

WAC/047 (30.10.17)
IWG-4/18r2 (05.09.17)

ATTACHMENT A
to FCC Public Notice DA 17-1059

**Preliminary Views and Draft Proposals presented at
October 30, 2017 Meeting of the
World Radiocommunication Conference Advisory Committee**

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Maritime Aeronautical and Radar Services

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Document WAC/039(30.10.17)

WRC-19 Agenda Item 1.8

IWG-1 members were not able to reach consensus on a proposal for WRC-19 Agenda Item 1.8 regarding the scope of modifications to No. **5.368** of the Radio Regulations. The differences focus on the application of radio regulation 4.10 and a desire to not constrain users in adjacent frequency bands. The views on the appropriate regulatory changes the FCC should support are provided.

View A is supported by: Iridium, Aviation Spectrum Resources, Inc., The Boeing Company, Harris, Wiltshire & Grannis, LLP, Jansky-Barmat Telecommunications, Inc. and Access Partnership, LLC.

View B is supported by: Inmarsat, Ligado Networks, and Globalstar.

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VIEW A

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View A:

WAC members supporting View A maintain that the WAC should approve Document IWG-1-026r2 AI 1-8 PP 9-29-17 (“Doc. 26”) and recommend to the FCC to use Doc. 26 as the basis for reconciling a draft United States Proposal for submission to the upcoming meeting of CITEL PCC.II.¹ Iridium Satellite, LLC, The Boeing Company, Harris, Wiltshire & Grannis, LLP, Jansky-Barmat Telecommunications, Inc., Access Partnership, LLC, Aviation Spectrum Resources, Inc., support View A.

Background

Document IWG-1-026r2 is a draft proposal addressing Agenda Item 1.8 with respect to *resolves* 2 of Resolution **359 (WRC-15)** concerning the introduction of additional satellite systems into the GMDSS. The United States was the primary advocate of this WRC-19 Agenda Item.

To date, only one mobile satellite system has been recognized by the International Maritime Organization (IMO) for use in the GMDSS “system of systems”. Recognizing the need for additional satellite resources capable of providing increased coverage and competition for provision of maritime services, the International Maritime Organization is considering incorporation of additional satellite systems into the GMDSS. The IMO has taken action to facilitate the introduction of an additional satellite system into the GMDSS, and is considering the approval of the HIBLEO-2 (i.e., Iridium) satellite system for introduction into the GMDSS.²

Discussion

A prerequisite to participating in the GMDSS is successfully completing a rigorous IMO approval process. Among other things, the IMO analyzes whether a system is sufficiently robust to support distress and safety communications. Without IMO approval, a system – existing or planned – cannot participate in the GMDSS.

For its role, through WRC-19, the International Telecommunication Union (“ITU”) will capture necessary changes to its Radio Regulations (“RR”) to recognize Iridium’s IMO approval to participate in the GMDSS. Because Iridium is an existing MSS system operating within the 1610-1626.5 MHz band for over 20 years, revisions to the RR to recognize GMDSS operation within this band, and consequential revisions for RR consistency, will be minimal. The View A proposal reflects a minimalist approach. In the View A proposal, the proposed revisions are:

- A footnote added to Article 5 for the band 1616-1626.5 MHz to recognize new frequencies for GMDSS satellite operations.
- Modifications to relevant parts of Appendix 15 of the RR to recognize new frequencies for GMDSS satellite operations.
- Modifications to relevant parts of Article 33 to recognize new frequencies for GMDSS satellite operations.

¹ The next meeting of CITEL PCC.II is planned for November 27 to December 1, 2017; Barranquilla, Colombia.

² The IMO is well along in its review and approval process. The HIBLEO-2 satellite system has already surpassed significant IMO milestones. Going forward, by February 2018 we anticipate that the Navigation, Communications Search and Rescue (NCSR) will conduct a second stage evaluation of the HIBLEO-2 application to assess compliance with remaining IMO requirements. If the NCSR determines all requirements have been met, we anticipate that the NCSR will inform the Maritime Safety Committee (MSC) of successful completion and, by May 2018, we anticipate that MSC will issue a resolution recognizing the HIBLEO-2 system a GMDSS service provider.

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IWG-1 Opposition

In IWG-1 discussions proponents of View B have raised these issues (View A responses appear in italics after each point:

- Because GMDSS is used for distress and safety communications, identifying spectrum within the 1610-1626.5 MHz band for GMDSS would somehow confer “superprimary” status to Iridium’s secondary downlinks operating within the 1613.8-1626.5 MHz band.

“Superprimary” is a made-up term that has no basis in the Radio Regulations. Allocation status is defined in Article 1 of the Radio Regulations.

- Applying No. 4.10 only cautions administration to take care when assigning a station or frequency.

The application of applying 4.10 to GMDSS does not impact traffic priority. It reinforces to administrations that special care should be taken when assigning a station due to safety traffic. It acts to compliment No 1.59.

- *1.59 safety service: Any radiocommunication service used permanently or temporarily for the safeguarding of human life and property.*
- *4.10 Member States recognize that the safety aspects of radionavigation and other safety services require special measures to ensure their freedom from harmful interference; it is necessary therefore to take this factor into account in the assignment and use of frequencies.*
- The addition of a GMDSS designation could potentially change the interference relationships now existing between the 1613.8-1626.5 MHz and upper adjacent 1626.5-1660 MHz band.

The technical and operational characteristics of the Iridium satellite system will not change simply because the IMO approves Iridium for GMDSS carriage. With no change in the system, the interference relationships remain the same.

- The United States Proposal should be limited to the 1618.725-1626.5 GHz band because:
 - The proposal as contained in the version proposed by Iridium is inconsistent with the current USA Table of Allocations and the band at 1616.0 MHz and does not conform to the ITU-R Table of Allocations; and
 - GMDSS operating below 1618 MHz would cause greater shipboard separation requirements between lower adjacent band GNSS receivers and GMDSS receivers operating from 1616-1626.5 MHz.

With regard to sub-point one, the proposal is inconsistent with the referenced tables because the entire point of the proposal is to change the relevant Radio Regulations to reflect the IMO approval of GMDSS. Should WRC-19 adopt a proposal on GMDSS, at its option, the FCC can choose to implement RR changes into its domestic rules.

Based on the points above, View B proponents (one of whom has been the *sole* provider of satellite GMDSS from the inception of GMDSS sat-com up to today) have developed their own counter-proposal that modifies the proponent’s View A proposal to:

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- Add a footnote note to Article 5 of the RR to capture unprecedented (with respect to commercial services) nebulous adjacent band protection phraseology to be applied to GMDSS within the 1610-1626.5 MHz band;
- Limit the proposal to the band 1618.725-1626.5 – reflecting Iridium’s FCC authorization.
- Apparently conceding that No. 4.10 can be applied to Iridium’s downlink, limiting the application to 1618.725-1626.5 MHz – consistent with their GMDSS band limitation; and

Proponent’s Proposal

The Iridium MSS system has existed for 20 years and the addition of GMDSS does not change the technical and operational aspects of the system. Therefore, the relative regulatory and interference “position” of Iridium relative to systems operating in the same, or upper and lower adjacent bands, is not changed by the IMO approving carriage of GMDSS traffic over the Iridium’s satellite system, nor by WRC-19 capturing that fact by adopting appropriate changes to the RR. Therefore, minimal “regulatory” changes are required to capture IMO GMDSS approval in the RR.

Further, GMDSS is not a service as defined by the ITU. Thus, there are no new allocation issues to consider – the entirety of the 1610-1628.5 MHz band is already allocated to MSS.

For these reasons, the View A proponents drafted a minimalist proposal to capture IMO approval in the relevant sections of the RR. This minimalist approach is reflected in the attached View A proposal drafted by the proponent whose system the IMO is considering for GMDSS.

Counter-Proposal of Opponents

The View B proposal overcomplicates a straightforward matter. In many respects, even the “pared down” View B proposal appears to hijack the Agenda 1.8 agenda item for issues outside the scope of the agenda item itself.

First, the View B proposal would put new restraints on GMDSS traffic – which on the Iridium system is indistinguishable from other MSS traffic – to afford upper adjacent band operators (Inmarsat and Ligado) apparent new protection. This is bad precedent, and, moreover, any regulatory restrictions on secondary services is inherent in various provisions of the RR and it is unnecessary for repetition in an Article 5 footnote. If greater adjacent band protection is sought (unnecessary in Iridium’s view), it should be pursued elsewhere.

The limitation to individual licenses is counter to sound spectrum management principles. Generally, allocations and designations of applications within an allocation should be as broad and flexible as possible. Iridium’s initial proposal was to designate the entire band as available for GMDSS for MSS operators who pass IMO approval. However, due to concerns raised by the radio astronomy community and others, the proposal was pared back to the frequency range 1616-1626.5 MHz which aligns with the band referenced in Resolution **359 (WRC-15)**. Ultimately, as Iridium argues in IWG-1 deliberations, the proposal could evolve to accommodate developments in the ITU-R Working Parties addressing this matter, as well as the IMO.

Finally, as mentioned earlier, View B proponents appear to concede that No. 4.10 can be applied to GMDSS operations within the 1610-1626.5 MHz band. This is good because nowhere does the RR require a specific allocation status for a safety service. However, the above comment on frequency range

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applies here as well and the View A proponent advocates for applying No. 4.10 to GMDSS that may operate in the 1616-1626.5 MHz; not just to Iridium's FCC authorization.

Summary and Recommendation

Two proposals are presented to address Agenda Item 1.8 concerning incorporating an additional satellite system into the GMDSS.

The first and original proposal is a minimalist one that attempts to incorporate an upcoming IMO decision on approving the Iridium satellite system to participate in the GMDSS. The proposal is minimalist because the approval to carry GMDSS traffic will not change the technical and operational characteristics of the Iridium system, nor will it change the relative regulatory status of other systems within the band, not in the upper and lower adjacent bands.

The second proposal, by competitors and opponents, is one that attempts to use Agenda Item 1.8 to capture in the RR new restrictions on Iridium operations, and also to limit flexibility in providing GMDSS – a critical safety of life at sea service.

The purpose of this draft United States Proposal is to begin to socialize the issue within CITEL PCC.II so that our regional WRC partners can assist in developing a regional position based on evolving events in the ITU-R Working Parties and in the IMO. Many of the CITEL countries have maritime interests and are awaiting developments on this Agenda Item 1.8 matter.

The proponent's intention is to capture such developments in subsequent evolutions of this proposal. At this juncture, there is no need to overly restrict the proposal. Consequently, View A proponents recommend that the WAC adopt the View A proposal and reject the View B proposal.

ATTACHMENT TO VIEW A:

UNITED STATES OF AMERICA

DRAFT PROPOSAL FOR THE WORK OF THE CONFERENCE

Agenda Item 1.8: *to consider possible regulatory actions to support Global Maritime Distress and Safety Systems (GMDSS) modernization and to support the introduction of additional satellite systems into the GMDSS, in accordance with Resolution 359 (Rev. WRC-15)*

INTRODUCTION: WRC-15 adopted agenda item 1.8 for WRC-19, which considers possible regulatory actions to support Global Maritime Distress and Safety Systems (GMDSS) modernization and to support the introduction of additional satellite systems into the GMDSS in accordance with Resolution 359 (Rev. WRC-15). This document proposes changes to the Radio Regulations to support the introduction of additional satellite systems into the GMDSS.

BACKGROUND: To date, only one mobile satellite system has been recognized by the International Maritime Organization (IMO) for use in the GMDSS “system of systems”. Advances in communications technology, the maturity of commercial satellite operations have introduced competition into the satellite sector, and the deployment of non-geostationary satellite constellations have led the IMO to identify recognition of additional satellite systems to the GMDSS as an urgent work item. Consequently, the IMO is considering incorporation of additional satellite systems into the GMDSS. Recognizing the need for additional satellite resources capable of providing increased coverage and competition for provision of maritime services, the IMO has taken action to facilitate the introduction of an additional satellite system into the GMDSS.

IMO’s Maritime Safety Committee (MSC) has considered the notification by the United States of America of the application of the Hibleo-2 mobile-satellite system for recognition and use in the GMDSS. Noting no objections in principle, the MSC referred the matter to IMO’s Sub-Committee on Navigation, Communications and Search and Rescue (NCSR) for evaluation.³ Recognizing general support of the application among administrations, the NCSR suggested to MSC options for undertaking a detailed technical and operational assessment of the Hibleo-2 application⁴. MSC subsequently directed that the International Mobile Satellite Organization (IMSO) should undertake the assessment of the Hibleo-2 mobile satellite system and provide a report for consideration by the NCSR Sub Committee.⁵

IMSO has completed its report to the NCSR which, in turn, determined that the Hibleo-2 mobile satellite system could be incorporated into the GMDSS subject to compliance with a list of conditions. The NCSR invited the MSC to endorse this view, with the understanding that it, based on evaluation reports from IMSO, would advise the Committee on final recognition.⁶ The MSC subsequently endorsed the list of conditions to be complied with by the Hibleo-2 mobile satellite system.⁷ That action concluded a first stage review of the United States’ GMDSS application, with a statement that approval (“recognition”) of the introduction of the Hibleo-2 mobile satellite system into the GMDSS can be made when the MSC-endorsed list of conditions are satisfied.

³ MSC 92-26, “Report of the Maritime Safety Committee at its Ninety-second Session”, 30 June 2015, p 41-42.

⁴ MSC 94-9-2, “Note by the Secretariat: Evaluation of the Iridium Mobile Satellite System”, 3 September 2014.

⁵ MSC 94-21, “Report of the MSC on its Ninety Fourth Session”, 26 November 2014, p 36-37.

⁶ NCSR 3-29, “Report to the Maritime Safety Committee”, 22 March 2016, p 19-22.

⁷ MSC 96-25, “Report of the Maritime Safety Committee at its 96th Session”, 31 May 2016, p 61.

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The IMO has also concluded an equipment performance standard applicable to new mobile satellite GMDSS services (resolution MSC 434(98) on *Performance standards for a ship earth station for use in the GMDSS*) and has agreed an amendment to its Safety of Life at Sea (SOLAS) Convention enabling new providers of mobile satellite GMDSS services.⁸ A final stage of evaluation is planned and IMSO's findings will be reported to NCSR accordingly. It is expected that NCSR will recommend approval (recognition) of the system in 2018.⁹

The IMO actions described above are intended to facilitate the timely introduction of an additional MSS system into the GMDSS. This proposal will modify the Radio Regulations to recognize the availability of the band 1 616-1 626.5 MHz for providing GMDSS by mobile satellite systems.

