ATTACHMENT A
to FCC Public Notice DA 15-604

Recommendations presented at
May 20, 2015 Meeting of
the Advisory Committee for
the 2015 World Radiocommunication Conference

Maritime Aeronautical and Radar Services

WAC/110(20.05.15)

UNITED STATES OF AMERICA

PROPOSAL FOR THE WORK OF THE CONFERENCE

Agenda Item 1.17: *to consider possible spectrum requirements and regulatory actions, including appropriate aeronautical allocations, to support wireless avionics intra-communications (WAIC), in accordance with Resolution* ***423 (WRC-12)***

Background:

The aerospace industry is developing the future generation of commercial aircraft to provide airlines and the flying public more cost-efficient, safe, and reliable aircraft. Wireless capabilities will reduce aircraft weight, provide multiple and redundant methods to transmit safety-related information, and provide environmental benefits and cost savings to manufacturers and operators.

WAIC systems consist of multiple radiocommunication devices between two or more transmitters and receivers on a single aircraft and provide safety-related aircraft applications. WAIC system transmissions are located both inside and outside the aircraft with the majority being interior to the aircraft structure.

WAIC communication traffic will be between transmitters and receivers on the same aircraft as part of a closed, exclusive network required for aircraft operation. WAIC systems will not provide air-to-ground, air-to-air or air-to-satellite communications.

The 2012 World Radiocommunication Conference (WRC-12) in response to a request to consider possible spectrum requirements and regulatory measures in support of wireless avionics communication systems approved Agenda Item 1.17 for WRC-15.

WRC-12 resolved to invite the ITU-R to consider, based on the results of ITU-R studies, possible regulatory actions, including appropriate aeronautical allocations, to support the implementation of WAIC systems, while taking into account spectrum requirements for WAIC and protection requirements for incumbent systems operating in accordance with existing allocations.

Resolution 423 (WRC-12) invites Working Party 5B (WP5B) to consider:

i. frequency bands within existing worldwide aeronautical mobile service, aeronautical mobile (R) service and aeronautical radionavigation service allocations; and
ii. additional frequency bands above 15.7 GHz for aeronautical services if spectrum requirements cannot be met in frequency bands studied under *invites ITU-R* 3 i)

Studies submitted to WP5B show that WAIC systems can be accommodated in the band 4200-4400 MHz provided that mitigation techniques for some applications, provided in ~~[Working document towards a preliminary draft new~~ Report, ITU-R M. 2319 are utilized~~[WAIC_SHARING_4 200-4 400MHz - Compatibility analysis between wireless avionics intra-communications systems and systems in the existing services in the frequency band 4 200-4 400 MHz. Document 5B/TEMP/241] are utilized. If~~

~~such mitigation techniques cannot be utilized, then some external WAIC applications might not be compatible with existing aeronautical services~~.

However, both radio altimeter and WAIC systems are aeronautical applications and regulated by aviation certification authorities. Additional standardization and aircraft certification efforts must occur within the aviation community in order to guarantee the safe and compatible operation of WAIC and radio altimeter systems.

PROPOSALS:

ADD **USA/1.17/1**

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations

4 200-4 400 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
4 200-4 400	AERONAUTICAL RADIONAVIGATION **MOD 5.438** AERONAUTICAL MOBILE (R) **ADD 5.XXX** 5.439 5.440 **ADD 5.YYY**	

5.438 Use of the band 4 200-4 400 MHz by the aeronautical radionavigation service is reserved exclusively for radio altimeters installed on board aircraft and for the associated transponders on the ground. ~~However, passive sensing in the Earth exploration-satellite and space research services may be authorized in this band on a secondary basis (no protection is provided by the radio altimeters).~~

5.A117~~XXX~~ Use of the frequency band 4 200- 4 400 MHz by the aeronautical mobile (R) service is reserved exclusively for wireless avionics intra-communication systems that operate in accordance with recognized ~~limited to~~ international~~ly~~ ~~standardized~~ aeronautical standards. Such use shall be in accordance with Resolution [A117-WAIC] (WRC-15)~~systems for the provision of wireless avionics intra-communications~~.

5.YYY Passive sensing in the Earth exploration-satellite and space research services may be authorized in the band 4200-4400 MHz on a secondary basis. ~~(no protection is provided by radio altimeters or by wireless avionics intra-communications)~~.

Reason: To add a primary Aeronautical mobile (route) service (AM(R)S) allocation in the frequency band 4200-4400 MHz to Article 5 of the Radio Regulations. The AM(R)S allocation is limited to WAIC systems via footnote. The Earth exploration-satellite and Space research services maintain their status via footnote.

SUP **USA**/1.17/2

RESOLUTION 423 (WRC-12)

Consideration of regulatory actions, including allocations, to support Wireless Avionics Intra-Communications

Reason: The required studies have been completed and this resolution is no longer needed.

