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Agenda item [[2]](#footnote-2) 10

Technical Domain / Task Number 2 Working Group 3 (Emerging Digital Technology)

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Status of 3GPP MARCOM standardisation

# Summary

This document describes the status of 3GPP (3rd Generation Partnership Project) standardisation on MARCOM (Work Item on Maritime Communication Services over 3GPP system).

## Purpose of the document

This document is to inform IALA ENAV meeting of the status of 3GPP standardisation on MARCOM.

## Related documents

None

# Background

3GPP have developed 3GPP Technical Report and are working on a 3GPP Technical Specification to be applicable to maritime usage.

# Status of 3GPP MARCOM standardisation

## Status of 3GPP Stage 1 FS\_MARCOM standardisation

3GPP SA WG1 started the feasibility study on maritime communication services over 3GPP system since September 2016 to achieve the following objectives by the completion date of the standardisation 3GPP Technical Report 22.819 [1].

* Objectives of the study item 3GPP Stage 1 FS\_MARCOM

1. to develop use cases and potential requirements for services between Authorities and the public on board in the maritime radio communication environment;
2. to analyse gap between the potential requirements identified by developed use cases and existing 3GPP functions and specifications and indicate which potential requirements are already covered by existing functions and which potential requirements need additional work for new functions;
3. to study the harmonisation among the public safety networks on land and at sea;
4. to study the interworking between 3GPP system and the existing/future maritime radio communication systems for the seamless service of voice communication and data exchange between users ashore and at sea or between vessels at sea.

* Completion date of standardisation for FS\_MARCOM: June 2017

Then, in February 2017, 3GPP SA WG1 extended the objectives of the study item 3GPP Stage 1 FS\_MARCOM by adding two new objectives related to commercial maritime usage as well as the completion date of the standardisation of 3GPP Technical Report 22.819 by June 2018 as follows [2][3].

* Revised objectives of the study item 3GPP Stage 1 FS\_MARCOM

1. to develop use cases and potential requirements for mobile broadband services between users on land and users at sea and between users at sea; *[new objective added]*
2. to develop use cases and potential requirements for machine type communication services between UEs inside a vessel, between vessels at sea and between UEs at sea; *[new objective added]*
3. to develop use cases and potential requirements for maritime communication services between authorities on land and at sea and the public on board users (e.g. ship personnel or vessels) at sea for ship entry and departure clearance, ship navigation support or maritime safety etc. in the maritime radio communication environment;
4. to analyse gap between the potential requirements identified by developed use cases and existing 3GPP functions and specifications and indicate which potential requirements are already covered by existing functions and which potential requirements need additional work for new functions;
5. to study the harmonisation among the public safety networks on land and at sea;
6. to study the interworking between 3GPP system and the existing/future maritime radio communication systems for the seamless service of voice communication and data exchange between users ashore and at sea or between vessels at sea.

* Revised completion date of standardisation for FS\_MARCOM: June 2018

When 3GPP started the study first in 2016, the objectives of the study item 3GPP Stage 1 FS\_MARCOM initially focused on maritime safety and traffic management related to IMO MSPs but use cases of most IMO MSPs were not introduced in 3GPP Technical Report 22.819 because IMO MSC#101 that is supposed to be held in June 2019 is planned to make a decision on the guideline of IMO MSP based on the report from IMO NSCR#6 so it is not possible to receive detailed guidance on IMO MSPs before the standardisation of the 3GPP Technical Report 22.189 was completed.

Therefore, 3GPP SA WG1 started to additionally focus on the commercial maritime use cases by extending the objectives of the study item 3GPP Stage 1 FS\_MARCOM since February 2017.

3GPP Technical Report 22.819 that is the outcome of the feasibility study introduced and studied use cases and potential requirements for the support of maritime communication services over 3GPP system so that 3GPP system can be a good candidate of innovative tools to help address the information gap between users on land and users at sea as well as the maritime safety and vessel traffic management etc. that IMO intends to achieve especially in 5G era.

Consolidated potential requirements are specified in the section 10.2.1 of 3GPP Technical Report 22.819 to enable existing 3GPP enabling technologies to be applicable for the support of maritime communication services over 3GPP system. Example of existing features are as follows.

* Mobile services such as mobile internet access, real time audio and video streaming for transmission and reception, TV broadcast and multicast services, SMS, MSM, voice call and video call etc.
* Machine type communication such as eMTC and NB-IoT feature
* Public warning service for PWS-UEs and ePWS-UEs
* Mission Critical Services on-network and off-network
* General 5G services developed by SMARTER work
* Enabling technologies developed by 5GSAT work and 5GLAN work
* Indoor positioning services developed by 5G\_HYPOS

Consolidated potential requirements dedicated to maritime usage are described in the section 10.2.2 and 10.2.3 of 3GPP Technical Report 22.819.

* In the section 10.2.2 of 3GPP Technical Report 22.819, consolidated potential requirements that are common requirements for the general maritime usage applicable for commercial maritime usage as well as authority-related usage for the purpose of maritime safety and traffic management over 3GPP system.
* In the section 10.2.3 of 3GPP Technical Report 22.819, consolidated potential requirements dedicated to authority-related usage on maritime safety and traffic management over 3GPP system.