⁸ MSC 98-23, "Report of the Maritime Safety Committee on its Ninety-Eighth Session", 28 June 2017.

⁹ Specifically, by February 2018 we anticipate that the Navigation, Communications Search and Rescue (NCSR) will conduct a second stage evaluation of the HIBLEO-2 application to assess compliance with remaining IMO requirements. If the NCSR determines all requirements have been met, we anticipate that the NCSR will inform the Maritime Safety Committee (MSC) of successful completion and, by May 2018, we anticipate that MSC will issue a resolution recognizing the HIBLEO-2 system a GMDSS service provider.

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Proposal:

MOD USA/1.8/1

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations

1 610-1 660 MHz

Allocation to services		
Region 1	Region 2	Region 3
1 610-1 610.6 MOBILE-SATELLITE (Earth-to-space) 5.351A AERONAUTICAL RADIONAVIGATION 5.341 5.355 5.359 5.364 5.366 5.367 MOD 5.368 5.369 5.371 5.372	1 610-1 610.6 MOBILE-SATELLITE (Earth-to-space) 5.351A AERONAUTICAL RADIONAVIGATION RADIODETERMINATION- SATELLITE (Earth-to-space) 5.341 5.364 5.366 5.367 MOD 5.368 5.370 5.372	1 610-1 610.6 MOBILE-SATELLITE (Earth-to-space) 5.351A AERONAUTICAL RADIONAVIGATION Radiodetermination-satellite (Earth-to-space) 5.341 5.355 5.359 5.364 5.366 5.367 MOD 5.368 5.369 5.372
1 610.6-1 613.8 MOBILE-SATELLITE (Earth-to-space) 5.351A RADIO ASTRONOMY AERONAUTICAL RADIONAVIGATION 5.149 5.341 5.355 5.359 5.364 5.366 5.367 MOD 5.368 5.369 5.371 5.372	1 610.6-1 613.8 MOBILE-SATELLITE (Earth-to-space) 5.351A RADIO ASTRONOMY AERONAUTICAL RADIONAVIGATION RADIODETERMINATION- SATELLITE (Earth-to-space) 5.149 5.341 5.364 5.366 5.367 MOD 5.368 5.370 5.372	1 610.6-1 613.8 MOBILE-SATELLITE (Earth-to-space) 5.351A RADIO ASTRONOMY AERONAUTICAL RADIONAVIGATION Radiodetermination-satellite (Earth-to-space) 5.149 5.341 5.355 5.359 5.364 5.366 5.367 MOD 5.368 5.369 5.372

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1 613.8-1 626.5 MOBILE-SATELLITE (Earth-to-space) 5.351A <u>ADD 5.GMDSS</u> AERONAUTICAL RADIONAVIGATION Mobile-satellite (space-to-Earth) <u>ADD 5.GMDSS</u> 5.208B 5.341 5.355 5.359 5.364 5.365 5.366 5.367 <u>MOD</u> 5.368 5.369 5.371 5.372	1 613.8-1 626.5 MOBILE-SATELLITE (Earth-to-space) 5.351A <u>ADD</u> <u>5.GMDSS</u> AERONAUTICAL RADIONAVIGATION RADIODETERMINATION- SATELLITE (Earth-to-space) Mobile-satellite (space-to-Earth) <u>ADD 5.GMDSS</u> 5.208B 5.341 5.364 5.365 5.366 5.367 <u>MOD</u> 5.368 5.370 5.372	1 613.8-1 626.5 MOBILE-SATELLITE (Earth-to-space) 5.351A <u>ADD 5.GMDSS</u> AERONAUTICAL RADIONAVIGATION Mobile-satellite (space-to-Earth) <u>ADD 5.GMDSS</u> 5.208B Radiodetermination-satellite (Earth-to-space) 5.341 5.355 5.359 5.364 5.365 5.366 5.367 <u>MOD</u> 5.368 5.369 5.372
1 626.5-1 660 MOBILE-SATELLITE (Earth-to-space) 5.351A 5.341 5.351 5.353A 5.354 5.355 5.357A 5.359 5.362A 5.374 5.375 5.376		

Reason: To reference new No. 5.GMDSS identifying the 1618.725-1626.5 MHz band to support the introduction of an additional satellite system into the GMDSS in accordance with Resolution **359 (Rev.WRC-15)**.

ADD USA/1.8/2

5.GMDSS The band 1616-1626.5 MHz may also be used for the provision of distress, urgency, and safety communications of the Global Maritime Distress and Safety System (GMDSS). (See Table **15-2** of Appendix **15**, No. **33.50** and No. **33.53** of Article **33**).

Reason: To identify the band 1616-1626.5 MHz as being available for the provision of GMDSS by mobile-satellite service systems.

MOD USA/1.8/3

5.368 With respect to the radiodetermination-satellite service and the mobile-satellite services the provisions of No. **4.10** do not apply in the band 1 610-1626.5 MHz, with the exception of the aeronautical radionavigation-satellite service and aeronautical mobile-satellite (route) service in the band 1610-1626.5 MHz, and the Global Maritime Distress and Safety System in the band 1616-1626.5 MHz.

Reason: To recognize that in the band 1616-1626.5 MHz the mobile-satellite service is used for the provision of aeronautical and maritime safety services. Consequently, No. 4.10 applies.

MOD USA/1.8/4

APPENDIX 15 (REV.WRC-19)

**Frequencies for distress and safety communications for the Global
Maritime Distress and Safety System (GMDSS)**

TABLE 15-2 (WRC-15)
Frequencies above 30 MHz (VHF/UHF)

Frequency (MHz)	Description of usage	Notes
*121.5	AERO-SAR	The aeronautical emergency frequency 121.5 MHz is used for the purposes of distress and urgency for radiotelephony by stations of the aeronautical mobile service using frequencies in the frequency band between 117.975 MHz and 137 MHz. This frequency may also be used for these purposes by survival craft stations. Use of the frequency 121.5 MHz by emergency position-indicating radio beacons shall be in accordance with Recommendation ITU-R M.690-3. Mobile stations of the maritime mobile service may communicate with stations of the aeronautical mobile service on the aeronautical emergency frequency 121.5 MHz for the purposes of distress and urgency only, and on the aeronautical auxiliary frequency 123.1 MHz for coordinated search and rescue operations, using class A3E emissions for both frequencies (see also Nos. 5.111 and 5.200). They shall then comply with any special arrangement between governments concerned by which the aeronautical mobile service is regulated.
123.1	AERO-SAR	The aeronautical auxiliary frequency 123.1 MHz, which is auxiliary to the aeronautical emergency frequency 121.5 MHz, is for use by stations of the aeronautical mobile service and by other mobile and land stations engaged in coordinated search and rescue operations (see also No. 5.200). Mobile stations of the maritime mobile service may communicate with stations of the aeronautical mobile service on the aeronautical emergency frequency 121.5 MHz for the purposes of distress and urgency only, and on the aeronautical auxiliary frequency 123.1 MHz for coordinated search and rescue operations, using class A3E emissions for both frequencies (see also Nos. 5.111 and 5.200). They shall then comply with any special arrangement between governments concerned by which the aeronautical mobile service is regulated.
156.3	VHF-CH06	The frequency 156.3 MHz may be used for communication between ship stations and aircraft stations engaged in coordinated search and rescue operations. It may also be used by aircraft stations to communicate with ship stations for other safety purposes (see also Note f) in Appendix 18).
*156.525	VHF-CH70	The frequency 156.525 MHz is used in the maritime mobile service for distress and safety calls using digital selective calling (see also Nos. 4.9 , 5.227 , 30.2 and 30.3).
156.650	VHF-CH13	The frequency 156.650 MHz is used for ship-to-ship communications relating to the safety of navigation in accordance with Note k) in Appendix 18.
*156.8	VHF-CH16	The frequency 156.8 MHz is used for distress and safety communications by radiotelephony. Additionally, the frequency 156.8 MHz may be used by aircraft stations for safety purposes only.
*161.975	AIS-SART VHF CH AIS 1	AIS 1 is used for AIS search and rescue transmitters (AIS-SART) for use in search and rescue operations.

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*162.025	AIS-SART VHF CH AIS 2	AIS 2 is used for AIS search and rescue transmitters (AIS-SART) for use in search and rescue operations.
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TABLE 15-2 (end) (WRC-15)

Frequency (MHz)	Description of usage	Notes
*406-406.1	406-EPIRB	This frequency band is used exclusively by satellite emergency position-indicating radio beacons in the Earth-to-space direction (see No. 5.266).
1 530-1 544	SAT-COM	In addition to its availability for routine non-safety purposes, the band 1 530-1 544 MHz is used for distress and safety purposes in the space-to-Earth direction in the maritime mobile-satellite service. GMDSS distress, urgency and safety communications have priority in this band (see No. 5.353A).
*1 544-1 545	D&S-OPS	Use of the band 1 544-1 545 MHz (space-to-Earth) is limited to distress and safety operations (see No. 5.356), including feeder links of satellites needed to relay the emissions of satellite emergency position-indicating radio beacons to earth stations and narrow-band (space-to-Earth) links from space stations to mobile stations.
<u>1616-1626.5</u>	<u>SAT-COM</u>	<u>In addition to its availability for routine non-safety purposes, the band 1 616-1 626.5 MHz is used for distress and safety purposes in the Earth-to-space and space-to-Earth directions in the maritime mobile-satellite service. GMDSS distress, urgency and safety communications have priority over non-safety communications within a satellite system (see No. 5.GMDSS).</u>
*1 645.5-1 646.5	D&S-OPS	Use of the band 1 645.5-1 646.5 MHz (Earth-to-space) is limited to distress and safety operations (see No. 5.375).
9 200-9 500	SARTS	This frequency band is used by radar transponders to facilitate search and rescue.

Legend:

AERO-SAR These aeronautical carrier (reference) frequencies may be used for distress and safety purposes by mobile stations engaged in coordinated search and rescue operations.

D&S-OPS The use of these bands is limited to distress and safety operations of satellite emergency position-indicating radio beacons (EPIRBs).

SAT-COM These frequency bands are available for distress and safety purposes in the maritime mobile-satellite service (see Notes).

VHF-CH# These VHF frequencies are used for distress and safety purposes. The channel number (CH#) refers to the VHF channel as listed in Appendix 18, which should also be consulted.

AIS These frequencies are used by automatic identification systems (AIS), which should operate in accordance with the most recent version of Recommendation ITU-R.M.1371. (WRC-07)

* Except as provided in these Regulations, any emission capable of causing harmful interference to distress, alarm, urgency or safety communications on the frequencies denoted by an asterisk (*) is prohibited. Any emission causing harmful interference to distress and safety communications on any of the discrete frequencies identified in this Appendix is prohibited. (WRC-07)

Reason: To add the band 1618.725-1626.5 MHz as being available for distress and safety communications for the Global Maritime Distress and Safety System (GMDSS).

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MOD USA/1.8/5

33.50 § 26 Maritime safety information may be transmitted via satellite in the maritime mobile-satellite service using the bands 1 530-1 545 MHz and 1 616-1 626.5 MHz. (see Appendix **15**).

Reason: To include the 1616-1626.5 MHz band as being available for transmitting maritime safety information via satellite.

MOD USA/1.8/6

33.53 § 28 Radiocommunications for safety purposes concerning ship reporting communications, communications relating to the navigation, movements and needs of ships and weather observation messages may be conducted on any appropriate communications frequency, including those used for public correspondence. In terrestrial systems, the bands 415-535 kHz (see Article **52**), 1 606.5-4 000 kHz (see Article **52**), 4 000-27 500 kHz (see Appendix **17**), and 156-174 MHz (see Appendix **18**) are used for this function. In the maritime mobile-satellite service, frequencies in the bands 1 530-1 544 MHz, 1616-1626.5 MHz, and 1 626.5-1 645.5 MHz are used for this function as well as for distress alerting purposes (see No. **32.2**). (WRC-07)

Reason: To apply No. 33.53 to the 1616-1626.5 MHz band for use by mobile-satellite service systems approved by the International Maritime Organization to participate in the Global Maritime Distress and Safety System.

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VIEW B

WAC/047 (30.10.17)
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VIEW B:

IWG-1 members, Ligado Networks, Inmarsat and Globalstar, setting forth this view support efforts to facilitate the modernization of GMDSS—including through the introduction of a new GMDSS system. However, these members also share concerns raised at WRC-15 about the potential impact of such a new GMDSS system, operating in portions of the 1 610-1626.5 MHz band, on current and future operations by adjacent spectrum users and those in the same 1 610-1626.5 MHz band.

As discussed below, the IWG-1 members supporting View B have concluded that certain changes in the ITU Radio Regulations (RRs) proposed under View A are inappropriate and premature as drafted, particularly in light of the current secondary allocation for MSS downlink use of the 1 613.8-1626.5 MHz band segment. Instead, these members propose alternative language that would provide a path for the use of portions of that band segment by GMDSS satellite systems while making it clear that such systems may not adversely affect, or claim to be adversely affected by, spectrum uses in adjacent bands.

Res. 359 Directs WRC-19 To Take Regulatory Actions with respect to GMDSS Modernization In a Manner that Is Compatible with Adjacent Spectrum Uses

Res. 359 (and, by extension, AI 1.8) recognizes that any introduction of new GMDSS systems must be compatible with adjacent spectrum uses. Thus, Res. 359 provides for the introduction of new GMDSS systems if—and only if—two conditions are satisfied:

1. GMDSS satellite systems must fully protect existing services. Res. 359 explicitly recognizes that “GMDSS satellite systems need to provide protection of incumbent services in accordance with the Radio Regulations, including those in adjacent frequency bands, from harmful interference.”
2. GMDSS satellite systems must be capable of operating within the known interference environment, without any need to claim special protection from existing systems. Res. 359 explicitly recognizes that “GMDSS communications systems . . . must be resilient to interference” and “should operate within the interference environment of existing systems.”

Both conditions are designed to ensure that potential regulatory action under AI 1.8 provides GMDSS-related benefits *without* adversely affecting adjacent spectrum uses.

