 4 NON-HARMONIZED STANDARDS

ETSI is not in the position to solve the technical problem of mutual interferences of conventional and solid-state radars as these radars are using the same frequency band.

However, solid-state radars utilize much less output power. In the maritime field, outside busy harbour areas,   
co-existence of conventional and solid-state radar might be possible.

On inland waterways with vessel passing distances of less than 50 m, and in busy harbour areas, the situation might be different. However, the radar range used is short here. Hence, pulse length restriction (e.g. 5 us) is not harmful for the intended use of the radar.

The combination of pulse length restriction and pulse staggering might be a promising approach to overcome the problems of interference. More investigation must be done to prove the concept.

ETSI ERM TGMARINE is developing a non-harmonized standard for navigational radar used on inland waterways that comprises the operational and technical requirements:

- ETSI EN 303 676: Navigation radar used on inland waterways;  
 operational, functional and technical requirements

This standard comprises a test clause with a setup of two radars, positioned 40 m apart, to test the Interference rejection capability. Since there are currently no solid-state radars for the use on inland waterways yet, this test is for conventional radar only. In the future, this test clause could be extended with respect to solid-state radars.

## 5 ACTION REQUESTED

IALA is invited to note the information above and take action as appropriate.

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