

ENAV23-12.1.6.1

3GPP TS 22.119 V16.0.0 (2018-12)

Technical Specification

**3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
Maritime Communication Services over 3GPP system;
Stage 1
(Release 16)**



The present document has been developed within the 3rd Generation Partnership Project (3GPP™) and may be further elaborated for the purposes of 3GPP..
The present document has not been subject to any approval process by the 3GPP Organizational Partners and shall not be implemented.
This Specification is provided for future development work within 3GPP only. The Organizational Partners accept no liability for any use of this Specification.
Specifications and Reports for implementation of the 3GPP™ system should be obtained via the 3GPP Organizational Partners' Publications Offices.

Keywords

Maritime, Requirements

3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

<http://www.3gpp.org>

Mis en forme : Français (France)

Copyright Notification

No part may be reproduced except as authorized by written permission.
The copyright and the foregoing restriction extend to reproduction in all media.

© 2018, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
All rights reserved.

UMTS™ is a Trade Mark of ETSI registered for the benefit of its members

3GPP™ is a Trade Mark of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners

LTE™ is a Trade Mark of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners

GSM® and the GSM logo are registered and owned by the GSM Association

Contents

Foreword.....	4
1 Scope	5
2 References	5
3 Definitions, symbols and abbreviations	5
3.1 Definitions	5
3.2 Symbols.....	5
3.3 Abbreviations.....	5
4 Overview	5
5 Requirements of basic capabilities	6
5.1 Network connection and service continuity	6
5.1.1 Description	6
5.1.2 Requirements	6
5.2 Identification.....	7
5.2.1 Description	7
5.2.2 Requirements	7
6 Requirements of multi-access and seamless mobility	7
6.1 Seamless mobility	7
6.1.1 Description	7
6.1.2 Requirements	7
7 Requirements of warning notification and emergency request	7
7.1 Notification for maritime safety	7
7.1.1 Description	7
7.1.2 Requirements	8
7.2 Emergency request for maritime safety	8
7.2.1 Description	8
7.2.2 Requirements	8
Annex A (informative): Status of legacy communication methods used for the navigation.....	9
Annex B (informative): Status of legacy communication methods used by equipment inside a vessel	10
Annex C (informative): Change history	11

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
 - 1 presented to TSG for information;
 - 2 presented to TSG for approval;
 - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document describes service requirements to enable maritime communication services to be supported over 3GPP system. Requirements for MCX Services applicable to general maritime usage are specified in 3GPP Technical Specifications dedicated to MCX Services.

Requirements in this specification are specific for maritime usage.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

3.2 Symbols

For the purposes of the present document, the following symbols apply:

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

4 Overview

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.

This technical specification 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.

5 Requirements of basic capabilities

5.1 Network connection and service continuity

5.1.1 Description

General 3GPP procedures of network connection and service continuity are applicable to maritime usage within 3GPP communication range. For example, a UE mapped to a vessel needs to perform the network reselection when a vessel arrives at a port where different 3GPP networks are available from a 3GPP network that a vessel was initially connected to but disconnected from when a vessel started a voyage away from the initial 3GPP communication range. Additional capabilities for the establishment of a 3GPP network connection and for the service continuity could improve user experiences on maritime communication services over 3GPP system in spite of some constraints from the maritime communication environment including the communication environment inside a vessel that is usually made of steel.

5.1.2 Requirements

3GPP system shall provide a mechanism to establish a 3GPP network connection and support service continuity between direct network connection and indirect network connection for maritime usage under some constraints (e.g. any UE constraint on the uplink transmission capability or signal attenuation due to steel material of a vessel).

5.2 Identification

5.2.1 Description

A UE identity specified in 3GPP specifications is applicable to maritime usage. There are vessel identities ~~such as IMO number~~ for the identification of a vessel as a unique identity in maritime communication services. Mapping a UE identity with a vessel identity is needed to support identification procedures based on vessel identities in maritime domain when a vessel itself plays the role of a UE in a 3GPP system.

Commenté [JC1]: IMO number is not the appropriate number for communications use.
Process – follow up with ITU regarding the numbering system for maritime communications equipment. (for example ITU-R M.585 (latest edition)).

5.2.2 Requirements

3GPP system shall provide a mechanism to associate a UE identity with a vessel identity (e.g. a national vessel identification number managed by a national authority or an IMO number that is a unique international vessel identification number consisting of 7-digit number in case of SOLAS vessels).