ADD **USA**/1.17/3

RESOLUTION [A117-WAIC] (WRC-15)

Use of Wireless Avionics Intra-Communications in the frequency band 4 200-4 400 MHz

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that aircraft are designed to enhance efficiency, reliability and safety, as well as to be more environmentally friendly;

b) that Wireless Avionics Intra-Communications (WAIC) systems provide radiocommunications between two or more aircraft stations integrated into or installed on a single aircraft, supporting the safe operation of the aircraft;

c) that WAIC systems do not provide radiocommunications between an aircraft and the ground, another aircraft or a satellite;

d) that WAIC systems operate in a manner that ensures the safe operation of an aircraft;

e) that WAIC systems operate during all phases of flight, including on the ground;

f) that aircraft equipped with WAIC systems operate globally;

g) that WAIC systems operating inside an aircraft receive the benefits of fuselage attenuation to facilitate sharing with other services;

h) that Recommendation ITU-R M.2067 provides technical characteristics and operational objectives for WAIC systems,

recognizing

that Annex 10 to the Convention on International Civil Aviation contains Standards and Recommended Practices (SARPs) for safety aeronautical radionavigation and radiocommunication systems used by international civil aviation,

resolves

1 that WAIC is defined as radiocommunication between two or more aircraft stations located on a single aircraft, supporting the safe operation of the aircraft;

2 that the WAIC systems operating in the frequency band 4 200-4 400 MHz shall not cause harmful interference to, nor claim protection from systems of the aeronautical radionavigation service operating in this frequency band;

3 that the WAIC systems operating in the frequency band 4 200-4 400 MHz shall comply with Standards and Recommended Practices published in Annex 10 to the Convention on International Civil Aviation;

4 that No. **43.1** shall not apply for WAIC systems,

instructs the Secretary-General

to bring this Resolution to the attention of ICAO,

invites ICAO

to take into account Recommendation ITU-R M.[WAIC-CONDITIONS] in the course of development of SARPs for WAIC systems.

Reasons: This Resolution provides relevant regulatory provisions to satisfy the agenda item.

WAC/111(20.05.15)

UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 10

10 *To recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences, in accordance with article 7 of the Convention.*

Background

Resolution **808 (WRC-12)** containing the Preliminary agenda for WRC-18 lists, as item 2.1 for inclusion in the agenda for WRC-18, to consider regulatory actions, including spectrum allocations, to support GMDSS modernization and implementation of e-navigation in accordance with Resolution **359 (WRC-12)**.

IMO plans to continue the modernization plan for the GMDSS through 2018 with further work to be undertaken on the implementation of e-navigation during the 2016 to 2019 study period.

In parallel to GMDSS modernization, IMO has received an application from the United States to introduce a new satellite service provider into the GMDSS. If a new satellite service provider is recognized for use in the GMDSS, consequential regulatory actions may need to be considered by the ITU.

The United States continues to support the agenda item for WRC-19 proposed by Resolution 808 (WRC-12) supported by Resolution 359 (WRC-12) in order to allow a framework for ITU-R studies and WRC-19 consideration of possible regulatory actions in support of IMO's GMDSS modernization and e-Navigation activities. The United States further proposes modifications to Resolution 359 (WRC-12) to include the consideration of ITU-R studies into possible consequential regulatory actions to support IMO introduction of new systems into the GMDSS.

Proposals

MOD USA/10/1

RESOLUTION 808 (Rev. WRC-15)

Agenda for the 2019 World Radiocommunication Conference

The World Radiocommunication Conference (Geneva, 2015),

2.1 to consider regulatory actions, including spectrum allocations, to support GMDSS modernization, implementation of e-navigation and recognition of new service providers in the GMDSS, in accordance with Resolution **359 (Rev. WRC-15)**;

Reasons: Maintaining this item on the agenda for the 2019 World Radiocommunication Conference will allow studies and possible modifications to the Radio Regulations in support of GMDSS Modernization, e-Navigation and addition of new service providers in the GMDSS. It is understood that Resolution 808 will be suppressed and a new Resolution with the WRC-19 agenda will be developed, taking account of the preliminary agenda adopted at WRC-12.

MOD USA/10/2

RESOLUTION 359 (WRC-15)

Consideration of regulatory provisions for update and modernization of the Global Maritime Distress and Safety System and studies related to e-navigation

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that there is a continuing need in the Global Maritime Distress and Safety System (GMDSS), on a global basis, for improved communications to enhance maritime capabilities;

b) that the International Maritime Organization (IMO) has initiated work plans for GMDSS modernization;

c) that the Automatic Identification System (AIS) offers potential enhancements to VHF maritime safety communications;

d) that advanced maritime MF/HF/VHF data systems and satellite communication systems may be used to deliver Maritime Safety Information (MSI) and other GMDSS communications;

e) that additional global and regional GMDSS satellite providers may be considered by IMO;

f) that IMO is developing a strategy and implementation plan for e-navigation, defined as the harmonized collection, integration, exchange, presentation and analysis of marine information on board and ashore by electronic means to enhance berth-to-berth navigation and related services for safety and security at sea and protection of the marine environment;

g) that GMDSS modernization may be influenced by the development of e-navigation,

noting

that WRC-12:

a) has reviewed Appendix **17** and Appendix **18** to improve efficiency and introduce bands for new digital technology;

b has reviewed the regulatory provisions and spectrum allocations for use by maritime safety systems for ships and ports,

recognizing

a) that advanced maritime communication systems may support the implementation of GMDSS modernization and e-navigation;

b) that IMO efforts to implement GMDSS modernization and e-navigation may require modification of the Radio Regulations to accommodate advanced maritime communication systems;

c) that due to the importance of these radio links in ensuring the safe operation of shipping and commerce and security at sea, they must be resilient to interference,

d) that IMO has received an application to introduce a new service provider into the GMDSS and if this service provider is recognized for use in the GMDSS, then consequential regulatory actions may need to be considered,

resolves to invite WRC-19

1 to consider possible regulatory actions, including spectrum allocations based on the ITU-R studies, to support GMDSS modernization;