Res. 359 Directs ITU-R to Complete Studies To Verify that these Conditions Are Satisfied

Res. 359 calls for the completion of studies to evaluate the potential impact of GMDSS-related regulatory actions on adjacent spectrum uses. Such studies are to be conducted under the auspices of ITU-R, and must evaluate “the potential impact of possible modifications to the provisions of the Radio Regulations on sharing and compatibility with other services and systems in the frequency band and adjacent frequency bands.”

Res. 359 further establishes that action under AI 1.8 should be guided by the results of these studies. The resolution directs WRC-19 to: (i) “consider the result of [those] studies and *take*

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necessary actions, as appropriate, to support GMDSS modernization” and (ii) “*consider regulatory provisions, if appropriate, based on the ITU-R studies . . .* while ensuring the protection of all incumbent services, including those in adjacent frequency bands, from harmful interference . . .” In short, Res. 359 treats the referenced studies as necessary inputs to any regulatory changes pursuant to AI 1.8.

Requisite studies have not been completed to evaluate the potential impact of GMDSS operations within that band on other services—which is particularly problematic given the evolving nature of systems and operations in that band and adjacent bands. While the proponents of View A assert that the ability to provide non-safety services within a portion of the 1 610-1626.5 MHz band today, including on a secondary basis, somehow ensures the compatibility of new GMDSS spectrum uses, this approach is inconsistent with the mandate of AI 1.8 and Res. 359.

The Known Interference Environment Includes the Existing Secondary Allocation for MSS Downlinks at 1 613.8-1626.5 MHz

Within the 1 610-1626.5 MHz band being considered for the introduction of a new GMDSS satellite system, the 1 613.8-1626.5 MHz segment is allocated for downlink operations (space-to-Earth) only on a secondary basis. The secondary nature of this allocation currently is not qualified in any manner, and does not include any references to the operation of GMDSS systems, their priority vis-à-vis other services or spectrum uses, or the application of No. 4.10 of the ITU RRs to any safety services or systems operated under this secondary allocation.

The Changes Proposed under View B Avoid Potentially Harmful Impacts on Adjacent Spectrum Users under View A

There are essentially five areas of disagreement between View A and View B:

1. Frequency Range for GMDSS
 - a. View A would amend the ITU RRs to permit GMDSS operations in the entire 1 616-1626.5 MHz band (through the addition of a new No. 5.GMDSS to the ITU RRs).
 - b. In contrast, View B would amend the ITU RRs to permit GMDSS operations in the 1 618.725-1 626.5 MHz band—the actual band segment that has been proposed for use by a new GMDSS satellite system (which is consistent with the existing AMS(R)S authorization granted by the Commission to Iridium).
2. Application of No. 4.10
 - a. View A would apply the provisions of No. 4.10 to GMDSS operations without qualification (through revisions to No. 5.368 of the ITU RRs). The absence of clarifying language, together with other changes proposed under this view, suggests that GMDSS would be entitled to certain protections vis-a-vis adjacent spectrum uses (including existing services).

Particularly in the absence of any studies establishing the compatibility of GMDSS in the band with other spectrum uses, this suggestion is inconsistent with the mandate set forth in AI 1.8 and Res. 359, as discussed above.

- b. In contrast, View B would make clear, through additional language in No. 5.368, that No. 4.10 would apply to the GMDSS only on an intra-system basis—*i.e.*, solely with respect to the prioritization of different spectrum uses by that GMDSS satellite system within that spectrum range (as opposed to on an inter-system basis). This is consistent with the proposed changes to Article 15 under View A.
- 3. Modifications to Article 15 of the ITU RRs
 - a. View A would modify Table 15-2 to provide that GMDSS communications have certain priority without specifying the services or spectrum uses with respect to which such priority would exist.
 - b. In contrast, View B would add language to the modified Table 15-2 consistent with the modifications to No. 5.368 described above.
- 4. Modifications to Address Aeronautical Mobile-Satellite (Route) Service (AMS(R)S)
 - a. View A would modify No. 5.368 to make No. 4.10 also apply to AMS(R)S provided at 1 610-1626.5 MHz, even though the FCC restricts AMS(R)S operation by Iridium to the 1 618.725-1626.5 MHz frequency band (see DA 16-875).
 - b. In contrast, View B would not address AMS(R)S in No. 5.368 because this is outside the scope of AI 1.8.
- 5. Addition of Footnote Speculating as to the Outcome of Related International Maritime Organization (IMO) Processes
 - a. View A would add a footnote 7 to the United States submission cover page discussing the expected outcome of various IMO-related processes.
 - b. In contrast, View B would delete this footnote because it is inappropriate to speculate as to the outcome of these processes.

Another potential change that was proposed in the IWG was the inclusion of language in proposed No. 5.GMDSS explicitly providing, in light of the absence of studies and the secondary downlink allocation for MSS at 1 613.8-1626.5 MHz, that GMDSS operations may not constrain the development and use of services in adjacent frequency bands—*e.g.*, “GMDSS operations in this frequency band shall not constrain the development and use of the services operating in the adjacent frequency bands.”

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During the IWG-1 process, certain stakeholders expressed concern about this language. Alternative language—*e.g.*, “A mobile earth station operating GMDSS services in this band shall be designed and installed as to tolerate the potential interference from MSS terminals operating in the adjacent bands. (WRC-19)” —was also proposed to address these concerns; however, no agreement was reached. While the parties supporting View B have sought to reach a compromise resolution by not including any modification to No. 5.GMDSS in the proposal, those parties agree that language proposed would clarify No. 5.GMDSS and address the compatibility of GMDSS operations with other services in adjacent bands.

The IWG-1 members supporting View B recognize the desire to facilitate the modernization of GMDSS—including through the introduction of a new GMDSS system. Pursuant to Res. 359, however, any such modernization must protect the operations in adjacent bands. The changes proposed in View B are a reasonable means of accomplishing both goals.

ATTACHMENT TO VIEW B:

UNITED STATES OF AMERICA

DRAFT PROPOSAL FOR THE WORK OF THE CONFERENCE

Agenda Item 1.8: *to consider possible regulatory actions to support Global Maritime Distress and Safety Systems (GMDSS) modernization and to support the introduction of additional satellite systems into the GMDSS, in accordance with Resolution 359 (Rev. WRC-15)*

INTRODUCTION: WRC-15 adopted agenda item 1.8 for WRC-19, which considers possible regulatory actions to support Global Maritime Distress and Safety Systems (GMDSS) modernization and to support the introduction of additional satellite systems into the GMDSS in accordance with Resolution 359 (Rev. WRC-15). This document proposes changes to the Radio Regulations to support the introduction of additional satellite systems into the GMDSS.

BACKGROUND: To date, only one mobile satellite system has been recognized by the International Maritime Organization (IMO) for use in the GMDSS “system of systems”. Advances in communications technology, the maturity of commercial satellite operations have introduced competition into the satellite sector, and the deployment of non-geostationary satellite constellations have led the IMO to identify recognition of additional satellite systems to the GMDSS as an urgent work item. Consequently, the IMO is considering incorporation of additional satellite systems into the GMDSS. Recognizing the need for additional satellite resources capable of providing increased coverage and competition for provision of maritime services, the IMO has taken action to facilitate the introduction of an additional satellite system into the GMDSS.

IMO’s Maritime Safety Committee (MSC) has considered the notification by the United States of America of the application of the Hibleo-2 mobile-satellite system for recognition and use in the GMDSS. Noting no objections in principle, the MSC referred the matter to IMO’s Sub-Committee on Navigation, Communications and Search and Rescue (NCSR) for evaluation.¹⁰ Recognizing general support of the application among administrations, the NCSR suggested to MSC options for undertaking a detailed technical and operational assessment of the Hibleo-2 application.¹¹ MSC subsequently directed that the International Mobile Satellite Organization (IMSO) should undertake the assessment of the Hibleo-2 mobile satellite system and provide a report for consideration by the NCSR Sub Committee.¹² IMSO has completed its report to the NCSR which, in turn, determined that the Hibleo-2 mobile satellite system could be incorporated into the GMDSS subject to compliance with a list of conditions. The NCSR invited the MSC to endorse this view, with the understanding that it, based on evaluation reports from IMSO, would advise the Committee on final recognition.¹³ The MSC subsequently endorsed the list of conditions to be complied with by the Hibleo-2 mobile satellite system.¹⁴ That action concluded a first stage review of the United States’ GMDSS application, with a statement that approval (“recognition”) of the introduction of the Hibleo-2 mobile satellite system into the GMDSS can be made when the MSC-endorsed list of conditions are satisfied.

¹⁰ MSC 92-26, “Report of the Maritime Safety Committee at its Ninety-second Session”, 30 June 2015, p 41-42.

¹¹ MSC 94-9-2, “Note by the Secretariat: Evaluation of the Iridium Mobile Satellite System”, 3 September 2014.

¹² MSC 94-21, “Report of the MSC on its Ninety Fourth Session”, 26 November 2014, p 36-37.

¹³ NCSR 3-29, “Report to the Maritime Safety Committee”, 22 March 2016, p 19-22.

¹⁴ MSC 96-25, “Report of the Maritime Safety Committee at its 96th Session”, 31 May 2016, p 61.

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The IMO has also concluded an equipment performance standard applicable to new mobile satellite GMDSS services (resolution MSC 434(98) on *Performance standards for a ship earth station for use in the GMDSS*) and has agreed an amendment to its Safety of Life at Sea (SOLAS) Convention enabling new providers of mobile satellite GMDSS services.¹⁵ A final stage of evaluation is planned and IMSO's findings will be reported to NCSR accordingly. It is expected that NCSR will recommend approval (recognition) of the system in 2018.

The IMO actions described above are intended to facilitate the timely introduction of an additional MSS system into the GMDSS. This proposal will modify the Radio Regulations to recognize the availability of the band 1 618.725-1626.5 MHz for providing GMDSS by mobile satellite systems.

¹⁵ MSC 98-23, "Report of the Maritime Safety Committee on its Ninety-Eighth Session", 28 June 2017.

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Proposal:

MOD USA/1.8/1

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations

1 610-1 660 MHz

Allocation to services		
Region 1	Region 2	Region 3
1 610-1 610.6 MOBILE-SATELLITE (Earth-to-space) 5.351A AERONAUTICAL RADIONAVIGATION 5.341 5.355 5.359 5.364 5.366 5.367 MOD 5.368 5.369 5.371 5.372	1 610-1 610.6 MOBILE-SATELLITE (Earth-to-space) 5.351A AERONAUTICAL RADIONAVIGATION RADIODETERMINATION- SATELLITE (Earth-to-space) 5.341 5.364 5.366 5.367 MOD 5.368 5.370 5.372	1 610-1 610.6 MOBILE-SATELLITE (Earth-to-space) 5.351A AERONAUTICAL RADIONAVIGATION Radiodetermination-satellite (Earth-to-space) 5.341 5.355 5.359 5.364 5.366 5.367 MOD 5.368 5.369 5.372
1 610.6-1 613.8 MOBILE-SATELLITE (Earth-to-space) 5.351A RADIO ASTRONOMY AERONAUTICAL RADIONAVIGATION 5.149 5.341 5.355 5.359 5.364 5.366 5.367 MOD 5.368 5.369 5.371 5.372	1 610.6-1 613.8 MOBILE-SATELLITE (Earth-to-space) 5.351A RADIO ASTRONOMY AERONAUTICAL RADIONAVIGATION RADIODETERMINATION- SATELLITE (Earth-to-space) 5.149 5.341 5.364 5.366 5.367 MOD 5.368 5.370 5.372	1 610.6-1 613.8 MOBILE-SATELLITE (Earth-to-space) 5.351A RADIO ASTRONOMY AERONAUTICAL RADIONAVIGATION Radiodetermination-satellite (Earth-to-space) 5.149 5.341 5.355 5.359 5.364 5.366 5.367 MOD 5.368 5.369 5.372

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1 613.8-1 626.5 MOBILE-SATELLITE (Earth-to-space) 5.351A <u>ADD 5.GMDSS</u> AERONAUTICAL RADIONAVIGATION Mobile-satellite (space-to-Earth) <u>ADD 5.GMDSS</u> 5.208B 5.341 5.355 5.359 5.364 5.365 5.366 5.367 <u>MOD</u> 5.368 5.369 5.371 5.372	1 613.8-1 626.5 MOBILE-SATELLITE (Earth-to-space) 5.351A <u>ADD</u> <u>5.GMDSS</u> AERONAUTICAL RADIONAVIGATION RADIODETERMINATION- SATELLITE (Earth-to-space) Mobile-satellite (space-to-Earth) <u>ADD 5.GMDSS</u> 5.208B 5.341 5.364 5.365 5.366 5.367 <u>MOD</u> 5.368 5.370 5.372	1 613.8-1 626.5 MOBILE-SATELLITE (Earth-to-space) 5.351A <u>ADD 5.GMDSS</u> AERONAUTICAL RADIONAVIGATION Mobile-satellite (space-to-Earth) <u>ADD 5.GMDSS</u> 5.208B Radiodetermination-satellite (Earth-to-space) 5.341 5.355 5.359 5.364 5.365 5.366 5.367 <u>MOD</u> 5.368 5.369 5.372
1 626.5-1 660 MOBILE-SATELLITE (Earth-to-space) 5.351A 5.341 5.351 5.353A 5.354 5.355 5.357A 5.359 5.362A 5.374 5.375 5.376		

Reason: To reference new No. 5.GMDSS identifying the 1618.725-1626.5 MHz band to support the introduction of an additional satellite system into the GMDSS in accordance with Resolution **359 (Rev.WRC-15)**.

ADD USA/1.8/2

5.GMDSS The band 1 618.725-1626.5 MHz may also be used for the provision of distress, urgency, and safety communications of the Global Maritime Distress and Safety System (GMDSS). (See Table 15-2 of Appendix 15, No. 33.50 and No. 33.53 of Article 33).

Reason: To identify the band 1618.725-1626.5 MHz as being available for the provision of GMDSS by mobile-satellite service systems.

MOD USA/1.8/3

5.368 With respect to the radiodetermination-satellite service and the mobile-satellite services the provisions of No. **4.10** do not apply in the band 1610-1626.5 MHz, with the exception of the aeronautical radionavigation-satellite service in that band, and with the exception of the Global Maritime Distress and Safety System in the band 1 618.725-1626.5 MHz to which No. 4.10 applies only with respect to the assignment to, and use of frequencies on, the satellite system operating in the relevant portion of the band 1 618.725-1626.5 MHz band and comprising such GMDSS system.

