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Electromagnetic compatibility and Radio spectrum Matters (ERM); System Reference document (SRdoc); Broadband communication links for ships and fixed installations engaged in off-shore activities operating in the 5 GHz to 8 GHz range

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ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

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Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

Executive summary

Due to the development of new systems and applications supporting maritime operations related to off-shore activities, there is an increasing need for high speed digital communication links between the units engaged in such activities.

A high speed maritime broadband radio system provides short range links between several vessels and fixed structures are cooperating in complex operations at sea. Basic VHF communication services, satellite communication and state of the art WLAN systems do not support the high speed and data throughput needed in such advanced and demanding operations.

Therefore, there is a need to develop new radio communication systems with higher capacity and link type characteristics to meet the new requirements for data capacity, speed and throughput.

A high speed Maritime Broadband Radio (MBR) working in the 5 GHz to 8 GHz range may be implemented with adaptive antenna arrays that will enable beam forming and high directivity. A radio communication system with advanced beam forming and digital processing may greatly increase the capability and capacity of the radio system compared to state of the art systems.

In order to achieve these benefits, however, it is necessary to operate typically in the 5 GHz band or higher in order to implement antenna arrays of practical size. Due to the high directivity used and thereby relatively high EIRP, a suitable frequency allocation is necessary to avoid interference problems with current WLAN systems and similar kind of equipment.

The main use for a Maritime Broadband Radio system is data communication between vessels and between vessels and fixed structures, typically oil installations at sea. As the system is totally digital, it can be used for voice, video and data transmission. Data rates will typically be in the order of 10 Mbit/s or more. The communication content will typically be different kind of operational data, navigational data, administration data, update of chart data, messaging, live video from cameras, etc.

Transmission of data rates like this, at long distance over sea, is by no means a trivial matter. Problems due to sea-reflections and reflections from structures may frequently occur and should be mitigated by suitable processes in the digital processing platform. Moreover, the high directivity obtained with phasing of antenna arrays makes it possible to establish a dynamic link communication system between several entities. The antenna directivity and pointing angle can be dynamically adjusted both in azimuth and elevation thereby optimizing the link budget under different conditions. Moreover, phasing of antennas can be used to create antenna nulls in directions which should not be illuminated with high EIRP, or to suppress interfering signals from specific directions.

The present document describes a novel broadband digital communications system which makes use of highly directional antennas in order to achieve the desired system performance. This feature also facilitates co-frequency sharing with other systems by minimizing interference for other services.

The described system has initially been designed to be capable of operating in two 20 MHz blocks of contiguous spectrum in the 5 GHz band or higher.

Introduction

The present document has been developed to support the co-operation between ETSI and the Electronic Communications Committee (ECC) of the European Conference of Post and Telecommunications Administrations (CEPT).

Status of pre-approval draft

The present document has been developed by BRAN. The information in it has undergone coordination by ERM/TG26.

1 Scope

The present document describes a maritime mobile broadband system which may require an additional frequency utilization within CEPT for the proposed band(s).

Although the technology is capable of operating in the range 5 GHz to 8 GHz, the preferred regulatory approach would be for this system to operate on a non-interference and unprotected basis within the higher end of the 5 GHz band.

The present document includes, in particular:

- Market information.
- Technical information.
- Regulatory issues.

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

2.1 Normative references

The following referenced documents are necessary for the application of the present document.

Not applicable.

2.2 Informative references

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] International Convention for the Safety of Life at Sea (SOLAS), 1974.

NOTE: Available at http://www.imo.org/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Safety-of-Life-at-Sea-(SOLAS),-1974.aspx.

[i.2] ERC Report 25: "The European table of frequency allocations and applications in the frequency range 9 kHz to 3 000 GHz (ECA Table).

[i.3] ITU Radio Regulations.

3 Symbols and abbreviations

3.1 Symbols

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

dB_c Level (dB) below carrier