2 to consider possible regulatory actions, including spectrum allocations based on the ITU-R studies, for maritime mobile service supporting e-navigation,

3 to consider possible consequential regulatory actions, based on ITU-R studies, related to new service provider recognized for use in the GMDSS,

invites ITU-R

to conduct studies, as a matter of urgency, taking into consideration the activities of IMO, in order to determine the requirements or regulatory actions to support GMDSS modernization, the implementation of e-navigation, and the recognition of new service providers for use in the GMDSS, and propose possible regulatory actions, including spectrum allocations,

invites

all members of the Radiocommunication Sector, IMO, the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), the International Electrotechnical Commission (IEC), the International Hydrographic Organization (IHO), the International Organization for Standardization (ISO) and the World Meteorological Organization (WMO) to contribute to these studies,

instructs the Secretary-General

to bring this Resolution to the attention of IMO and other international and regional organizations concerned.

Reasons: Modifications to Resolution 359 take account of the current situation in the IMO with respect to the modernization of GMDSS and e-Navigation, and the IMO consideration of new service providers as part of the GMDSS.

ATTACHMENT

PROPOSAL FOR ADDITIONAL AGENDA ITEM TO SUPPORT CONSIDERATION OF GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM (GMDSS)

Subject: Proposal to maintain Consideration of regulatory provisions for update and modernization of the Global Maritime Distress and Safety System and studies related to e-navigation on the WRC Agenda for WRC-2019

Origin: United States of America

Proposal: in accordance with Resolution 359 (Rev. WRC-15), to conduct studies, as a matter of urgency, taking into consideration the activities of IMO, in order to determine the requirements or regulatory actions to support GMDSS modernization, the implementation of e-navigation, and the recognition of new service providers for use in the GMDSS, and propose possible regulatory actions, including spectrum allocations.

Background/reason: Resolution 808 (WRC-12) included in the Preliminary agenda for WRC-18 item 2.1 - to consider regulatory actions, including spectrum allocations, to support GMDSS modernization and implementation of e-navigation in accordance with Resolution 359 (WRC-12).

IMO plans to continue the modernization plan for the GMDSS through 2018 with further work to be undertaken on the implementation of e-navigation during the 2016 to 2019 study period.
In parallel to GMDSS modernization, IMO has received an application from the United States to introduce a new satellite service provider into the GMDSS. If a new satellite service provider is recognized for use in the GMDSS, consequential regulatory actions may need to be considered by the ITU.

The ITU Radio Regulations contain many provisions, articles, appendices and Recommendations associated with the GMDSS. Changes to the Radio Regulations are expected to be necessary to support updates to the GMDSS, GMDSS modernization and e-Navigation.

Radiocommunication services concerned: maritime mobile service, mobile satellite service

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Indication of possible difficulties: None foreseen

Previous/ongoing studies on the issue: PDN Report ITU-R M.[MAR.MSS]

Studies to be carried out by: ITU-R Study Group 5, WP5B	*with the participation of: WP4C, IMO, IALA, IMSO*

ITU-R Study Groups concerned: Study Groups 4 and 5

ITU resource implications, including financial implications (refer to CV126): **Minimal**

Common regional proposal: Yes/No ***Multicountry proposal:*** Yes/No
Number of countries:

Remarks

Terrestrial Services

WAC/112(20.05.15)

PROPOSED EDITS TO NTIA DRAFT PROPOSAL ON WRC-15 AI 1.1
(REF. WAC/105(20.05.15))

With Respect to 1300-1400 MHz

IWG-2 members were not able to reach consensus on a proposal for WRC-15 agenda item 1.1 regarding the 1 300-1 400 MHz frequency range and, therefore, forwards two views on how the FCC should handle this matter.

View A is supported by Aviation Spectrum Resources, Inc., EchoStar Corporation, Inmarsat, Intelsat, Lockheed Martin Corp., New Wave Spectrum Partners LLC, SES Americom, and The Boeing Company.

View B is supported by Alcatel-Lucent, AT&T, Ericsson, Intel Corporation, Motorola Mobility, Nokia Solutions and Networks, Samsung, Sprint Corporation, Telecommunications Management Group Inc. and Verizon.

VIEW A

VIEW A: SUPPORT FOR THE U.S. PROPOSAL FOR NO CHANGE UNDER AI 1.1, FOR THE FREQUENCY BAND 1300-1400 MHz IN ALL THREE ITU REGIONS

The following WAC members are of the view that IWG-2 and the WAC should accept and endorse the current United States Proposal to WRC-15, under Agenda Item 1.1, for no change (NOC) in all three ITU Regions in the frequency band 1300-1400 MHz: Aviation Spectrum Resources, Inc., EchoStar Corporation, Inmarsat, Intelsat, Lockheed Martin Corp., New Wave Spectrum Partners LLC, SES Americom, and The Boeing Company.

Document WAC/105, from NTIA, contains a draft proposal for NOC for the 1300-1400 MHz frequency range. The United States took a slightly modified version of this proposal to the CITEL PCC.II meeting in Medellin, Colombia in February 2015. This NOC proposal is now a Preliminary Proposal in CITEL. Now, IWG-2 is considering whether to accept, reject, or propose comments to the proposal the U.S. has in CITEL.