In addition, it was recommended to start the normative work on consolidated potential requirements described in the clause 10 of 3GPP Technical Report 22.819.

Work is ongoing in the maritime domain for the digitalisation and mobilisation of maritime related businesses as well as maritime safety and traffic management. New movement towards the 4th Industrial Revolution of maritime domain is getting to recognise that mobile communication tools such as 3GPP system need to be taken into account for the realization of maritime autonomous ship, maritime smart shipping or smart port that requires the performance incapable of being satisfied by legacy maritime communication systems or evolved ones.

Therefore, it was also recommended to continue to study new maritime use cases that 3GPP need to take into account so that 3GPP system can be a good candidate of innovative tools as mobile communication platform necessary for the digitalization and mobilization of the maritime domain that bring about the Fourth Industrial Revolution of the maritime businesses as well as maritime safety and traffic management [6].

## Status of 3GPP Release 16 Stage 1 MARCOM standardisation

Based on the outcome of the feasibility study on 3GPP Stage 1 FS\_MARCOM, the new work item 3GPP Release 16 MARCOM was approved at 3GPP SA WG1 in August 2018 and then 3GPP TSG SA plenary in September 2018 in order to start the normative work to specify 3GPP Release 16 Stage 1 service requirements [4][5].

The objective of the work item 3GPP Release 16 Stage 1 MARCOM is to specify the Stage 1 requirements to support maritime communication services over 3GPP system that are

* to enable existing 3GPP enabling technologies to be applicable to maritime domain
* to support maritime communication services related to the general maritime usage
* to support maritime communication services dedicated to authority-related usage on maritime safety and traffic management
* Completion date of standardisation for 3GPP Release 16 Stage 1 MARCOM: December 2018

The maritime domain, one of the 5G vertical domains in 3GPP is moving forward with the digitalisation and mobilisation of commercial as well as safety fields. Legacy 3GPP-based technologies and solutions can be beneficial to the digitalisation and mobilisation of the maritime domain though some of the legacy 3GPP enabling technologies and solutions may not be able to fully support the performances required by the maritime domain. The maritime radio environment was not originally considered by 3GPP when the technical specifications and solutions were standardised for LTE and 5G.

However, most of the legacy mobile services and IoT services based on capabilities of EPS and 5GS specified in 3GPP specifications are applicable to maritime usage for the support of mobile broadband services, and for the support of IoT services or machine-type communication services in a vessel at sea.

In addition, there are service scenarios and requirements specified in 3GPP specifications based on requirements of other related vertical domains (e.g. public safety domain, automotive domain, factory automation domain, and satellite industrial domain). Some requirements derived by service scenarios from these related vertical domains are applicable to the maritime domain. Thus it is beneficial to use 3GPP enabling technologies developed to satisfy those requirements for the maritime domain in terms of the economy of scale.

For example, satellite access is one of the 3GPP radio access networks supported over the 5G system, so it is possible to provide seamless maritime mobile services by integrating multiple access technologies including satellite access depending on the service scenarios. In addition, 5G LAN-type access that can replace Ethernet-based access are applicable to indoor maritime mobile services inside a vessel.

MC Services specified in 3GPP specifications are applicable to commercial and maritime safety fields. Some similarities exist between the public safety domain and the maritime domain in terms of service scenarios that are essentially the same. For example, in some situations, mobile communication services are supported in spite of disconnected networks, i.e. off-network mode, or under isolated conditions.

However, the maritime domain also has specific situations that do not happen in other vertical domains or in the legacy ICT industrial domain. New 3GPP enabling technologies dedicated to the maritime domain can be used to address such specific situations based on requirements derived from maritime use cases. Other vertical domains may benefit from such new 3GPP enabling technologies that consider maritime domain scenarios and may need more robust technologies or solutions than those that currently exist for those vertical domains.

3GPP Technical Specification 22.119 provides the Stage 1 requirements specific to maritime usage over 3GPP system for commercial as well as safety purposes. The stage 1 requirements derived from specific maritime usage but also related to MCX Services are specified in 3GPP technical specifications dedicated to MCX Services [7].

# References

1. S1-162556, Study Item Description (SID) for Study on Maritime Communication Services over 3GPP system that was agreed at 3GPP SA WG1#75 meeting in August 2016
2. S1-171452, Revised SID for Study on Maritime Communication Services over 3GPP system that was agreed at 3GPP SA WG1#77 meeting in February 2017
3. SP-170453, Revised SID for Study on Maritime Communication Services over 3GPP system that was approved at 3GPP TSG SA plenary#75 meeting in March 2017
4. S1-181691, Work Item Description (WID) on Maritime Communication Services over 3GPP System that was agreed at 3GPP SA WG1#82 meeting in May 2018
5. SP-180594, WID on Maritime Communication Services over 3GPP System that was agreed at 3GPP TSG SA plenary#80 meeting in June 2018
6. 3GPP Technical Report 22.819, Feasibility Study on Maritime Communication Services over 3GPP system that is downloadable from http://www.3gpp.org/DynaReport/22819.htm
7. 3GPP Release 16 Stage 1 Technical Specification 22.119, Maritime Communication Services over 3GPP system that is downloadable from <http://www.3gpp.org/DynaReport/22119.htm>

# Action requested of the Committee

None

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