Commenté [JC2]: Same comment as above

6 Requirements of multi-access and seamless mobility

6.1 Seamless mobility

6.1.1 Description

Network deployment scenarios are one of the different aspects to be taken into account for maritime communication from terrestrial communication in order to provide seamless mobile services ~~within a for vessels or at sea~~ in port and in inland waterways. The usage of ~~moving networks, isolated networks or satellite access networks~~ may be more commonly applicable for maritime safety services as compared to general commercial services over 3GPP networks because fixed mobile network deployments are used for most terrestrial mobile services.

Commenté [JC3]: Confirm the terminology of ‘moving’ versus ‘mobile’ networks.
In maritime world the terminology used is ‘mobile’

The communication range may depend on a number of factors such as the power level transmitted, the height of the antenna, the ~~size-type~~ of vessels, ~~and the particular service scenarios~~ and propagation conditions. Thus, it may not be easy to provide a single value for the communication range between two vessels and a vessel that is applicable for all maritime service scenarios at sea.

6.1.2 Requirements

The minimum communication range between vessels shall be equal to the maximum line-of-sight range between antennas mounted on two vessels at sea, in port and in inland waterways.

NOTE 1: The ~~unit of the~~ communication range between vessels is a-measured in nautical miles (NM) ~~that is a unit of measurement used at sea and is (1 NM equals to 1852 metres)~~.

NOTE 2: For example, in the case of non-SOLAS vessels with antenna heights 4 metres above sea level, the minimum communication range is 10 NMs when applying the formula defined in IMO Resolution A.801(19).

Commenté [JC4]: Revise the terminology to refer to the formula (no need to include text re antenna heights)

7 Requirements of warning notification and emergency request

7.1 Notification for maritime safety

7.1.1 Description

Notifications for maritime safety can be transmitted by authorities to maritime mobile users at sea. Notifications can be used to inform vessels of the location of a vessel in danger. Considering maritime environment, a vessel that received notifications for maritime safety needs to be able to send such received notifications to neighbouring vessels that are not in the coverage of 3GPP system.

Commenté [JC5]: Rephrase to reflect communications identified in the GMDSS – confirm the phrasing provided here with the agreed terminology for Distress, Urgency, Safety and public correspondence communications.

7.1.2 Requirements

3GPP system shall provide a mechanism of including the position, heading and speed of other UEs in a maritime notification transmitted only to a dedicated UE requesting maritime safety information.

3GPP system shall provide a mechanism of enabling all UEs dedicated to vessels that are in the coverage of 3GPP system to receive the distributed maritime notifications and identify which of these maritime notifications are targeted for the UE.

Commenté [JC6]: When UE used confirm that this is maritime onboard equipment

7.2 Emergency request for maritime safety

7.2.1 Description

~~Maritime accidents used to happen when crews of a vessel do not recognise that one of people on board is falling into the sea on a vessel.~~ 3GPP system provides several mechanisms of enabling emergency request in case of maritime accidents to be transmitted to inform the occurrence of emergency to authorities in charge. In addition to legacy emergency request mechanisms, additional capabilities can make 3GPP system more powerful tools for maritime safety.

7.2.2 Requirements

The 3GPP system shall provide a mechanism of distributing the maritime emergency request received from a UE to all any UEs on that vessel or in the area.

A UE ~~dedicated to a vessel~~ shall support the capability of sending maritime emergency requests including the vessel-dedicated UE's actual position (e.g. current position, heading and speed of the vessel and scheduled navigational routes.)

The 3GPP system shall be able to transmit-forward the maritime emergency request via the indirect network connection.

Annex A (informative): Status of legacy communication methods used for the navigation

Void

Annex B (informative): Status of legacy communication methods used by equipment inside a vessel

Void

Annex C (informative): Change history

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2018-08	SA1#83	S1-182608				TS Skeleton	0.0.0
2018-08	SA1#83	S1-182609				Scope	0.1.0
2018-08	SA1#83	S1-182610				Overview	0.1.0
2018-08	SA1#83	S1-182611				Requirements of basic capabilities	0.1.0
2018-08	SA1#83	S1-182726				Requirements of maritime notification and emergency request	0.1.0
2018-09	SA#81	SP-180762				Raised by MCC to v.1.0.0 for presentation to SA for information	1.0.0
2018-11	SA1#84	S1-183615				Requirement on the communication range between vessels	1.1.0
2018-12	SA#82	SP-181004				Raised by MCC to v.2.0.0 for presentation to SA for approval	2.0.0
2018-12	SA#82	SP-181004				Raised by MCC to v.16.0.0 following SA#82 approval	16.0.0