There are two distinct segments in this frequency range – the 1300-1350 MHz band and the 1350-1400 MHz band. There appears to be consensus within IWG-2 that the three-Region NOC proposal for 1300-1350 MHz is acceptable, as this band segment is not identified in Section 1/1.1/4.2 of the CPM Report as a potential candidate frequency band. That makes the segment consistent in substance with the NTIA proposal in Document WAC/105.

For the 1350-1400 MHz band, the View A proponents agree with the NTIA proposal in WAC/105 for NOC across all three ITU Regions is the appropriate proposal. The View B proponents seek to limit the NOC proposal for 1350-1400 MHz to Region 2, despite not disputing that ITU-R compatibility studies all show that co-frequency sharing between radars and IMT systems in the same geographical area is not feasible in the 1300-1400 MHz range, and despite acknowledging that there is no technical basis for WRC-15 to assess compatibility between IMT and non-IMT mobile service in the 1350-1400 MHz band.

The only approach the FCC and the U.S. should consider for WRC-15 under these circumstances is to propose no change under Agenda Item 1.1 for WRC-15; these facts do not justify the View B approach of saying no change for our country and region, but leaving open the possibility that other countries and regions could ask WRC-15 to take actions not technically justified that inure to the extreme detriment of existing services. The View A proponents also do not support modifying the background section of the proposal to include references to future intra-U.S. Government studies. This proposal is for WRC-15, and not the future. Again, the View A proponents agree with NTIA and the WAC/105-based current U.S. proposal that for WRC-15, the only appropriate and justifiable proposal is for NOC across all three ITU Regions.

VIEW B

VIEW B: Revisions to WRC-15 AI 1.1
Proposal Regarding 1 300- 1 400 MHz

View B (attached) proposes revisions to the US proposal as submitted to the February 2015 meeting of CITEL PCC II for the 1 300 – 1 400 MHz frequency range under WRC-15 agenda item 1.1, in response to WAC/105 (20.05.15).

View B is supported by Alcatel-Lucent, AT&T, Ericsson, Intel Corporation, Motorola Mobility, Nokia Solutions and Networks, Samsung, Sprint Corporation, Telecommunications Management Group Inc. and Verizon.

Noting that the 1 300-1390 MHz frequency range is designated "for future study" in the NTIA Ten-year Plan and Timetable, the proponents of View B realize that the United States cannot support identification of spectrum within this frequency range to IMT due to existing operations in the United States. The attached proposal supports NOC in 1350-1400 MHz in Region 2, while not making a proposal regarding other Regions.

In addition, the proponents of View B have significant concerns about text regarding the role of the ITU-R in determining the "practicality" of mitigation techniques. Regarding another important issue, text regarding the possibility of harmonization has also been corrected based upon CPM text.

ATTACHMENT TO VIEW B:
Revisions to WRC-15 AI 1.1
Proposal Regarding 1 300- 1 400 MHz

Draft

United States of America

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 1.1

1.1 to consider additional spectrum allocations to the mobile service on a primary basis and identification of additional frequency bands for International Mobile Telecommunications (IMT) and related regulatory provisions, to facilitate the development of terrestrial mobile broadband applications, in accordance with Resolution **233 (WRC-12);**

Background Information: The 2012 World Radiocommunication Conference (WRC-12) recognized a need for additional radio spectrum to support the increasing mobile data traffic, and placed consideration of additional spectrum allocations for terrestrial mobile broadband applications on the agenda for WRC-15. The ITU established the Joint Task Group (JTG) 4-5-6-7 to consider spectrum requirements for IMT/mobile broadband and conduct compatibility studies taking into account protection requirements of other services from concerned ITU-R Working Parties.

JTG 4-5-6-7 ~~conducted~~ carried out studies on the compatibility between IMT systems and the radars that operate in the 1 300-1 400 MHz range and all studies show that co-frequency sharing between radars and IMT systems in the same geographical area is not feasible. These studies are contained in a working document attached to the final JTG 4-5-6-7 Chairman's Report (Annex 25 document 4-5-6-7/715). Additionally, the studies show that global harmonization of this band for IMT use may not be feasible. ~~and that any use of portions of this frequency range for IMT is possible only at the national level. Moreover, the mitigation techniques in Annex 25 that might allow compatible operations at the national level "have not at this point been determined as practical by the expert working parties" of the ITU-R~~.

In Region 1 and the United States, the frequency range 1 350-1 400 MHz (1 350-1 390 MHz in the United States) has co-primary allocations to the fixed service (FS), mobile service (MS), and radiolocation services In addition, the 1350-1370 MHz frequency band has a co-primary allocation to the aeronautical radionavigation service in the United States and Canada via

footnote 5.334). The JTG did not conduct sharing studies between IMT and other MS systems operating in the band. Therefore, no technical basis exists to assess the compatibility between these differing MS applications. Given the importance of these MS operations in the United States, including critical aeronautical mobile telemetry (AMT) operations, and the lack of studies in the ITU-R on compatibility between the differing MS uses of the band, the United States cannot support identification for IMT use in the 1 300-1 400 MHz frequency range.