Reason: To recognize that in the band 1618.725-1626.5 MHz the mobile-satellite service is used for the provision of maritime safety services, and that the application of No. **4.10** to maritime safety services

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or systems in this frequency band shall not be used to constrain services operating in adjacent frequency bands over other systems.

MOD USA/1.8/4

APPENDIX 15 (REV.WRC-19)

Frequencies for distress and safety communications for the Global Maritime Distress and Safety System (GMDSS)

TABLE 15-2 (WRC-15)
Frequencies above 30 MHz (VHF/UHF)

Frequency (MHz)	Description of usage	Notes
*121.5	AERO-SAR	The aeronautical emergency frequency 121.5 MHz is used for the purposes of distress and urgency for radiotelephony by stations of the aeronautical mobile service using frequencies in the frequency band between 117.975 MHz and 137 MHz. This frequency may also be used for these purposes by survival craft stations. Use of the frequency 121.5 MHz by emergency position-indicating radio beacons shall be in accordance with Recommendation ITU-R M.690-3. Mobile stations of the maritime mobile service may communicate with stations of the aeronautical mobile service on the aeronautical emergency frequency 121.5 MHz for the purposes of distress and urgency only, and on the aeronautical auxiliary frequency 123.1 MHz for coordinated search and rescue operations, using class A3E emissions for both frequencies (see also Nos. 5.111 and 5.200). They shall then comply with any special arrangement between governments concerned by which the aeronautical mobile service is regulated.
123.1	AERO-SAR	The aeronautical auxiliary frequency 123.1 MHz, which is auxiliary to the aeronautical emergency frequency 121.5 MHz, is for use by stations of the aeronautical mobile service and by other mobile and land stations engaged in coordinated search and rescue operations (see also No. 5.200). Mobile stations of the maritime mobile service may communicate with stations of the aeronautical mobile service on the aeronautical emergency frequency 121.5 MHz for the purposes of distress and urgency only, and on the aeronautical auxiliary frequency 123.1 MHz for coordinated search and rescue operations, using class A3E emissions for both frequencies (see also Nos. 5.111 and 5.200). They shall then comply with any special arrangement between governments concerned by which the aeronautical mobile service is regulated.
156.3	VHF-CH06	The frequency 156.3 MHz may be used for communication between ship stations and aircraft stations engaged in coordinated search and rescue operations. It may also be used by aircraft stations to communicate with ship stations for other safety purposes (see also Note <i>f</i>) in Appendix 18).
*156.525	VHF-CH70	The frequency 156.525 MHz is used in the maritime mobile service for distress and safety calls using digital selective calling (see also Nos. 4.9 , 5.227 , 30.2 and 30.3).
156.650	VHF-CH13	The frequency 156.650 MHz is used for ship-to-ship communications relating to the safety of navigation in accordance with Note <i>k</i>) in Appendix 18.

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*156.8	VHF-CH16	The frequency 156.8 MHz is used for distress and safety communications by radiotelephony. Additionally, the frequency 156.8 MHz may be used by aircraft stations for safety purposes only.
*161.975	AIS-SART VHF CH AIS 1	AIS 1 is used for AIS search and rescue transmitters (AIS-SART) for use in search and rescue operations.
*162.025	AIS-SART VHF CH AIS 2	AIS 2 is used for AIS search and rescue transmitters (AIS-SART) for use in search and rescue operations.

TABLE 15-2 (end) (WRC-15)

Frequency (MHz)	Description of usage	Notes
*406-406.1	406-EPIRB	This frequency band is used exclusively by satellite emergency position-indicating radio beacons in the Earth-to-space direction (see No. 5.266).
1 530-1 544	SAT-COM	In addition to its availability for routine non-safety purposes, the band 1 530-1 544 MHz is used for distress and safety purposes in the space-to-Earth direction in the maritime mobile-satellite service. GMDSS distress, urgency and safety communications have priority in this band (see No. 5.353A).
*1 544-1 545	D&S-OPS	Use of the band 1 544-1 545 MHz (space-to-Earth) is limited to distress and safety operations (see No. 5.356), including feeder links of satellites needed to relay the emissions of satellite emergency position-indicating radio beacons to earth stations and narrow-band (space-to-Earth) links from space stations to mobile stations.
<u>1 618.725-1626.5</u>	<u>SAT-COM</u>	<u>In addition to its availability for routine non-safety purposes, the band 1618.725-1626.5 MHz is used for distress and safety purposes in the Earth-to-space and space-to-Earth directions in the maritime mobile-satellite service. GMDSS distress, urgency and safety communications have priority over non-safety communications within the satellite system providing such GMDSS communications (see No. 5.GMDSS).</u>
*1 645.5-1 646.5	D&S-OPS	Use of the band 1 645.5-1 646.5 MHz (Earth-to-space) is limited to distress and safety operations (see No. 5.375).
9 200-9 500	SARTS	This frequency band is used by radar transponders to facilitate search and rescue.

Legend:

AERO-SAR These aeronautical carrier (reference) frequencies may be used for distress and safety purposes by mobile stations engaged in coordinated search and rescue operations.

D&S-OPS The use of these bands is limited to distress and safety operations of satellite emergency position-indicating radio beacons (EPIRBs).

SAT-COM These frequency bands are available for distress and safety purposes in the maritime mobile-satellite service (see Notes).

VHF-CH# These VHF frequencies are used for distress and safety purposes. The channel number (CH#) refers to the VHF channel as listed in Appendix 18, which should also be consulted.

AIS These frequencies are used by automatic identification systems (AIS), which should operate in accordance with the most recent version of Recommendation ITU-R M.1371. (WRC-07)

* Except as provided in these Regulations, any emission capable of causing harmful interference to distress, alarm,

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urgency or safety communications on the frequencies denoted by an asterisk (*) is prohibited. Any emission causing harmful interference to distress and safety communications on any of the discrete frequencies identified in this Appendix is prohibited. (WRC-07)

Reason: To add the band 1618.725-1626.5 MHz as being available for distress and safety communications for the Global Maritime Distress and Safety System (GMDSS).

MOD USA/1.8/5

33.50 § 26 Maritime safety information may be transmitted via satellite in the maritime mobile-satellite service using the band 1 530-1 545 MHz and 1618.725-1626.5 MHz. (see Appendix 15).

Reason: To include the 1618.725-1626.5 MHz band as being available for transmitting maritime safety information via satellite.

MOD USA/1.8/6

33.53 § 28 Radiocommunications for safety purposes concerning ship reporting communications, communications relating to the navigation, movements and needs of ships and weather observation messages may be conducted on any appropriate communications frequency, including those used for public correspondence. In terrestrial systems, the bands 415-535 kHz (see Article 52), 1 606.5-4 000 kHz (see Article 52), 4 000-27 500 kHz (see Appendix 17), and 156-174 MHz (see Appendix 18) are used for this function. In the maritime mobile-satellite service, frequencies in the bands 1 530-1 544 MHz, 1618.725-1626.5 MHz, and 1626.5-1 645.5 MHz are used for this function as well as for distress alerting purposes (see No. 32.2). (WRC-07)

Reason: To apply No. 33.53 to the 1 618.725-1626.5 MHz band for use by mobile-satellite service systems approved by the International Maritime Organization to participate in the Global Maritime Distress and Safety System.

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Terrestrial Services

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Document WAC/040 (30.10.17)

UNITED STATES OF AMERICA
DRAFT PRELIMINARY VIEWS FOR WRC-19

Agenda Item 9.1/Issue 9.1.1: *to study possible technical and operational measures to ensure coexistence and compatibility between the terrestrial component of IMT (in the mobile service) and the satellite component of IMT (in the mobile service and the mobile-satellite service) in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz where those frequency bands are shared by mobile service and the mobile-satellite service in different countries, in particular for the deployment of independent satellite and terrestrial components of IMT and to facilitate development of both the satellite and terrestrial components of IMT*

BACKGROUND: The frequency ranges 1 885-2 025 and 2 110-2 200 MHz have been identified for International Mobile Telecommunications (IMT). Within these broader frequency ranges, the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz are allocated to the fixed, mobile, and mobile-satellite services on a co-primary basis. Both the satellite and terrestrial components of IMT have already been deployed or are being considered for further deployment within the 1 980-2 010 MHz and 2 170-2 200 MHz frequency bands as noted in Resolution **212 (WRC-15)**.

Prior ITU-R studies have focused on co-existence and compatibility of terrestrial and satellite components of IMT within the same geographic area. Issue 9.1.1 is focused on studying the co-existence and compatibility when the two are deploying in adjacent countries.

U.S. VIEW: Support studies of technical and operational measures under agenda item 9.1/issue 9.1.1 in accordance with Resolution **212 (Rev. WRC-15)**, with the objective of ensuring compatible operations of both the terrestrial component of IMT in the mobile service and the satellite component of IMT in the mobile-satellite service in neighboring countries, without undue constraints on either service, in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz.

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UNITED STATES OF AMERICA
DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 9.1/Issue 9.1.2: *to conduct, in time for WRC-19, the appropriate regulatory and technical studies, with a view to ensuring the compatibility of IMT and BSS (sound) in the frequency band 1 452-1 492 MHz in Regions 1 and 3, taking into account IMT and BSS (sound) operational requirements*

Background Information: At WRC-15, it was decided to identify the frequency band 1452-1492 MHz for International Mobile Telecommunications (IMT) in more than 50 countries in Region 1 via No. **5.346** and in Region 3 via No. **5.346A**. In Region 2, the identification for IMT for the 1452-1492 MHz frequency band is provided via No. **5.341B**.

In addition to the primary mobile service allocation in the 1452-1492 MHz frequency band, the band is allocated to the fixed, broadcasting, and broadcasting-satellite services (BSS) in all three Regions on a primary basis. In accordance with No. 5.345 use of the frequency band 1 452-1 492 MHz by the broadcasting-satellite service, and by the broadcasting service, is limited to digital audio broadcasting and is subject to the provisions of Resolution **528 (WARC-92)**, subsequently revised by WRC-03 and WRC-15. The sharing conditions between BSS (sound) and the mobile service are currently governed by No. **9.11**. However, currently there is no power flux-density (pfd) limit for the frequency band 1 452-1 492 MHz in Article 21 to protect the mobile service (service area protection).

WRC-15 could not come to agreement on the results of technical and regulatory studies carried out on sharing of the frequency band 1 452-1 492 MHz by IMT and BSS for Regions 1 and 3 and for this reason WRC-19 Issue 9.1.2, pursuant to Resolution **761 (WRC-15)**, was agreed. This resolution specifically calls for regulatory and technical studies with a view to ensuring the compatibility of IMT and BSS (sound) in the frequency band 1 452-1 492 MHz in Regions 1 and 3 taking into account only IMT and BSS (sound) operational requirements. Further, Resolution **761 (WRC-15)** invites ITU Member States in Region 1, to use guidance from the ITU-R studies to determine the need for bilateral coordination between IMT systems and BSS earth stations until WRC-19 defines regulatory and technical conditions for this bilateral coordination and Member States in Region 3, to use guidance from ITU-R studies to determine the need for bilateral coordination to protect BSS earth stations until WRC-19 defines regulatory and technical conditions for this bilateral coordination. With regard to Region 2, the interests of countries in the Region in the band 1452-1492 MHz by the mobile service extend beyond IMT applications (e.g. see No. **5.343**). Also, most of the countries in the Region enjoy long and successful multilateral and bilateral frequency coordination arrangements with their neighbors without the need for specific guidance from the ITU on the conduct of such arrangements.

Proposal:

NOC USA/9.1.2/1

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ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations

1 300-1 525 MHz

Allocation to services		
	Region 2	
	1 452-1 492 FIXED MOBILE 5.341B 5.343 5.346A BROADCASTING BROADCASTING-SATELLITE 5.208B 5.341 5.344 5.345	

Reasons: WRC-19 issue 9.1.2 is limited to technical and regulatory studies of the mobile (IMT) and broadcasting satellite (sound) services in the band 1452-1492 MHz in Regions 1 and 3 only. Therefore, there is no basis for any changes to the Radio Regulations that would impact the services in the frequency band 1452-1492 MHz in Region 2 under this issue. Therefore, NOC is proposed with respect to any change to Article 5 that could impact Region 2 services in the frequency band 1452-1492 MHz. This proposal does not address Regions 1 and 3, so those columns of the Table of Frequency Allocations in Article 5, are thus not reproduced above.

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WRC-19 Agenda Item 9.1/Issue 9.1.5

IWG-2 members were not able to reach consensus on a proposal for WRC-19 Agenda Item 9.1/Issue 9.1.5 regarding the technical and regulatory impacts of referencing Recommendations ITU-R M.1638-1 and ITU-R M.1849-1 in Nos. **5.447F** and **5.450A** of the Radio Regulations, and, therefore, forwards two views on how the FCC should handle this matter.

View A is supported by: Cisco Systems, Inc., Facebook, Inc., Harris, Wiltshire & Grannis, LLP, Hewlett Packard Enterprise Company, Intel Corporation, Microsoft Corporation, NCTA – The Internet & Television Association, Samsung Electronics America and Wi-Fi Alliance.

View B is supported by: Aerospace Industries Association, Aviation Spectrum Resources, Inc., Lockheed Martin Corp., New Wave Spectrum Partners LLC, The Boeing Company, and Ygomi LLC.

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VIEW A

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View A:

Supported by Cisco Systems, Inc., Facebook Inc., Harris, Wiltshire & Grannis, LLP, Hewlett Packard Enterprise Company, Intel Corporation, Microsoft Corporation, NCTA - The Internet & Television Association, Samsung Electronics America and Wi-Fi Alliance.

Referencing Recommendations ITU R M.1638-1 and ITU R M.1849-1 in Nos. **5.447F** and **5.450A** of the Radio Regulations would result in detrimental impact on existing and future Radio Local Area Networks (RLANs) operations in the 5250-5350 MHz and 5470-5725 MHz frequency bands. For that reason, “No Change” is proposed to Nos. **5.447F** and **5.450A** under WRC-19 Agenda Item 9.1/Issue 9.1.5.

