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| Summary: | | |
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| Proposal: | | |
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DRAFT CEPT BRIEF ON AGENDA ITEM 1.16

1.16 to consider regulatory provisions and spectrum allocations to enable possible new Automatic Identification System (AIS) technology applications and possible new applications to improve maritime radiocommunication in accordance with Resolution 360 (WRC 12);

# ISSUE

The Automatic Identification System (AIS) is a proven maritime data system, with a large number of ships equipped and a supporting terrestrial and satellite infrastructure established;

AIS is used in the ship movement service for collision avoidance, it enables the identification of stations using this system, provides information about a ship and its cargo. It provides a means for ships to exchange ship data, including identification, position, course and speed, with other nearby ships and coast stations.

AIS has the capability for data exchange by application-specific messages for complementary information for navigation. Within recent years the AIS use is increasing rapidly, as well as Application Specific Message (ASM), and a potential overloading, of the current AIS1 and AIS2 (Appendix 18 of the Radio Regulations) need to be considered.

The decision of WRC 12 to assign new channels of the appendix 18 to digital communication makes the implementation and use of new digital communication means possible. The establishment of the maritime AIS technology, the VHF data exchange and certain satellite communication components on these new frequencies offers potential enhancements to VHF maritime safety communications on a global basis to satisfy the increasing need for maritime radiocommunications for enhanced maritime safety.

# Preliminary CEPT position

* CEPT is of the view that the implementation of the Concept of the VHF Data Exchange System (VDES) which contains a VDE terrestrial component, a satellite component and an ASM component would enhance maritime radio communications.
* CEPT is of the view that no modifications should be required to existing AIS equipment on board existing vessels and that the integrity of the original operational purpose of AIS as the primary function on the existing AIS frequencies should be protected
* CEPT considers that a combination of channels 24, 25, 84, and 85 could be a possible solution for the terrestrial component for the future VDES.
* CEPT is considering a new secondary allocation to the mobile satellite service in downlink and uplink direction, while ensuring the protection of existing terrestrial services.
* CEPT is of the view that a satellite component could include a downlink comprising the following combination of channels 2024, 2025, 2026, 2084, 2085 and 2086. For the uplink comprising the following channels 1024, 1025, 1026 1084, 1085, 1086 and the frequencies ASM1 (Channel 2027) and ASM2 (Channel 2028). (See Annex 1)

# Background

Resolves part of Resolution 360 (WRC-12) invites ITU-R:

1. to consider, based on the results of ITU-R studies, modifications to the Radio Regulations, including possible spectrum allocations, to enable new AIS terrestrial and satellite applications, while ensuring that these applications will not degrade the current AIS operations and other existing services;

The ship borne automatic identification system (AIS) mandated under Chapter V of the international convention for the Safety of Life At Sea (SOLAS) has become well accepted by the maritime community and is also being used by thousands of ships not subject to carriage requirement under the SOLAS Convention.

AIS is supported by a large shore based VHF infrastructure as well as being able to be detected by satellite. AIS is routinely used by ships for navigation and crew familiarity is a positive factor. AIS messages can be sent with a priority #1 (highest) through #4 (lowest).

AIS 1 and AIS 2 should be reserved for “Navigation Safety/Collision Avoidance” purposes (as a SOLAS requirement) and therefore the Application-Specific Messages (ASM) and other “non-critical communications” should be moved to new channels of RR Appendix 18 to avoid deleterious loading of the AIS VDL (VHF Data Link). This problem increases as more different types of equipment using AIS technology are developed, more vessels are equipped and more AIS applications are developed and implemented.

Taking into account the channels identified by WRC-12 as described in above, new digitalized channels could be used with modulation technique described in Recommendation ITU-R M.1842-1, and could be used for future VHF digital data, and ship-to-shore data exchange.

These may be used as discrete data communications channels, or a number may be combined into a single wide-bandwidth channel.

Where a number of the 25 kHz channels are combined, a typical scheme might have a 100 kHz bandwidth, allowing a much higher data throughput than a single 25 kHz channel. The use of the six VHF data channels plus two further channels (which have been identified for “possible testing of future AIS applications”) for an international scheme to be known as “VHF data exchange” (VDE).

1. to consider, based on the results of ITU-R studies, additional or new applications for maritime radiocommunication within existing maritime mobile and mobile-satellite service allocations, and if necessary to take appropriate regulatory measures,

Satellite communications is an effective means to deliver information in a broadcast or multicast mode to a large number of ships, i.e. efficiently addressing many vessels using only minimal parts of the scarce maritime radio spectrum resource. A satellite downlink channel is able to address a single message to thousands of ships simultaneously within its footprint.

Suitable frequencies for a satellite VDE downlink channel, as part of the VDE concept - allow the reception of the satellite channel with low-cost receive-only equipment, or can make extensive use of the existing VHF infrastructure on the ships and require only minor modifications.