The 1 300-1390 MHz frequency range is designated "for future study" in the NTIA Ten-year Plan and Timetable and "…to assist in identifying additional frequency bands for potential repurposing, NTIA will work with federal agencies to complete quantitative assessments of actual spectrum use in five frequency bands", which include 1 300- 1 390 MHz.[1]

Given the results of the ITU-R studies in the working document, the lack of studies in the ITU-R on compatibility between the differing MS uses of the band, and the importance of these MS operations in the United States, the United States cannot support IMT identification in the 1 300 1 350-1 400 MHz band in Region 2. The US makes no proposal regarding other Regions for the 1350-1400 MHz band. The 1 300-1 350 MHz band was not identified as a potential candidate band by JTG 4-5-6-7: the United States proposes NOC for all 3 Regions for the 1 300- 1 350 MHz band.

Proposal:

NOC USA/1.1/1

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations
(See No. **2.1**)

1 300-1 400 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 300-1 350	RADIOLOCATION AERONAUTICAL RADIONAVIGATION 5.337 RADIONAVIGATION-SATELLITE (Earth-to-space) 5.149 5.337A	

[1] http://www.ntia.doc.gov/files/ntia/publications/ntia_5th_interim_progress_report_on_ten-year_timetable_april_2015.pdf

~~*****~~ ~~**1 350-1 400**~~ ~~FIXED~~ ~~MOBILE~~ ~~RADIOLOCATION~~ ~~5.149 5.338 5.338A 5.339~~	**1 350-1 400** RADIOLOCATION 5.338A 5.149 5.334 5.339	~~*****~~

Reasons: ~~Preliminary~~ ITU-R studies show that co-frequency sharing between IMT and incumbent radiolocation systems in the same geographical area is not feasible. The compatibility between IMT and other mobile service applications was not studied. ~~1 300- 1 350 MHz was not identified as a potential candidate band by JTG4-5-6-7: NOC is proposed for all 3 Regions. For the 1350-1400 MHz frequency band, NOC is proposed for Region 2: no proposal is made for the other Regions.~~

WAC/113(20.05.15)

PROPOSED EDITS TO NTIA DRAFT PROPOSAL ON WRC-15 AI 1.1
(REF. WAC/109(20.05.15))

With Respect to 1 375- 1 400 and 1 427-1 452 MHz

IWG-2 members were not able to reach consensus on a proposal for WRC-15 agenda item 1.1 regarding IMT stations operating in the adjacent band(s) to Earth exploration-satellite service (1400-1427 MHz) and, therefore, forwards two views on how the FCC should handle this matter.

View A is supported by Aerospace and Flight Test Radio Coordinating Council, Aviation Spectrum Resources, Inc., New Wave Spectrum Partners LLC, The Boeing Company, and Lockheed Martin Corporation.

View B is supported by Alcatel-Lucent, AT&T, Ericsson, Intel Corporation, Motorola Mobility, Nokia Solutions and Networks, Samsung, Sprint Corporation, Telecommunications Management Group Inc. and Verizon.

VIEW A

VIEW A: View A supporting the Federal Agency proposal (WAC 109) for mandatory limits on IMT unwanted emissions to protect passive earth exploration satellite service ("EESS") systems operating in 1400-1427 MHz immediately adjacent to bands occupied by IMT systems

WAC members setting forth this view (View A) carefully considered the necessary protection for EESS in the 1400-1427 MHz band. As a result the members noted below support NTIA's proposal (WAC Doc. 109)[1] as the advice the WAC should provide to the FCC in its reconciliation process with NTIA. WAC members Aerospace and Flight Test Radio Coordinating Council, Aviation Spectrum Resources, Inc., New Wave Spectrum Partners LLC, Lockheed Martin Corp., and The Boeing Company support this view. The reasons are as follows.

First. The NTIA proposal is based on Report ITU-R RS.2336 which provides the maximum unwanted emissions from IMT operations in the adjacent band into the 1400-1427 MHz band. After completion of sharing studies by the Joint Task Group, this Report was approved jointly by Study Group 7 and Study Group 5 without qualification. The NTIA proposal, if adopted as the U.S. proposal, would align the U.S. with the CITEL IAP and a similar proposal within Europe to protect EESS as against identification of IMT above 1427 MHz. Within the Americas Region, and as of the Medellin meeting of PCC.II, nine CITEL administrations had signed on to the IAP that proposes mandatory limits as given in Report ITU-R RS.2336 for protecting the EESS band; two other administrations had signaled their intention to support such limits (s*ee* PCC. II Doc. 3818). U.S. failure to support this emerging international consensus would create a discordant and distracting issue for the U.S. as it seeks to forge as much comity as possible in aid of its principal objectives for the Conference. While the U.S. has indicated that the band 1427-1518 MHz will not be used for IMT within the U.S., there are existing U.S. EESS (passive) assets that could suffer harmful interference from IMT systems deployed in other countries if such limits are not adopted on a mandatory basis.

Second. At present, only six administrations have signed on to the IAP proposing No Change to RR **5.343 (**PCC. II Doc. 3817). Preserving RR **5.343** unchanged is a priority for the Aeronautical Mobile Telemetry (AMT) community. Aerospace companies and their association, AFTRCC, are concerned that, if the U.S. is perceived as not supporting the limits in Report ITU-R RS. 2336, either outright or by relegating them to mere recommended limits only, it could inadvertently provide a reason for other administrations not to support, or continue to support, No Change to RR **5.343** at the final CITEL PCC.II meeting in Ottawa. In other words, we are concerned that, if the U.S. were to propose to CITEL that the IAP be changed from mandatory limits to recommended limits as suggested by View B, support for the NOC on RR **5.343** could be put at significant risk.