RLANs have become an integral infrastructure component for delivering wireless connectivity to consumers, institutions, and enterprises in the United States and worldwide. The regulations for operation of RLANs were adopted in the U.S. in 1997 and revised as recently as 2014.¹⁶ The **5.447F** and **5.450A** provisions and applicable FCC rules are fully compatible. Billions of RLAN devices have been deployed in the U.S. and worldwide in the subject frequency ranges in conformance with these regulations. Billions more of RLAN devices will be deployed in the next decade.¹⁷

The 5 GHz band is the only mid-band alternative available for implementation of current and next-generation RLAN devices that enable broadband connectivity. Industry standard such as IEEE 802.11ac, can support higher speeds with a theoretical maximum speed of 3.5 Gbps and actual throughputs for end users of greater than 2 Gbps utilizing four antennas. In the future, IEEE 802.11ax will deliver even more data throughput capabilities to 5 GHz RLAN devices. To support higher data rates, both standards (802.11ac/802.11ax) depend on implementation of wider, 160 MHz channels. The only spectrum available for 802.11ac/802.11ax worldwide implementation of 160 MHz channels overlaps the 5250-5350 MHz and 5470-5725 MHz frequency ranges. Access to this spectrum and stable regulatory environment, therefore, are imperative to the future of Wi-Fi industry.

Over past several years, the U.S., CEPT and ITU carried out a significant amount of work to study coexistence between RLANs and new radar systems (i.e., radar systems referenced in recommendations ITU R M.1638-1 and ITU R M.1849-1 but not in Recommendation ITU-R M.1638-0). These studies concluded that there is no viable regulatory solution that RLAN devices can implement to comply with the requirement to protect these new radar systems.¹⁸

¹⁶ See Amendment of the Commission’s Rules to Provide for Operation of Unlicensed NII Devices in the 5 GHz Frequency Range, *Report and Order*, ET Docket No. 96-102, 12 FCC Rcd 1576 (1997). (*U-NII Report and Order*). See 47 C.F.R. Part 15 Subpart E and ET Docket No. 13-49.

¹⁷ According to [Cisco VNI](https://www.abiresearch.com/press/abi-research-anticipates-more-20-billion-cumulativ/), by the year 2020, up to 3 billion RLAN (Wi-F) devices will be shipped per year with almost all devices equipped with 802.11ac (i.e., functionality dependent on access to 5 GHz band). See also: <https://www.abiresearch.com/press/abi-research-anticipates-more-20-billion-cumulativ/>

¹⁸ See for example: Lawrence E. Strickling, Assistant Secretary of Commerce for Communications and Infrastructure, Remarks on the 5G Wireless Future and the Role of the Federal Government at the Hudson Institute (Dec.) <https://www.ntia.doc.gov/speechtestimony/2016/remarks-assistant-secretary-strickling-5g-wireless-future-and-rolefederal>. See also CEPT Report 57 and Report 64. See also ITU-R Doc. 5a/298, Annex 24 and Annex 27; also see Report of CPM to WRC-15, section 1/1.1/4.1.11.2

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Imposing regulatory requirement on the RLAN systems in the absence of a viable regulatory solutions would result in highly unstable and precarious regulatory environment for the existing and future RLAN deployments and, thereby, impede technological innovation, investment and the U.S. leadership in delivering broadband wireless connectivity solutions.

For these reasons, the organizations and companies listed above urge FCC to adopt the attached proposal for WRC-19 Agenda Item 9.1/Issue 9.1.5 (see Attachment to View A).

ATTACHMENT TO VIEW A:

UNITED STATES OF AMERICA

PROPOSAL FOR THE WORK OF THE CONFERENCE

Agenda Item 9.1/Issue 9.1.5: *Consideration of the technical and regulatory impacts of referencing Recommendations ITU R M.1638-1 and ITU R M.1849-1 in Nos. 5.447F and 5.450A of the Radio Regulations*

Background Information: The global demand for Radio Local Area Networks (e.g. Wi-Fi) is evidenced by widespread adoption of devices, increasing connection speeds, data traffic volumes and other metrics. More than half of the world's total internet traffic and over 60% of the mobile data traffic will be carried via Wi-Fi. The surging popularity of Wi-Fi means that Wi-Fi is an essential component of the global telecom infrastructure that requires a stable regulatory framework to continue to bring users the benefits of spectrum access and functionality. According to Cisco VNI¹⁹, by the year 2020, up to 3 billion Wi-Fi devices per year will be shipped, with almost all devices equipped with IEEE 802.11ac (i.e., 5 GHz band). The operations of many RLANS in the 5 GHz band are provided under Mobile allocation and consistent with RR Nos. 5.447F and 5.450A.

RR No. 5.447F In the frequency band 5 250-5 350 MHz, stations in the mobile service shall not claim protection from the radiolocation service, the Earth exploration-satellite service (active) and the space research service (active). These services shall not impose on the mobile service more stringent protection criteria, based on system characteristics and interference criteria, than those stated in Recommendations ITU-R M.1638-0 and ITU-R RS.1632-0. (WRC-03)

RR No. 5.450A In the frequency band 5 470-5 725 MHz, stations in the mobile service shall not claim protection from radiodetermination services. Radiodetermination services shall not impose on the mobile service more stringent protection criteria, based on system characteristics and interference criteria, than those stated in Recommendation ITU-R M.1638-0. (WRC-03)

During the WRC-15 study cycle, Recommendation ITU-R M.1638-0 was revised. In this revision process, several new radars with different system characteristics were included in Recommendation ITU-R M.1638-1 and M.1849-1.²⁰ In light of proposals to modify **Nos. 5.447F and 5.450A** to replace the reference to ITU-R M.1638-0 with ITU-R M.1638-1 and M.1849-1,

¹⁹ <https://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/mobile-white-paper-c11-520862.html>

²⁰ Consistent with the provisions of Resolution 27 (Rev. **WRC-12**), the reference in the Radio Regulations shall continue to apply to the earlier version incorporated by reference until such time as a competent WRC agrees to incorporate the new version.

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WRC-15 adopted agenda item 9.1.5 and associated Resolution **764 (WRC-15)** with the objective to investigate the technical and regulatory impacts on RLANs that would result from changing these references. It is important to emphasize that WRC-15 explicitly sought to ensure that no undue constraints are imposed on the Mobile service (i.e., RLANs) as the result of this modification (see Resolution **764 (WRC-15)**, *resolves 1 and 2*).

In preparation for WRC-15 and WRC-19, ITU-R has carried out a significant amount of work to study coexistence between RLANs and new radar systems (not included in Recommendation ITU-R M.1638-0), in particular bi-static radars and fast frequency-hopping radars which operate in 5250-5850 MHz range. The results of these studies indicate that there are no viable mitigation techniques that RLANs can implement to protect some of these new radar systems.²¹ In the absence of any identified viable mitigation techniques, the requirement to protect new radar systems specified in ITU-R M.1638-1 can be achieved only by precluding RLAN operations in the 5 GHz band. The aim of the agenda item and the associated Resolution **764 (WRC-15)**, however, is to ensure that no undue constraints are imposed on the services referenced in Nos. **5.447F** and **5.450A** footnotes.

Considering that by the year 2020, up to 3 billion 5 GHz enabled RLAN devices will be shipped per year and that functionality of all these devices is entirely dependent on access to 5 GHz, obviously, precluding RLAN operations in the 5 GHz band would be an undue and unacceptable constraint.

Hence, ITU-R studies confirm that the technical and regulatory impacts of requiring the mobile service to protect new radars types such as bi-static radars would impose undue constraints on RLAN operation in the 5250-5350 MHz and 5470-5725 MHz frequency ranges. The reference to ITU-R M.1638-0 should not be updated to ITU-R M.1638-1 in footnotes RR Nos. **5.447F** and **5.450A**.

Recommendation ITU-R M.1849-1 provides technical and operational aspects of ground-based meteorological radars. This recommendation clarifies that, "It should be noted that ground meteorological radars can theoretically operate in the whole frequency range 5 250-5 850 MHz, but their operation is, in general, limited to the frequency range 5 430-5 725 MHz. Most of these radars operate within the frequency band 5 600-5 650 MHz."²² The comparison of the meteorological radar characteristics given in Recommendations ITU-R M.1638-0 and M.1849-1, operating in the frequency band 5 470-5 725 MHz indicates that both Recommendations require essentially the same protection requirements. Adding a new reference to ITU-R M.1849-1 in addition to ITU-R M.1638-0 in RR Nos. **5.447F** and **5.450A** would be redundant and unnecessary.

Proposals:

²¹ ITU-R Doc. 5a/298, Annex 24 and Annex 27; also see Report of CPM to WRC-15, section 1/1.1/4.1.11.2

²² ITU-R M. 1849-1, Annex 2, Section 2

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations

NOC USA/9.1.5/1

5.447F In the frequency band 5 250-5 350 MHz, stations in the mobile service shall not claim protection from the radiolocation service, the Earth exploration-satellite service (active) and the space research service (active). These services shall not impose on the mobile service more stringent protection criteria, based on system characteristics and interference criteria, than those stated in Recommendations ITU-R M.1638-0 and ITU-R RS.1632-0. (WRC-03)

Reason: Referencing ITU R M.1638-1 instead of ITU-R M.1638-0 would preclude RLAN operations in the 5 GHz band resulting in undue and unacceptable constraint on the Mobile service. Given that both ITU-R M.1638-0 and M.1849-1 recommendations require essentially the same protection requirements, adding a new reference to ITU-R M.1849-1 is redundant and unnecessary.

NOC USA/9.1.5/2

5.450A In the frequency band 5 470-5 725 MHz, stations in the mobile service shall not claim protection from radiodetermination services. Radiodetermination services shall not impose on the mobile service more stringent protection criteria, based on system characteristics and interference criteria, than those stated in Recommendation ITU-R M.1638-0. (WRC-03)

Reason: Referencing ITU R M.1638-1 instead of ITU-R M.1638-0 would preclude RLAN operations in the 5 GHz band resulting in undue and unacceptable constraint on the Mobile service. Given that both ITU-R M.1638-0 and M.1849-1 Recommendations require essentially the same protection requirements, adding a new reference to ITU-R M.1849-1 is redundant and unnecessary.

SUP USA/9.1.5/3

RESOLUTION 764 (WRC-15)

Consideration of the technical and regulatory impacts of referencing Recommendations ITU-R M.1638-1 and ITU-R M.1849-1 in Nos. 5.447F and 5.450A of the Radio Regulations

Reason: Consequential: consideration of the subject issues has been completed.

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VIEW B

WAC/047 (30.10.17)
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VIEW B:

Modifications to Nos. 5.447F and 5.450A to incorporate by reference Recommendation ITU-R M.1849-1 and non-mandatory treatment of Recommendation ITU-R M.1638-1

Issue 9.1.5 of WRC-19 Agenda Item 9.1 was specifically established to address the unusual case at the conclusion of WRC-15 where an ITU-R Recommendation was revised during the past study cycle but an earlier version of that Recommendation continued to be incorporated by reference. The potential draft proposal in View A would perpetuate this unusual situation and each time Recommendation ITU-R M.1638 is revised would result in the need at future WRC's to address it under agenda item 9.1 or some other specific agenda item.

In the frequency bands, 5250-5350 MHz and 5470-5725 MHz, to which footnotes **5.447F** and **5.450A** respectively apply, the Mobile Service (within which RLANs operate), the Radiolocation Service, and (in the case of 5470-5725 MHz) other radiodetermination services have primary allocations. Spectrum sharing is addressed through an interference mitigation technique called Dynamic Frequency Selection (DFS), from Annex 1 to Recommendation ITU-R M.1652-1, that RLANs employ (pursuant to *resolves* 8 of Resolution **229 (Rev.WRC-12)**). Through DFS implementation, RLANs are to detect radar signals above a minimum detection threshold described in Annex 1 to Recommendation ITU-R M.1652-1 and avoid co-frequency operations intended to protect radars that have characteristics in Recommendation ITU-R M.1638-0. Resolution **229 (Rev.WRC-12)** is mandatorily applied in the Radio Regulations by No. **5.446A** for bands including 5250-5350 MHz and 5470-5725 MHz.

The main objective of issue 9.1.5 from the RLAN industry has been indicated as ensuring that no undue constraints are imposed on RLANs referenced in RR Nos. **5.447F** and **5.450A** as a result of any action under this agenda item. This objective led to View A.

The proponents of View B seek the following objectives:

- (1) To address the objective of the RLAN industry to ensure that no undue constraints are imposed on RLANs and the other services as stated above;
- (2) To protect additional Radiolocation and Radiodetermination radars in these frequency bands that are able to be protected without imposing any additional constraints on RLANs and thus continue to satisfy objective (1);
- (3) To ensure that the Radio Regulations reflect how to treat radars that are not able to be protected to the extent necessary and continue to satisfy objective (1); and
- (4) To ensure that the routine regulatory path available at WRCs to update the Radio Regulations to reflect revisions to ITU-R Recommendations incorporated by reference is made possible for these two footnotes by making particular and necessary modifications to these footnotes at WRC-19 under the scope of this agenda item to maximize regulatory certainty for both radars and RLANs.

While View B would enable satisfaction of the proponents of View A, View A would create regulatory uncertainty for RLANs and radars alike. The regulatory uncertainty in these bands would be as a result of certain radars having system characteristics and interference criteria that are in the revised version of Recommendation ITU-R M.1638 (M.1638-1) that can be protected

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without any additional constraints on RLANs without stating what the regulatory status of these radars are going forward from WRC-19. Similarly, with regard to new ground-based meteorological radars and other ground-based meteorological radars, some of which are in Recommendation ITU-R M.1638-0 and but now all contained in Recommendation ITU-R M.1849-1, the existing DFS mitigation technique in M.1652-1 continues to apply and protection can be achieved without imposing any new constraints on RLANs.

View A would also leave unanswered the substantive question of how to treat some of the new radar systems (specifically, the fast frequency-hopping and bi-static radars) included in Recommendation ITU-R M.1638-1 (but not in M.1638-0). The proponents of View B recognize and acknowledge that obligating RLANs to protect these fast frequency-hopping and bi-static radars without a viable mitigation technique would preclude or substantially constrain RLAN operations in geographical areas of where these radars operate and are not proposing to do so under this agenda item.

To address the objectives of *both* the RLAN and radar communities under Issue 9.1.5, the proponents of View B propose to retain the incorporation by reference of Recommendation M.1638-0, add an incorporation by reference of Recommendation M.1849-1 to protect new ground-based meteorological radars which are protectable through DFS and therefore would not cause any additional RLAN constraints, and add a non-mandatory reference to Recommendation M.1638-1 that sets forth the regulatory treatment of radars new to M.1638-1 through a revision of Resolution **764**.