A satellite downlink channel would allow to pass information to ships which are out of reach of the terrestrial shore infrastructure, therefore extending the geographical reach of services such as remote areas e.g. polar regions.

With agenda item 1.16, WRC-15 is mandated to decide on technical, regulatory and operational solution to enable and establish new AIS Applications and digital data communication between ship and land and satellite down links in the existing maritime mobile and mobile-satellite service allocations including Appendix 18.

Invites part of Resolution 360 (WRC-12) invites ITU-R:

1. to conduct, as a matter of urgency, studies that identify potential regulatory actions to accommodate emerging maritime mobile service and mobile-satellite service AIS requirements;
2. to conduct, as a matter of urgency, studies on additional or new applications for maritime radiocommunication within maritime mobile and mobile-satellite service allocations, and to identify potential regulatory actions to accommodate emerging maritime radiocommunication requirements;
3. to complete studies in time for WRC-15 taking into account existing systems and services that share the bands.

# List of relevant documents

ITU-Documentation (Recommendations, Reports, other)

Recommendation ITU-R M.1084 – Interim solutions for improved efficiency in the use of the band 156-174 MHz by stations in the maritime mobile service.

Recommendation ITU-R M.1371 – Technical characteristics for an automatic identification system using time-division multiple access in the VHF maritime mobile band.

Recommendation ITU-R M.1842 – Characteristics of VHF radio systems and equipment for the exchange of data and electronic mail in the maritime mobile service RR Appendix 18 channels.

ITU-Reports:

Annex 6 to document 5B/475304 – WP 5B Chairman’s report (November July 2013) – Draft Workplan on AI 1.16

Annex 5 to document 5B/475304 – WP 5B Chairman’s report (November July 2013) - Working document towards Draft CPM Report on AI 1.16

Annex 37 to document 5B/475 – WP 5B Chairman’s report (November 2013)

Other ITU documents:

5B/106 and 5B/153

Updated information/documentation on the ITU-R Preparatory Studies for WRC-15 are available at <http://www.itu.int/ITU-R/go/rcpm-wrc-15-studies>.

Report ITU-R M 2287-0 Automatic Identification System VHF Datalink loading

CEPT and/or ECC Documentation (Decisions, Recommendations, Reports)

EU Documentation (Directives, Decisions, Recommendations, other), if applicable.

# Actions to be taken

* Study the content of the existing ASM applications messages and other non-critical messages and study the implication and amount of these over the VDL. The possible content to be moved from AIS 1 and 2 to the ASM channels should be evaluated.
* Consideration of the additional or new maritime communications applications within the existing maritime mobile and maritime mobile-satellite allocations, such as VDES (terrestrial and satellite).
* Compatibility and sharing studies to determine the technical and regulatory measures for the new terrestrial and satellite applications, while ensuring that these applications will not degrade the current AIS operations and other existing services.
* Appropriate solutions for channels to be used for the satellite component and ASM are to be studied. (See Annex 1) Note Exchange the Annex 1 and 2 by material from 5B chairman's report for channel arrangement. – (Note: Complete Tables are available as Objects).

# Relevant information from outside CEPT (examples of these are below)

## European Union (date of proposal)

## Regional telecommunication organisations:

APT ( 4-5 December 2013)

Supports ITU-R studies towards new applications using the AIS and enhanced maritime radiocommunications in the maritime mobile service in accordance with Resolution 360 (WRC-12).

No modifications are required to existing AIS equipment on board existing vessels, but rather allow for new applications using AIS technology to evolve, supported by communication primarily on the new frequencies identified by WRC-12, while protecting the integrity of the original operational purpose of AIS as the primary function on the existing AIS frequencies.

That the frequency band identified to VDES should accommodate the expected future AIS VDL loading.

Supports the frequency bands identified by WRC-12 for digital modulation could be considered as possible candidates for the global and regional channel allocation for VDE.

Any new allocation for the future applications, including satellite application, to the frequency bands listed in the Appendix 18 should be based on issued ITU-R Recommendation(s) to contain on gap analysis, sharing and compatibility, experiments and tests, applications, system architecture, characteristics, shipborne equipment standards, performance or managing requirements, etc..

Transitional arrangements are required to minimize the impact of use of new applications on the existing services using frequencies listed in the Appendix 18. The VDES equipment should provide backwards compatibility for existing AIS, the installation costs should be minimized and the proper transitional period should be considered.

ATU (January 2014)

Africa recognize the importance of AIS, and support any allocation improving AIS, however specific bands to identified after the availability of results of ongoing studies

Arab Group ( 4-5 December 2013) ASMG Position

Follow up the current studies about the regulatory provisions and spectrum requirements to enable possible new Automatic Identification System (AIS) technology applications and possible new applications to improve maritime radiocommunications and work on protection of the current AIS systems operations and other existing services.

Encourage Arab administrations to coordinate with the Maritime Safety relevant entities with this regard.