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[1] WAC members supporting View A offer some editorial revisions to the NTIA proposal contained in WAC Doc. 109 as shown in the Attachment to View A, while fully retaining and supporting the mandatory limits included therein.

Third. The U.S. aerospace industry has an important stake in protecting the interests of its satellite customers around the world. U.S. companies have built major components of the earth sensing satellites operating in the 1400-1427 MHz band, which satellites were launched either by the U.S. or by other administrations. Failure to support the NTIA proposed limits, affirmed by the international community in the form of ITU-R Report RS. 2336, would be inconsistent with U.S. aerospace interests in the intense global competition with foreign suppliers.

Proponents of View B do not argue that EESS satellites are not particularly sensitive to harmful interference. Nor do they argue that IMT systems will not be characterized by dense deployments.

Rather, View B argues that the values in Report ITU-R RS. 2336 should be open to question because they would become mandatory in application of the Radio Regulations; that is, approval of an ITU-R Report is not an *a priori* indication of the technical credibility of the material contained therein nor its value to serve as a basis for international coordination of radio services (page 2). This argument proves far too much: By this standard, all Reports would be open to endless second-guessing -- including the very Reports that the IMT community relied upon to secure Agenda Item 1.1 in the first place.

Moreover, it is common practice for ITU-R Reports to be used as the basis for provisions in the Radio Regulations. Many decisions to be taken at WRC-15 will be reflected in the Radio Regulations, and those decisions will be based upon the studies and Reports that the JTG developed and that were then approved jointly by SG-5 and either SG-4, 6 or 7. Report ITU-R RS. 2336 is no exception to this.

View B also questions the wisdom of the U.S. making a proposal at odds with current FCC Rules for mobile system unwanted emissions. But here again, the argument is groundless: It is commonplace for the U.S. to make proposals which are not aligned with its current domestic rules. One need look no further than Agenda Item 1.1 to see that the U.S. has made proposals for re-allocation of bands and/or identification in ways which are not consistent with the current U.S. allocation table, e.g. 470-698 MHz and 3400-3700 MHz. Such inconsistencies are routinely dealt with post-Conference by means of rulemakings aligning the Commission's Rules with the results of the Conference. *See, e.g., Report and Order, Order, and Notice of Proposed Rulemaking* in ET Docket No. 12-338, FCC 15-50, released April 27, 2015 (effecting changes in numerous FCC Rules to align with decisions taken at WRC-07).

View B proponents also maintain that the deployment scenario assumed in Report ITU-R RS. 2336 conflicts with IMT deployments envisioned in the U.S.; i.e. that U.S. deployments assume on the order of 693 base stations in a 50 km radius, or half the 18 eNodeB stations assumed for deployments in and around Paris by the Report.

Whether IMT systems operating or deployed in the United States are consistent with the values set forth in the Report, is beside the point. EESS satellites are not subject to interference from just one administration, like the United States. Due to their wide field of view, the satellites will be subject to interference from numerous administrations, and a multitude of operating IMT

systems, at any given time. It is not surprising, then, that the IMT community's challenge to the basis for the density assumption at Study Group 5 (along with other points concerning the draft Report, Doc. SG5/157), did not receive the support of a single administration; rather, the Report was approved without a dissenting administration.

Beyond this, there also appear to be issues with the above technical assertions offered in support of View B. No basis has been discerned for the statement regarding 693 base stations in a 50 km radius; given the large size of the Paris metropolitan area and its corresponding population, the base station deployment assumed in Report ITU-R RS.2336 is eminently reasonable.

Finally, to treat the limits as merely recommendations, or utilize the generic mobile values in the table, would be pointless. As noted above, EESS satellites are by their nature international. In an environment characterized by tens of thousands, if not millions, of potentially interfering devices, with no one administration able to enforce compliance, it is hard to see how recommended limits, much less generic mobile limits, could provide the requisite protection.

ATTACHMENT TO VIEW A:
Suggested Revisions to Proposal in Document WAC 109

Draft

United States of America

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 1.1

1.1 to consider additional spectrum allocations to the mobile service on a primary basis and identification of additional frequency bands for International Mobile Telecommunications (IMT) and related regulatory provisions, to facilitate the development of terrestrial mobile broadband applications, in accordance with Resolution **233 (WRC-12);**

Background Information: NASA operates Earth exploration-satellite service (passive) sensors in the 1 400-1 427 MHz band. ~~The~~ NASA's Aquarius passive sensor is currently flying on the~~an~~ Argentinian satellite, SAC-D. NASA recently launched the Soil Moisture Active Passive (SMAP) satellite, which will begin operations in the near future. SMAP carries a passive sensor that operates across the 1 400-1 427 MHz band. Joint Task Group 4-5-6-7 completed compatibility studies regarding IMT in the 1375-1400 MHz and 1427-1452 MHz frequency bands and EESS (passive) in the adjacent 1 400-1 427 MHz frequency band that are contained in Report ITU-R RS.2336 jointly approved by ITU-R Study Group 7 and Study Group 5. Among other things, the JTG considered that the density of IMT deployment was a factor distinguishing IMT from traditional mobile systems covered by Res. 750 (Rev. WRC-12) and studied before WRC-07. The ~~draft~~ CPM Report provides the following text regarding the summary of studies on unwanted emissions in the
1 400-1 427 MHz band:

~~"Draft new Report ITU-R RS.[EESS-IMT 1.4 GHz] (now~~ Report ITU-R RS.2336~~)~~ shows that, in order to protect EESS (passive) systems, the unwanted emission level of –60 dBW/27 MHz as currently recommended in Resolution **750 (Rev. WRC-12)** is not sufficient and that the following levels of unwanted emissions in the 1 400-1 427 MHz frequency band are required:

For base stations:

– −80 dBW/27 MHz in the case both 1 375-1 400 MHz and 1 427-1 452 MHz frequency bands are considered to be used simultaneously by IMT systems;

– −75 dBW/27 MHz in the case only one of the 1 375-1 400 MHz or 1 427-1 452 MHz frequency bands is to be considered for IMT systems.

For user equipment:

– −65 dBW/27 MHz (This value is derived under the assumption that one UE is transmitting at an average output power of 15 dBm (over all resource blocks (RB)) per sector. It would therefore have to be verified consistently according to these conditions.)"

To protect U.S. spaceborne assets operating in the 1 400-1 427 MHz band from potential harmful interference by IMT operations in the adjacent 1 427-1 518 MHz band, these OOBE limits are required for IMT and need to be made mandatory in the Radio Regulations. The US proposes updating Tables 1-1 and 1-2 in Resolution 750 (Rev. WRC-12), with the appropriate IMT OOBE limits along with the existing mobile service OOBE limits.

Proposal:

MOD USA/1.1/1

RESOLUTION 750 (REV.WRC-15)

Compatibility between the Earth exploration-satellite service (passive) and relevant active services

…

TABLE 1-1

EESS (passive) band	Active service band	Active service	Limits of unwanted emission power from active service stations in a specified bandwidth within the EESS (passive) band[1]
1 400 – 1427 MHz	1 427 – 1452 MHz	Mobile	**For IMT base stations**: -75 dBW/27 MHz **{Editor's note: This may have to be revised if both bands around 1400 – 1427 MHz are used for IMT.}** **For IMT user equipment**: -65dBW/27 MHz
23.6-24.0 GHz	22.55-23.55 GHz	Inter-satellite	−36 dBW in any 200 MHz of the EESS (passive) band for non-geostationary (non-GSO) inter-satellite service (ISS) systems for which complete advance publication information is received by the Bureau before 1 January 2020, and −46 dBW in any 200 MHz of the EESS (passive) band for non-GSO ISS systems for which complete advance publication information is received by the Bureau on or after 1 January 2020
31.3-31.5 GHz	31-31.3 GHz	Fixed	For stations brought into use after 1 January 2012: −38 dBW

		(excluding HAPS)	in any 100 MHz of the EESS (passive) band. This limit does not apply to stations that have been authorized prior to 1 January 2012
50.2-50.4 GHz	49.7-50.2 GHz	Fixed-satellite (E-to-s)[2]	For stations brought into use after the date of entry into force of the Final Acts of WRC-07: −10 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain greater than or equal to 57 dBi −20 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain less than 57 dBi
50.2-50.4 GHz	50.4-50.9 GHz	Fixed-satellite (E-to-s)[2]	For stations brought into use after the date of entry into force of the Final Acts of WRC-07: −10 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain greater than or equal to 57 dBi −20 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain less than 57 dBi
52.6-54.25 GHz	51.4-52.6 GHz	Fixed	For stations brought into use after the date of entry into force of the Final Acts of WRC-07: −33 dBW in any 100 MHz of the EESS (passive) band

[1] The unwanted emission power level is the level measured at the antenna port.

[2] The limits apply under clear-sky conditions. During fading conditions, the limits may be exceeded by earth stations when using uplink power control.

TABLE 1-2

EESS (passive) band	**Active service band**	**Active service**	**Recommended maximum level of unwanted emission power from active service stations in a specified bandwidth within the EESS (passive) band**[1]
1 400-1 427 MHz	1 350-1 400 MHz	Radiolocation[2]	−29 dBW in the 27 MHz of the EESS (passive) band
		Fixed	−45 dBW in the 27 MHz of the EESS (passive) band for point-to-point
		Mobile	−60 dBW in the 27 MHz of the EESS (passive) band for mobile service stations except transportable radio-relay stations −45 dBW in the 27 MHz of the EESS (passive) band for transportable radio-relay stations
	1 427-1 429 MHz	Space operation (E-to-s)	−36 dBW in the 27 MHz of the EESS (passive) band
	1 427-1 429 MHz	Mobile except aeronautical mobile	−60 dBW in the 27 MHz of the EESS (passive) band for mobile service stations except IMT stations and transportable radio-relay stations[3] −45 dBW in the 27 MHz of the EESS (passive) band for