As a result, the proposal under View B ensures that no undue constraints are imposed on the services, including RLANs, provides protection to the protectable radars, makes clear as to how to treat radars that are in M.1638-1 that are not in M.1638-0, and provides a regulatory path using standing WRC agenda items for future revisions of the recommendations without having to seek a specific WRC agenda item. Although there are more provisions in View B than the straight “no change” proposal in View A, View B represents maintenance of the status quo much more effectively than View A (including provisions to ensure no change to No. **5.446A**, which makes Resolution **229 (Rev.WRC-12)** mandatory, and to *resolves* 8 of Res. **229** itself).

The proposal put forth by View B is also fully consistent with the scope of issue 9.1.5 of agenda item 9.1 as WRC-19 is to consider any regulatory action in response to the ITU-R’s investigation of the technical and regulatory impacts of referencing M.1638-1 and M.1849-1.

* * *

For all of these reasons, the only alternative for the United States at WRC-19 is to propose the modifications to Nos. **5.447F**, **5.450A**, and Resolution **764**, and make no changes to Resolution **229** or No. **5.446A** under issue 9.1.5 of agenda item 9.1, as reflected in the Attachment hereto.

ATTACHMENT TO VIEW B:

UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 9.1/Issue 9.1.5: *Consideration of the technical and regulatory impacts of referencing Recommendations ITU-R M.1638-1 and ITU-R M.1849-1 in Nos. 5.447F and 5.450A of the Radio Regulations*

Background Information: Radio Local Area Networks (RLANs) and radars in the 5 250-5 350 MHz and 5 470-5 725 MHz bands provide valuable services as part of national infrastructures, and sharing between RLANs and radars in these bands has been proven feasible for some applications. The sharing of spectrum by RLANs under the mobile service and radars under the radiolocation service in these bands is pursuant to RR Nos. 5.447F and 5.450A. **The challenge of WRC-19 Agenda Item 9.1/Issue 9.1.5 is to determine what, if any, are the technical and regulatory impacts of referencing Recommendations ITU-R M.1638-1 and ITU-R M.1849-1 in Nos. 5.447F and 5.450A of the Radio Regulations while ensuring that no undue constraints are imposed on any of the services referenced in Nos. 5.447F and 5.450A.**

The global demand for RLANs (e.g., Wi-Fi devices) is evidenced by widespread adoption of devices, increasing connection speeds, data traffic volumes and other metrics. The surging popularity of Wi-Fi for internet traffic and mobile data traffic means that Wi-Fi is an essential component of the global telecommunications infrastructure that requires a stable regulatory framework to continue to bring users the benefits of spectrum access and functionality.

Radiolocation radars in the bands 5 250-5 350 MHz and 5 470-5 725 MHz perform a variety of functions, such as tracking space launch vehicles and aeronautical vehicles, sea and air surveillance, environmental measurements in the study of ocean water cycles and weather phenomena such as hurricanes, and Earth imaging. Airborne meteorological radars are used for both hurricane research and reconnaissance. New radar technologies for ground, ship, and airborne platforms are deploying and being developed in support of the above functions as part of the critical infrastructure.

During the ITU-R study cycle leading up to WRC-15, Recommendation ITU-R M.1638-0, which is incorporated by reference into both Nos. 5.447F and 5.450A, was revised. In this revision process, several new radars with different system characteristics were included in Recommendations ITU-R M.1638-1 and M.1849-1.²³ The revisions also included placing ground-based meteorological radars that were initially included in Recommendation ITU-R M.1638-0 into the revision of Recommendation ITU-R M.1849-0. In light of proposals to modify **Nos. 5.447F and 5.450A** to replace the reference to Recommendation ITU-R M.1638-0

²³ Consistent with the provisions of Resolution 27 (Rev.WRC-12), the reference in the Radio Regulations shall continue to apply to the earlier version incorporated by reference until such time as a competent WRC agrees to incorporate the new version.

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with Recommendations ITU-R M.1638-1 and M.1849-1, WRC-15 adopted agenda item 9.1/Issue 9.1.5 and associated Resolution **764 (WRC-15)** with the objective to investigate the technical and regulatory impacts on RLANs and radiolocation and radiodetermination services that would result from changing these references. It is important to emphasize that WRC-15 explicitly sought to ensure that no undue constraints are imposed on any of the services referenced in Nos. **5.447F and 5.450A** as the result of the updating of references to ITU-R recommendations (see Resolution **764 (WRC-15)**, *resolves* 1 and 2).

The Dynamic Frequency Selection (DFS) mitigation technique from Annex 1 to Recommendation ITU-R M.1652-1 is required to be implemented by systems in the mobile service in the bands 5 250-5 350 MHz and 5 470-5 725 MHz to ensure compatible operation with radiodetermination systems and is incorporated by reference in *resolves* 8 of Resolution **229 (Rev.WRC-12)** through No. **5.446A**. Taking this into account, the ITU-R has carried out a significant amount of work to study coexistence between RLANs and new types of radar systems (not included in Recommendation ITU-R M.1638-0), in particular bi-static radars and fast frequency-hopping radars which operate in the 5250-5850 MHz frequency range. These studies sought to identify mitigation techniques that RLANs can implement to protect some of these new radar systems that is not yet possible under the mitigation technique of DFS. However, some of the new radar system characteristics included in the revision to Recommendation ITU-R M.1638-0 are able to be protected with the DFS mitigation technique from Annex 1 to Recommendation ITU-R M.1652-1.

Recommendation ITU-R M.1849-1 provides technical and operational aspects of ground-based meteorological radars. Ground-based meteorological radars were initially included in Recommendation ITU-R M.1638-0, but were removed from the revision ITU-R M.1638-1 and placed in ITU-R M.1849-0, including additional radars. The comparison of the meteorological radar characteristics given in Recommendations ITU-R M.1638-0 and M.1849-1, operating in the frequency ranges 5 250-5 350 MHz and 5 470-5 725 MHz, indicates that the protection requirements are similar, and that no undue constraints would thus be required for RLANs in the mobile service to protect the additional ground-based meteorological radars in Recommendation ITU-R M.1849-1 that were not also in Recommendation ITU-R M.1638-0. The required protection of all of the ground-based meteorological radars operating in the frequency ranges 5 250-5 350 MHz and 5 470-5 725 MHz is thus not assured without reference to Recommendation ITU-R M.1849-1 in Nos. **5.447F and 5.450A**.

In summary, radars that can be protected using existing protection criteria and mitigation techniques (i.e., without any additional constraints to RLAN mobile operation), should be covered and protected through appropriate revisions to Nos. **5.447F and 5.450A**. This includes all radars that were included in Recommendation ITU-R M.1638-0 (some of which are now in Recommendation ITU-R M.1638-1, and others of which are now in Recommendation ITU-R M.1849-1), as well as all of the new ground-based meteorological radars in Recommendation ITU-R M.1849-1, but only some of the new radars in Recommendation ITU-R M.1638-1.

To achieve these results, the following approach is proposed:

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- Modify Nos. **5.447F** and **5.450A** to incorporate by reference Recommendation ITU-R M.1849-1 and provide a non-mandatory reference, in accordance with Resolution **27**, to Recommendation ITU-R M.1638-1 by applying a revised version of Resolution **764**. The incorporation by reference of Recommendation ITU-R M.1638-0 is retained.
- Modify Resolution **764** so that it does three things:
 - Specify that for radars that are in Recommendation ITU-R M.1638-1 but that were not in Recommendation ITU-R M.1638-0, mobile systems implementing WAS including RLANs in the subject bands protect radars having characteristics in Recommendation ITU-R M.1638-1 only to the extent provided by Annex 1 to Recommendation ITU-R M.1652-1;
 - Continue ITU-R studies to develop mitigation measures for mobile systems that would enable compatible operation with bi-static and fast frequency hopping radiodetermination systems in the 5 250-5 350 MHz and 5 470-5 725 MHz bands if implemented;
 - Continue the approach of current Resolution **764**, which requires that there be no undue constraints on the services mentioned in Nos. **5.447F** and **5.450A**.
- Propose firm no change to No. **5.446A**, which makes Resolution **229 (Rev.WRC-12)** mandatory, and to Resolution **229** itself.

Under this proposal, through the adoption of the revised Resolution **764**, new bi-static and fast frequency hopping radars are protected only to the extent available via Annex 1 to Recommendation ITU-R M.1652-1.

Proposals to effect these provisions follow.

Proposals:

MOD USA/9.1.5/1

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations

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5 250-5 570 MHz

Allocation to services		
Region 1	Region 2	Region 3
5 250-5 255	EARTH EXPLORATION-SATELLITE (active) MOBILE except aeronautical mobile 5.446A MOD 5.447F RADIOLOCATION SPACE RESEARCH 5.447D 5.447E 5.448 5.448A	
5 255-5 350	EARTH EXPLORATION-SATELLITE (active) MOBILE except aeronautical mobile 5.446A MOD 5.447F RADIOLOCATION SPACE RESEARCH (active) 5.447E 5.448 5.448A	
...		
...		
5 470-5 570	EARTH EXPLORATION-SATELLITE (active) MOBILE except aeronautical mobile 5.446A MOD 5.450A RADIOLOCATION 5.450B MARITIME RADIONAVIGATION SPACE RESEARCH (active) 5.448B 5.450 5.451	
5 570-5 650	MOBILE except aeronautical mobile 5.446A MOD 5.450A RADIOLOCATION 5.450B MARITIME RADIONAVIGATION 5.450 5.451 5.452	
5 650-5 725	MOBILE except aeronautical mobile 5.446A MOD 5.450A RADIOLOCATION Amateur Space research (deep space) 5.282 5.451 5.453 5.454 5.455	

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5.447F In the frequency band 5 250-5 350 MHz, stations in the mobile service shall not claim protection from the radiolocation service, the Earth exploration-satellite service (active) and the space research service (active). These services shall not impose on the mobile service more stringent protection criteria, based on system characteristics and interference criteria, than those stated in Recommendations ITU-R M.1638-0, [ITU-R M.1849-1](#), and ITU-R RS.1632-0. With respect to radiolocation radars included in Recommendation ITU-R M.1638-1, but not in Recommendation ITU-R M.1638-0, see Resolution 764 (Rev.WRC-19). (WRC-1519)

Reason: Modifying the footnote to incorporate Recommendation ITU-R M.1849-1, would ensure that all meteorological radar types currently protected from harmful interference by

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RLAN and any other mobile service operations in the 5 250-5 350 MHz band continue to be protected. The inclusion of new radars in Recommendation ITU-R M.1638-1 is addressed by the citation of revised Resolution **764** (see Proposal USA/9.1.5/6) using non-mandatory language.

MOD USA/9.1.5/3

5.450A In the frequency band 5 470-5 725 MHz, stations in the mobile service shall not claim protection from radiodetermination services. Radiodetermination services shall not impose on the mobile service more stringent protection criteria, based on system characteristics and interference criteria, than those stated in Recommendations ITU-R M.1638-0 and ITU-R M.1849-1. With respect to radiodetermination radars included in Recommendation ITU-R M.1638-1, but not in Recommendation ITU-R M.1638-0, see Resolution **764 (Rev.WRC-19)**. (WRC-~~45~~19)

Reason: Modifying the footnote to incorporate Recommendation ITU-R M.1849-1, would ensure that all meteorological radar types currently protected from harmful interference by RLAN and any other mobile service operations in the 5 470-5 725 MHz band continue to be protected. The inclusion of new radars in Recommendation ITU-R M.1638-1 is addressed by the citation of revised Resolution **764** (see Proposal USA/9.1.5/6) using non-mandatory language.

NOC USA/9.1.5/4

5.446A

Reason: Retaining the mandatory reference to Resolution **229 (Rev.WRC-12)** in No. **5.446A**, which leads to the incorporation by reference of Recommendation ITU-R M.1652-1, is essential.

NOC USA/9.1.5/5

RESOLUTION 229 (REV.WRC-12)

**Use of the bands 5 150-5 250 MHz, 5 250-5 350 MHz and 5 470-5 725 MHz
by the mobile service for the implementation of wireless access systems
including radio local area networks**

Reason: For the bands 5 250-5 350 MHz and 5 470-5 725 MHz, Resolution **229 (Rev.WRC-12)**, *resolves* 8 provides that Annex 1 to Recommendation ITU-R M.1652-1 contains mitigation measures that “shall be implemented by systems in the mobile service to ensure compatible operation with radiodetermination systems.” No. **5.446A** and Resolution **229 (Rev.WRC-12)** must remain in place for the approach proposed here to be effective.