CITEL March 2014)

Preliminary view AI 1.16

Canada:   
With additional applications being developed in the maritime mobile service, and taking into account other existing services, Canada supports studies to determine the need for additional spectrum and if required, what frequency band would be appropriate for additional applications using AIS technology.

USA:   
Modifies Appendix 18 to specify Channels 2078, 2019, 2079 and 2020 are not available for transmitting from ships to protect AIS receivers

RCC (22 November 2013)

* it is possible to identify frequency bands (channels) for implementation of enhanced AIS technology applications and new applications for enhanced maritime radiocommunication in accordance with Resolution 360 (WRC-12). However such identification should be conducted within the existing allocations to MMS and MSS taking into account EMC with existing services;
* for VDE terrestrial component it is feasible to use combination of VHF channels 24, 25, 26, 84, 85, 86 identified by WRC-12 for digital technologies in MMS;
* for AIS-ASM (AIS distress-nonrelated) the identification of new channels is feasible (within MMS). However two options are available for consideration: channels 87 (157.375 МHz) and 88 (157.425 МHz) (option 1); channels 2027 (161.950 МHz) and 2028 (162.000 МHz) (option 2);
* allocation of new frequency bands to the MSS to be used by VDES satellite component is possible upon completion of compatibility studies between existing radio services.

## International organisations

IATA (date of proposal)

ICAO (July 2013)

Position

To ensure that any change to the regulatory provisions and spectrum allocations resulting from this agenda item do not adversely impact on the capability of search and rescue aircraft to effectively communicate with vessels during disaster relief operations.

IMO (update 25 January 2013)

1. IMO's position is that modifications should not be required to existing AIS equipment on board existing vessels, but rather allow for new applications using AIS technology to evolve, supported by communication primarily on the new frequencies identifed by WRC-12, while protecting the integrity of the original operational purpose of AIS as the primary function on the existing AIS frequencies.
2. IMO supports studies conducted by ITU-R WP 5B.

NATO ( 06 December 2013)

NATO supports the consideration of regulatory provisions or enhanced AIS technology applications and for enhanced maritime radiocommunication, while protecting the integrity of the original operational purpose of AIS

SFCG (July 2013)

It is possible that new allocations may be proposed under this agenda item. Therefore, the SFCG will monitor the development of studies that may impact the science services and update its view on this agenda item as necessary.

WMO and EUMETNET (date of proposal

## OTHER INTERNATIONAL AND REGIONAL ORGANISATIONS

ESA (date of proposal)

Eurocontrol (date of proposal)

1. 1. Channel plan

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| --- | --- | --- | --- | --- | --- |
| 1024  157.200 | 1084  157.225 | 1025  157.250 | 1085  157.275 | 1026  157.300 | 1086  157.325 |
| VDE1 | | | |  | |
| SAT up3 | | | | | |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2024  161.800 | 2084  161.825 | 2025  161.850 | 2085  161.875 | 2026  161.900 | 2086  161.925 | 2027  161.950 | AIS1  161.975 | 2028  162.000 | AIS2  162.025 |
| VDE1 | | | |  | | ASM1 |  | ASM2 |  |
| SAT Downlink | | | | | | SAT up1 | AIS1  uplink | SAT up2 | AIS2  uplink |

* 1. VHF data exchange system channel usage:
     1. VHF data exchange system data exchange between terrestrial stations:
* AIS 1 (161.975) and AIS 2 (162.025) are AIS channels, in accordance with Recommendation ITU-R M.1371;
* ASM 1 (161.950) and ASM 2 (162.000) are non-navigation application specific messages (ASM);
* VDE 1 lower legs (channels 1024… 1085) are ship-shore VDE (VHF data exchange);
* VDE 1 upper legs (channels 2024… 2085) are shore-ship and ship-ship VDE.
  1. VHF data exchange system data exchange between satellites and terrestrial stations:
* AIS 1 (161.975) and AIS 2 (162.025) are used as uplinks for receiving AIS messages by satellite;
* SAT up1 (161.950) and SAT up 2 (162.000) are used for receiving ASM by satellite;
* SAT up3 (channels 1024… 1086) is a ship-satellite VDE uplink;
* SAT Downlink (channels 2024… 2086) is the satellite-ship VDE downlink.
  1. Technical characteristics
     1. Shipborne VHF data exchange system receivers are protected

As in AIS, shipborne VDES receivers are on the upper legs of RR Appendix 18, 4.6 MHz above the lower legs, which facilitates protection by filtering from receiver blocking by ships VHF radios.

* + 1. SAT Downlink is optimized

The satellite downlink power is spread over 6 channels to minimize interference to terrestrial services and to maximize reception by ship VDES stations.

* + 1. VDE1 uses both legs of the duplex channels

Full channel capacity is utilized for the duplex channels in VDE1 by using the lower legs for ship-shore and the upper legs for shore-ship and ship-ship digital messaging.