MOD USA/9.1.5/6

RESOLUTION 764 (~~REV. WRC-15~~19)

~~Consideration of the technical~~ Technical and regulatory ~~impacts of provision treatment of for referencing~~ Recommendations ITU-R M.1638-1, and ITU-R M.1849-1 as referenced in Nos. 5.447F and 5.450A of the Radio Regulations

The World Radiocommunication Conference (~~Geneva, 2015~~TBD, 2019),

considering

- a) that the frequency bands 5 250-5 350 MHz and 5 470-5 725 MHz are allocated worldwide on a primary basis to the radiolocation service;
- b) that WRC-03 allocated the frequency bands 5 150-5 350 MHz and 5 470-5 725 MHz on a primary basis to the mobile service for the implementation of wireless access systems (WAS) including radio local area networks (RLANs);
- c) that Resolution **229 (Rev. WRC-12)** defines the conditions for the use of the frequency bands 5 150-5 250 MHz, 5 250-5 350 MHz and 5 470-5 725 MHz by the mobile service for the implementation of WAS including RLANs while protecting existing primary services;
- cbis*) that one of the conditions in Resolution **229 (Rev. WRC-12)** for mobile service use of the bands 5 520-5 350 MHz and 5 470-5 725 MHz is that the mitigation measures in Annex 1 to Recommendation ITU-R M.1652-1 shall be implemented by systems in the mobile service to ensure compatible operation with radiodetermination systems;
- d) that No. **5.447F**, as revised by WRC-19, states that in the frequency band 5 250-5 350 MHz, stations in the mobile service shall not claim protection from the radiolocation service, the Earth exploration-satellite service (active) and the space research service (active) and that these services shall not impose on the mobile service more stringent protection criteria, based on system characteristics and interference criteria, than those stated in Recommendations ITU-R M.1638-0, ITU-R M.1849-1, and ITU-R RS.1632-0;
- e) that No. **5.450A**, as revised by WRC-19, states that in the frequency band 5 470-5 725 MHz, stations in the mobile service shall not claim protection from radiodetermination services and that radiodetermination services shall not impose on the mobile service more stringent protection criteria, based on system characteristics and interference criteria, than those stated in ~~Recommendation~~Recommendations ITU-R M.1638-0 and ITU-R M.1849-1;
- f) that Nos. **5.447F** and **5.450A**, as revised by WRC-19, also state with respect to Recommendation ITU-R M.1638-1 that Resolution **764 (Rev. WRC-19)** applies,

noting

- a) that Recommendation ITU-R M.1638-0 identifies the characteristics of, and protection criteria for sharing studies for, radiolocation, aeronautical radionavigation and meteorological radars operating in the frequency range 5 250-5 850 MHz;
- b) that Recommendation ITU-R M.1638-1 identifies the characteristics of, and protection criteria for sharing studies for, radiolocation (except ground-based meteorological radars) and aeronautical radionavigation radars operating in the frequency bands between 5 250 and

~~5 850 MHz and that Recommendation ITU-R M.1849-1 identifies the technical and operational aspects of ground-based meteorological radars;~~

~~c) that Recommendation ITU-R M.1638-1 includes additional new radar contains characteristics not for radar systems that were contained in Recommendation ITU-R M.1638-0 as well as characteristics for radar systems that were not contained included in Recommendation ITU-R M.1638-0;~~

~~d) that Annex 1 of Recommendation ITU-R M.1652-1 provides mitigation measures that must be used by systems in the mobile service for the implementation of wireless access systems (WAS) including radio local area networks (RLANs) to ensure compatible operation with radiodetermination systems in the 5250-5350 MHz and 5470-5725 MHz band, including radars having characteristics contained in Recommendation ITU-R M.1638-0,~~

further noting

~~a) that the references to Resolution 764 (Rev.WRC-19) and Recommendation ITU-R M.1638-1 in Nos. 5.447F and 5.450A of the Radio Regulations are not made using mandatory language;~~

~~b) that, according to Principle 4 of Annex 1 to Resolution 27 (Rev.WRC-12), texts which are of a non-mandatory nature shall not be considered for incorporation by reference the reference of material which is incorporated by reference on a mandatory basis must be explicit, specifying the specific part of the text, if appropriate,~~

recognizing

~~a) that the mitigation measures provided in Annex 1 of Recommendation ITU-R M.1652-1 will assure protection of only some of the radars having characteristics in Recommendation ITU-R M.1638-1 that are not contained in Recommendation ITU-R M.1638-0;~~

~~b) that other mitigation measures have yet to be developed to protect bi-static and fast frequency hopping radars having characteristics included in Recommendation ITU-R M.1638-1 from RLAN interference in the 5 250-5 350 MHz and 5 470-5 725 MHz bands,~~

resolves

~~that radiolocation radars in the 5 250-5 350 MHz band and radiodetermination radars in the 5 470-5 725 MHz band with system characteristics and interference criteria included in Recommendation ITU-R M.1638-1, but not in Recommendation ITU-R M.1638-0, shall not claim more interference protection from systems in the mobile service than what is provided by the application of the mitigation measures in Annex 1 of Recommendation ITU-R M.1652-1;~~

resolves to invite the ITU Radiocommunication Sector

~~1—to investigate the technical and regulatory impacts on the services referred to in Nos. 5.447F and 5.450A that would result from referencing Recommendation ITU-R M.1638-1 in place of Recommendation ITU-R M.1638-0 in those footnotes, while ensuring that no undue constraints are imposed on the services referenced in these footnotes;~~

~~2—to investigate the technical and regulatory impacts on the services referred to in Nos 5.447F and 5.450A that would result from adding a new reference to Recommendation~~

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~~ITU-R M.1849-1 to these footnotes, while ensuring that no undue constraints are imposed on the services referenced in these footnotes;~~
to continue efforts to develop a new or revised recommendation containing mitigation measures that, if implemented by systems in the mobile service, would provide the protection of all other radiolocation systems in the 5 250 -5 350 MHz band and radiodetermination systems in the 5 470-5 725 MHz band referred to in recognizing b) and would not impose undue constraints on either the mobile service or the radiodetermination services.

~~*instructs the Director of the Radiocommunication Bureau*~~
~~to include the results of these studies in the Director's Report to WRC-19 for consideration of any regulatory action in response to resolves to invite the ITU Radiocommunication Sector~~
~~above.~~

Reason: Addresses the need to develop mitigation techniques to protect newer radars that are not adequately protected by the mitigation measures in Annex 1 of Recommendation ITU-R M.1652-1, while assuring no undue constraints on systems in the mobile service for the implementation of wireless access systems (WAS) including radio local area networks (RLANs).

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Space Services

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UNITED STATES OF AMERICA

DRAFT PRELIMINARY VIEWS FOR WRC-19

AGENDA ITEM 1.3: *to consider possible upgrading of the secondary allocation to the meteorological-satellite service (space-to-Earth) to primary status and a possible primary allocation to the Earth exploration-satellite service (space-to-Earth) in the frequency band 460-470 MHz, in accordance with Resolution 766 (WRC-15).*

ISSUE: This agenda item relates to consideration of possible upgrade of the secondary allocation to the meteorological-satellite service (space-to-Earth) to primary status and a possible primary allocation to the Earth exploration-satellite service (space-to-Earth) in the frequency band 460-470 MHz, in accordance with Resolution 766 (WRC-15).

The ITU-R is invited to study:

- Sharing and compatibility studies of such an upgrade while protecting existing primary fixed and mobile services.
- Determine the appropriate pfd limits to place on MetSat (space-to-Earth), and EESS (space-to-Earth) systems to protect existing primary services.

BACKGROUND: The 460-470 MHz band is allocated on a primary basis to the fixed and mobile services. Under the co-primary allocation to the mobile Service, “the frequency band 450-470 MHz is identified for use by administrations wishing to implement International Mobile Telecommunications (IMT)” in all 3 Regions pursuant to No 5.286AA.

The meteorological-satellite service currently has a secondary allocation in this band. Under No. 5.289, “Earth exploration-satellite service applications, other than the meteorological-satellite service, may also be used in the bands 460-470 MHz for space-to-Earth transmissions subject to not causing harmful interference to stations operating in accordance with the Table”.

Within this band, the Argos Data Collection System (ADCS) monitors more than 21,000 active Argos platforms collecting data for over 2,000 distinct projects in 100+ countries. Critical applications of the ADCS include atmospheric and ocean monitoring/research, tropical cyclone forecasting, fishery management, oil spill tracking, fishing vessel tracking, search and rescue modeling (at sea), anti-piracy alerting, import/export and hazardous materials tracking, endangered species studies, migration mapping, and wildlife tracking and management.

The administration of the Argos program is under a joint agreement between the National Oceanic and Atmospheric Administration (NOAA) and the French Space Agency, Centre National d’Etudes Spatiales (CNES). Additional partners include the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT), and the Indian Space Research Organization (ISRO).

~~Critical applications of the ADCS include atmospheric and ocean monitoring/research, tropical cyclone forecasting, fishery management, oil spill tracking, fishing vessel tracking, search and rescue modeling (at~~

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~~sea), anti-piracy alerting, import/export and hazardous materials tracking, endangered species studies, migration mapping, and wildlife tracking and management.~~

The meteorological-satellite (space-to-Earth) service operates on a secondary basis to the fixed and mobile services and thus it must not interfere with these services. The Resolution 766 proposal has the potential to adversely impact approximately 127,000 licensed PLMR operations if not implemented in a way that ensures protection of terrestrial operations from harmful interference. Critical applications of licensees using this spectrum include Public Safety dispatch of first responders; correctional institution communications; state and local government operation and homeland security response; critical infrastructure communications (water, sewer, power and fuel pipeline control); and hospital operations. In addition, the 460-470 MHz band is used by alarm service providers to monitor at least 400,000 homes, businesses and government facilities in the United States to detect fires, medical emergencies, home invasions and other urgent circumstances, and alert first responders. At least 200,000 alarm radios in this band are used in countries outside of the United States.²⁴ To protect the fixed and land mobile services within the United States, a power flux density (pfd) limit of -152 dBW/m²/4kHz has been imposed on the meteorological-satellite (space-to-Earth) service.

Preliminary testing by the relevant United States government agencies has shown that, at satellite angles of arrival below 25 degrees, the -152 dBW/m²/4kHz limit is not adequate to protect terrestrial operations. To provide the necessary protection to existing services in the band, globally, the next generation of ADCS transmitters must implement direct sequence spread spectrum or equivalent technology in the satellite downlink to reduce the pfd in the 460-470 MHz band to less than -152 dBW/m²/4kHz, or such other levels determined necessary to protect terrestrial operations, depending on the angle of arrival.

Potential upgrade of EESS allocation to primary will bring confidence to the space agencies involved in Satellite Data Collection Programs and will ease coordination with Administrations. These space programs do represent a long-term effort and require decades of investment between the time the program is officially approved and the time the various satellites are in operation, keeping in mind that usually many satellites are deployed in order to provide a continuous service. For the specific case of this band, the number of satellites expected to be in operation is limited for cost reasons, and it is unlikely that two satellites will transmit at the same time over the same geographical area.

U.S. VIEW: ~~In order to protect the investment and expansion of the ADCS systems while ensuring the protection of existing and planned deployments of co-primary services including IMT applications,~~ The United States supports conducting and completing sharing and compatibility studies with the co-primary Fixed and Mobile services including IMT. These studies would determine the feasibility of potentially upgrading the MetSat (space-to-Earth) allocation to primary status, and the potential addition of a primary EESS (space-to-Earth) allocation in the frequency band 460-470 MHz, while protecting the current primary allocations for fixed and land mobile services including IMT systems and maintaining the conditions contained in No. 5.289.

Should studies support the upgrade of the MetSat service and/or addition of a primary allocation to the EESS, the appropriate pfd limit should be determined for MetSat (space-to-Earth) and EESS (space-to-Earth) systems to protect the existing and planned deployments of primary services in the frequency band 460-470 MHz. Should studies conclude that a less restrictive pfd limit than that contained in Resolution 766 (WRC-15) *considering further a)* can protect incumbent services, then the pfd limit (-152 dBW/m² /4

²⁴ Alarm radio systems operate in the 460-470 MHz band in more than 50 nations outside of the United States, including countries such as Canada, Greece, Ireland, Russia, Spain, United Kingdom, Netherlands, Columbia, France, Belgium, Bolivia, Saudi Arabia, Mexico, Ethiopia, Argentina, Brazil and Cambodia.

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kHz) shall apply. To the extent that sharing and compatibility studies, field tests and other relevant input indicate that a more restrictive pfd limit is necessary to protect terrestrial operations, such more restrictive limit must be adopted if any upgrade to the existing MetSat secondary allocation or new allocation to EESS is proposed.

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UNITED STATES OF AMERICA
DRAFT PRELIMINARY VIEWS FOR WRC-19

Agenda Item 1.7: to study the spectrum needs for telemetry, tracking and command (TT&C) in the space operation service for non-geostationary (NGSO) satellites with short duration missions, to assess the suitability of existing allocations to the space operation service and, if necessary, to consider new allocations, in accordance with Resolution **659 (WRC-15)**

BACKGROUND: The demand for suitable spectrum for NGSO satellites with short duration missions is growing due to the increasing number of these types of satellite missions. The mass and dimensions of these satellites contribute to their success and their use will likely grow. These types of missions provide an affordable means for scientific and commercial space purposes and are increasingly used by new entrants in space. Nevertheless, it is important to ensure that these missions do not cause harmful interference to existing systems and incumbent services. WRC-19 Agenda Item 1.7 invites studies to accommodate spectrum requirements for TT&C in the space operation service, below 1 GHz, for NGSO satellites with short duration missions in existing bands or identify new spectrum supported by sharing studies.

The term “short duration mission” used in Resolution **659 (WRC-15)** refers to a mission having a limited period of validity of typically not more than 3 years.

U.S. VIEW: The United States supports completing sharing and compatibility studies between NGSO satellites with short duration missions and the incumbent services with respect to invites ITU-R 1, 2, and 3 of Resolution **659 (WRC-15)**, and supports that frequency bands below 1 GHz should be considered for allocation changes only if agreed ITU-R studies demonstrate sharing feasibility.

The frequency ranges described for consideration under invites ITU-R 3 overlap with allocations to critical global maritime distress and safety service (GMDSS) frequencies, identified in **RR** Appendix **15**, and centered at 156.3 MHz, 156.525 MHz, 156.65 MHz, 156.8 MHz, 161.975 MHz, and 162.025 MHz, as well as frequencies used for the safety of life COSPAS/SARSAT system in the band 406-406.1 MHz. Therefore, the U.S. is of the view that CPM text must exclude the GMDSS frequency bands stated above and the COSPAS-SARSAT frequency range 406-406.1 MHz and the 100 kHz adjacent bands above and below the COSPAS-SARSAT frequency range (Res. **205 (WRC-15)**) from consideration for possible new allocations or an upgrade of the existing allocations to the space operation service. Additionally, the frequency ranges for fixed and land mobile (162.0375-173.2 MHz, 173.4-174 MHz, and 406.1-420.0 MHz), meteorological satellite (400.15-403 MHz), earth exploration satellite service (401-403 MHz) and meteorological aids (400.15-406 MHz) services are heavily used, and usage of the existing allocations is expected to increase in the future. The United States is of the view these factors must be considered in any sharing and compatibility studies under this agenda item.

The United States is of the view that a single spacecraft with a lifetime of less than three years, where the operator does not launch replenishment or replacement spacecraft is a short duration mission. The operation of multiple spacecraft simultaneously can qualify as short duration if all spacecraft have lifetimes less than three years and therefore the frequency and orbital characteristics and capabilities exist for less than 3 years – i.e., no replenishment/replacement. The case of a single (or multiple) spacecraft with a lifetime of less than three years, where the operator launches a single (or multiple) replenishment/replacement spacecraft(s) such that the operator has persistent frequency and orbital characteristics and capabilities longer than three years, is not considered a short duration mission.

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UNITED STATES OF AMERICA
DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 9.1, Issue 9.1.3: *Study of technical and operational issues and regulatory provisions for new non-geostationary-satellite orbit systems in the 3 700-4 200 MHz, 4 500-4 800 MHz, 5 925-6 425 MHz and 6 725-7 025 MHz frequency bands allocated to the fixed-satellite service*

BACKGROUND

The Report of the Director of the Radiocommunication Bureau to WRC-15 acknowledged that there may be a need for “reviewing or confirming” assumptions that led to the development of the power limits found in Article 21 and Article 22, taking into account the characteristics of non-GSO systems recently submitted to the ITU-R. Moreover, given the growing interest in deploying non-GSO FSS systems, the Report of the Director of the BR noted that there is a need to ensure that all existing services are adequately protected.

As a result, WRC-15 adopted Resolution 157 (WRC-15), which discusses how facilitating the deployment of new types of non-GSO systems has the potential to augment the capacity, spectrum efficiency and benefits derived from GSO and non-GSO systems operating in the bands 3 700-4 200 MHz (space-to-Earth), 4 500-4 800 MHz (space-to-Earth), 5 925-6 425 MHz (Earth-to-space), 6 725-7 025 MHz (Earth-to-space).

There are approximately 170 GSO satellites currently operating in the 3700-4200 MHz band and 229 allotments in the 4500-4800 MHz band, both of which are globally allocated to provide FSS downlinks. Many highly sensitive and public services use these FSS bands, such as satellite telemetry, disaster relief, public meteorological data distribution, and aeronautical applications in various regions. A number of next-generation non-GSO systems are being developed that can provide high-capacity, low-latency communications to end users in all locations around the world, thus allowing those living and working in rural and remote areas to access the same level of connectivity as those living in more densely populated urban areas.

Resolution 157 (WRC-15) also contains a list of technical and operational issues (e.g. Article 21 and 22) to be studied for the bands identified above, requests the development of new regulatory provisions for the protection of terrestrial services in the band 4 500-4 800 MHz and non-GSO MSS feeder link receiving stations in the band 6 700-7 075 MHz and the clarification of some existing regulatory provisions (e.g. 5.440A and 5.457C).

The United States supported studies under Resolution 157 (WRC-15) for new non-GSO FSS satellite systems. Its view was that modification to Article 22 for the inclusion of epfd limits for non-GSO FSS systems in the bands 4 500-4 800 MHz (space-to-Earth) and 6 725-7 025 MHz (Earth-to-space) to protect the geostationary FSS allotments in the Plan and the assignments in the Appendix 30B List can only be considered in conjunction with modifications to Article 5, including No. 5.441 to authorize use of these bands by non-GSO FSS systems. This footnote specifies that the use of the bands by the FSS shall be in accordance with Appendix 30B, which

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is limited to GSO fixed-satellite service. This is not the case in the bands 3 700-4 200 MHz and 5 925-6 425 MHz where non-GSO FSS are currently allowed without any restrictions in Article 5.

Similarly, the United States' view was that the adoption of regulatory measures to protect terrestrial services in the band 4 500-4 800 MHz (space-to-Earth) can only be considered in conjunction with modifications to No. 5.441.

The United States also noted that under the current regulatory framework, the protection of the non-GSO MSS feeder link receiving earth stations from non-GSO FSS transmitting earth station in the band 6 700-6 725 MHz and 7 025-7 075 MHz is ensured through the application of coordination procedures under No. 9.17A (see also Table 9a in Appendix 7). An extension of these coordination procedures to the band 6 725-7 025 MHz can only be achieved through modifications to No. 5.441 referred to above.

RESULTS OF STUDIES

In accordance with Resolution 157 (WRC-15), ITU-R studies were conducted regarding sharing between circular-orbit non-GSO systems and GSO systems. This study considered the operation of a representative circular-orbit non-GSO system providing global broadband services. EPFD↓ profiles were generated based on the collected statistics of non-GSO system operation and compared against the protection criteria given in Recommendation ITU-R S.1323.

The simulation results of this study indicate that the operation of a circular-orbit non-GSO system in the 6/4 GHz bands results in large exceedances when tested against the Recommendation ITU-R S.1323 protection requirements. These results can be attributed to calculation of protection to the GSO as given in Recommendation ITU-R S.1323, Methodology A. This methodology computes interference based on a comparison of the degradation due to propagation loss with the degradation due to interference. In the 6/4 GHz band, there is minimal degradation due to propagation losses and thus the margin for protection is almost entirely dominated by the interference statistics.

Proposals:

<u>NOC</u>	USA/9.1/9.1.3/1	ARTICLE 21
	Terrestrial and space services sharing frequency bands above 1 GHz	
<u>NOC</u>	USA/9.1/9.1.3/2	ARTICLE 22
	Space services	
SUP	USA/9.1/9.1.3/3	RESOLUTION 157 (WRC-15)
	Study of technical and operational issues and regulatory provisions for new non-geostationary-satellite orbit systems in the 3 700-4 200 MHz, 4 500-4 800 MHz, 5 925-6 425 MHz and 6 725-7 025 MHz frequency bands allocated to the fixed-satellite service	

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Reason: The results of ITU-R studies indicate that the operation of a circular-orbit non-GSO system in the 6/4 GHz bands results in large exceedances when tested against the Recommendation ITU-R S.1323 protection requirements.

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Regulatory Issues

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UNITED STATES OF AMERICA
DRAFT PROPOSAL FOR THE WORK OF THE CONFERENCE

Agenda Item 7, Issue E: *Harmonization of RR Appendix 30B with RR Appendices 30 and 30A.*

Background Information:

ITU-R Working Party 4A received a contribution with a proposal for a new issue under WRC-19 agenda item 7 to consider aligning several provisions in RR **AP30B** with RR **AP30/30A** for Regions 1 and 3. Working Party 4A agreed to establish a new Issue E under WRC-19 agenda item 7 to address this proposal.

The three specific proposed modifications to **AP30B** to align it with **AP30/30A** are:

Issue “E1”: To incorporate in **AP30B** a provision similar to that of 4.1.24 of **AP30/30A**;

Issue “E2”: To incorporate in **AP30B** a provision similar to that of 4.1.25 of **AP30/30A**; and

Issue “E3”: To incorporate in **AP30B** a provision similar to those of 4.1.13 and 4.2.17 of **AP30/30A**.

Proposal:

NOC USA/7/E/1

APPENDIX 30B (REV.WRC-15)

**Provisions and associated Plan for the fixed-satellite service
in the frequency bands 4 500-4 800 MHz, 6 725-7 025 MHz,
10.70-10.95 GHz, 11.20-11.45 GHz and 12.75-13.25 GHz**

Reasons: With respect to provision (§ 4.1.24) of Appendices **30** and **30A** for Regions 1 and 3:
4.1.24 No assignment in the List shall have a period of operation exceeding 15 years, counted from the date of bringing into use, or 2 June 2000, whichever is later. Upon request by the responsible administration received by the Bureau at the latest three years before the expiry of this period, this period may be extended by up to 15 years, on condition that all the characteristics of the assignment remain unchanged.

This provision is limited to satellite networks serving Regions 1 and 3 only and there is no such provision in RR **AP30/30A** for networks serving Region 2. Therefore, any changes to RR **AP30B** should not be applicable to Region 2.

Moreover, there is no linkage between RR **AP30/30A**, which was created for the broadcasting-satellite service, and RR **AP30B**, which was created for the fixed-satellite service. Each of these appendices have

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its own set of conditions and procedures. Consequently, there is no need for harmonization amongst those plans. Those plans were established for two different satellite services for different purposes.

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DRAFT PROPOSAL FOR THE WORK OF THE CONFERENCE

Agenda Item 7, Issue G: *Updating the reference situation for networks under RR Appendices 30 and 30A when provisional recording is used.*

Background Information

§ 4.1.18 of Appendices 30 and 30A of the Radio Regulations prescribes that in the case of recording in the List with outstanding coordination requirements, this recording shall be provisional, but that the entry shall be changed from provisional to definitive recording in the List if the Bureau is informed that the new assignment in the Regions 1 and 3 List has been in use, together with the assignment which was the basis for the disagreement, for at least four months without any complaint of harmful interference being made. When the provisional recording becomes definitive, the reference situation of the interfered-with network will be updated. This could severely affect the reference situation of the interfered-with network. There is a similar, but different, provision applicable in Region 2, § 4.2.21A of Appendices 30 and 30A. The Region 2 provisions are applicable to a much smaller subset of services with no potential impact to the reference situation of the interfered-with network.

In preparations for WRC-15 it was too late to have this issue raised and captured in the Conference Preparatory Meeting (CPM) Report. Subsequently, this issue was brought to the attention of the RRB-70 meeting in October 2015 (Document RRB-70/10), requesting that a Rule of Procedure (RoP) be prepared to outline the desired practice to be followed by the Bureau. RRB-70 however was of the view that such a RoP would consist in a change of the Radio Regulations and therefore was outside the authority of the RRB.

Following this decision, a late contribution on this issue was submitted to WRC-15 which has the authority to make changes to the Radio Regulations, Document WRC-15/169. Since this proposal was made directly to the Conference with no previous studies, WRC-15 decided that
“....it was felt that further study of this issue is required if this current practice is to be changed. ITU-R is therefore invited to study this issue under the standing agenda item 7 with the aim of finding an appropriate regulatory and technical solution to this issue.”

Issue G is in response to these activities before and during the last Conference and the decision of WRC-15.

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Proposal:

APPENDIX 30 (REV.WRC-15)*

**Provisions for all services and associated Plans and List¹ for
the broadcasting-satellite service in the frequency bands
11.7-12.2 GHz (in Region 3), 11.7-12.5 GHz (in Region 1)
and 12.2-12.7 GHz (in Region 2) (WRC-03)**

ARTICLE 4 (REV.WRC-15)

**Procedures for modifications to the Region 2 Plan or
for additional uses in Regions 1 and 3³**

NOC USA/7/G/1

4.2.21A If, in spite of the application of § 4.2.20 and 4.2.21, there is still continuing disagreement and the assignment which was the basis of the disagreement is not an assignment in the Region 2 Plan, or in the Regions 1 and 3 Plan or List, or for which the procedure of § 4.1 or 4.2 has been initiated, and if the notifying administration insists that the proposed assignment be included in the Region 2 Plan, the Bureau shall provisionally enter the assignment in the Region 2 Plan with an indication of those administrations whose assignments were the basis of the disagreement; however, the entry shall be changed from provisional to definitive recording in the Region 2 Plan only if the Bureau is informed that the new assignment in the Region 2 Plan has been in use, together with the assignment which was the basis for the disagreement, for at least four months without any complaint of harmful interference being made. (WRC-03)

Reasons:

With the reactions of RRB-70 in mind, it is better to clarify the desired actions in the Radio Regulations rather than suggesting words in the minutes of a WRC-19 Plenary. However, there are notable differences between the application of the procedures § 4.2.21A for the Region 2 BSS and feeder-link Plans and the application of § 4.1.18 for the Regions 1 and 3 List, therefore NOC is needed for Region 2. For example, for Regions 1 and 3, § 4.1.18 may be applied to Regions 1 and 3 List assignments or pending List modifications or terrestrial or FSS assignments, while in Region 2, § 4.2.21A is applied in a much more limited fashion, solely to terrestrial or FSS or unplanned BSS assignments.

* The expression "frequency assignment to a space station", wherever it appears in this Appendix, shall be understood to refer to a frequency assignment associated with a given orbital position. See also Annex 7 for the orbital limitations. (WRC-2000)

¹ The Regions 1 and 3 List of additional uses is annexed to the Master International Frequency Register (see Resolution **542 (WRC-2000)****). (WRC-03)

**** Note by the Secretariat:** This Resolution was abrogated by WRC-03.

Note by the Secretariat: Reference to an Article with the number in roman is referring to an Article in this Appendix.

³ The provisions of Resolution **49 (Rev.WRC-15)** apply. (WRC-15)

APPENDIX 30A (REV.WRC-15)*

**Provisions and associated Plans and List¹ for feeder links for the
broadcasting-satellite service (11.7-12.5 GHz in Region 1, 12.2-12.7 GHz
in Region 2 and 11.7-12.2 GHz in Region 3) in the frequency bands
14.5-14.8 GHz² and 17.3-18.1 GHz in Regions 1 and 3,
and 17.3-17.8 GHz in Region 2 (WRC-03)**

ARTICLE 4 (REV.WRC-15)

**Procedures for modifications to the Region 2 feeder-link Plan
or for additional uses in Regions 1 and 3**

NOC USA/7/G/2

4.2.21A If, in spite of the application of § 4.2.20 and 4.2.21, there is still continuing disagreement and the assignment which was the basis of the disagreement is not an assignment in the Region 2 Plan, or in the Regions 1 and 3 Plan or List, or for which the procedure of § 4.1 or 4.2 has been initiated, and if the notifying administration insists that the proposed assignment be included in the Region 2 Plan, the Bureau shall provisionally enter the assignment in the Region 2 Plan with an indication of those administrations whose assignments were the basis of the disagreement; however, the entry shall be changed from provisional to definitive recording in the Region 2 Plan only if the Bureau is informed that the new assignment in the Region 2 Plan has been in use, together with the assignment which was the basis for the disagreement, for at least four months without any complaint of harmful interference being made. (WRC-03)

Reasons:

With the reactions of RRB-70 in mind, it is better to clarify the desired actions in the Radio Regulations rather than suggesting words in the minutes of a WRC-19 Plenary. However, there are notable differences between the application of the procedures § 4.2.21A for the Region 2 BSS and feeder-link Plans and the application of § 4.1.18 for the Regions 1 and 3 List, therefore NOC is needed for Region 2. For example, for Regions 1 and 3, § 4.1.18 may be applied to Regions 1 and 3 List assignments or pending List modifications or terrestrial or FSS assignments, while in

* The expression "frequency assignment to a space station", wherever it appears in this Appendix, shall be understood to refer to a frequency assignment associated with a given orbital position. (WRC-03)

¹ The Regions 1 and 3 feeder-link List of additional uses is annexed to the Master International Frequency Register (see Resolution **542 (WRC-2000)****). (WRC-03)

** *Note by the Secretariat:* This Resolution was abrogated by WRC-03.

² This use of the band 14.5-14.8 GHz is reserved for countries outside Europe.
Note by the Secretariat: Reference to an Article with the number in roman is referring to an Article in this Appendix.

WAC/047 (30.10.17)
IWG-4/18r2 (05.09.17)

Region 2, § 4.2.21A is applied in a much more limited fashion, solely to terrestrial or FSS or unplanned BSS assignments.