			transportable radio-relay stations
		Fixed	−45 dBW in the 27 MHz of the EESS (passive) band for point-to-point
	1 429- 1 452 MHz	Mobile	−60 dBW in the 27 MHz of the EESS (passive) band for mobile service stations except IMT stations and transportable radio-relay stations[3] −45 dBW in the 27 MHz of the EESS (passive) band for transportable radio-relay stations −28 dBW in the 27 MHz of the EESS (passive) band for aeronautical telemetry stations[4]
		Fixed	−45 dBW in the 27 MHz of the EESS (passive) band for point-to-point
31.3-31.5 GHz	30.0-31.0 GHz	Fixed-satellite (E-to-s)[5]	−9 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain greater than or equal to 56 dBi −20 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain less than 56 dBi
86-92 GHz[6]	81-86 GHz	Fixed	$-41 - 14(f - 86)$ dBW/100 MHz for $86.05 \le f \le 87$ GHz −55 dBW/100 MHz for $87 \le f \le 91.95$ GHz where f is the centre frequency of the 100 MHz reference bandwidth expressed in GHz
	92-94 GHz	Fixed	$-41 - 14(92 - f)$ dBW/100 MHz for $91 \le f \le 91.95$ GHz −55 dBW/100 MHz for $86.05 \le f \le 91$ GHz where f is the centre frequency of the 100 MHz reference bandwidth expressed in GHz

[1] The unwanted emission power level is the level measured at the antenna port.

[2] The mean power is to be understood here as the total power measured at the antenna port (or an equivalent thereof) in the band 1 400-1 427 MHz, averaged over a period of the order of 5 s.

[3] Stations of the mobile service for cellular systems, including those complying with Recommendation ITU-R M.1457or IMT standards, are likely to meet this unwanted emission power level.

[4] The band 1 429-1 435 MHz is also allocated to the aeronautical mobile service in eight Region 1 administrations on a primary basis exclusively for the purposes of aeronautical telemetry within their national territory (No. **5.342**).

[5] The recommended maximum levels apply under clear-sky conditions. During fading conditions, these levels may be exceeded by earth stations when using uplink power control.

[6] Other maximum unwanted emission levels may be developed based on different scenarios provided in Report ITU-R F.2239 for the band 86-92 GHz.

Reasons: Appropriate unwanted emission limits are required to protect EESS passive systems operating in the band 1 400-1 427 MHz from IMT stations operating in the adjacent band.

~~Canada is currently assessing the impact of the new limits. As such, in the proposal above, the unwanted emission limits contained in Report ITU-R RS.2336 are shown in square brackets.~~

MOD USA/1.1/2

5.338A In the bands 1 350-1 400 MHz, 1 427-1 452 MHz, 22.55-23.55 GHz, 30-31.3 GHz, 49.7-50.2 GHz, 50.4-50.9 GHz, 51.4-52.6 GHz, 81-86 GHz and 92-94 GHz, Resolution **750 (Rev.WRC-15)** applies. (WRC-~~12~~15)

[NOTE: consequential changes to the Table of Allocations will also be required.]

Reasons: The changes to the references in No. 5.338A are consequential to the revision of Resolution **750.**

VIEW B

VIEW B: [Brief Description]

The proponents of View B are of the view that the Commission should not support changes to Resolution **750 (rev. WRC-12)** as proposed by the NTIA position given in WAC/109, unless it has addressed the issues put forward below and is satisfied that the basis for the WAC/109 proposal is consistent with the Commissions' rules and consistent with the deployment characteristics of LTE systems operating in the United States. However, if the FCC decides to pursue changes to WRC Resolution 750, the proponents of View B have provided revisions in Attachment B with the recommendation that any values more stringent than the existing values should remain in Table 1-2. Alternately, the existing values of −60 dBW in the 27 MHz of the EESS (passive) band for mobile service stations could be implemented in Table 1-1.

View B is supported by Alcatel-Lucent, AT&T, Ericsson, Intel Corporation, Motorola Mobility, Nokia Solutions and Networks, Samsung, Sprint Corporation, Telecommunications Management Group Inc. and Verizon.

Background Information:

Resolution **750 (Rev. WRC-12)** addresses "Compatibility between the Earth exploration-satellite service (passive) and relevant active services": it includes Table 1-1 with mandatory out of band emission (OOBE) limits and Table 1-2 with recommended OOBE limits. Document WAC/109 proposes revisions to Tables 1-1 and 1-2 in Resolution **750 (Rev. WRC-12).** In particular, it proposes new values for out of band emission (OOBE) limits for IMT systems only and would make them mandatory in the Radio Regulations. The existing values for OOBE limits for other mobile services would remain recommended values. Resolution **750 (Rev. WRC-12)** is listed in the ITU Radio Regulations, Volume 3.

The proposal in WAC/109 is based upon a study undertaken by the ITU-R Joint Task Group 4-5-6-7 (JTG 4-5-6-7) and approved as Report RS.2336 by ITU-R Study Groups 5 and 7. The report addresses the compatibility between IMT systems in the frequency bands 1 375-1 400 MHz and 1 427-1 452 MHz and EESS (passive) systems in the 1 400-1 427 MHz frequency band.

This study should not be used as the basis for mandatory limits being placed on IMT equipment, which is what the proposal in WAC/109 does. It is a huge step to incorporate the results of an ITU-R report into the Radio Regulations. An ITU-R report is (as described in ITU-R Resolution 1-6) "A technical, operational or procedural statement, prepared by a Study Group on a given subject related to a current Question or the results of studies referred to in § 3.3." This is in contrast to a recommendation that is defined (again as in ITU-R Resolution 1-6) as "An answer to a Question, part(s) of a Question or topics referred to in § 3.3, which, within the scope of existing knowledge, research and available information, normally provides recommended specifications, requirements, data or guidance for recommended ways of undertaking a specified task; or recommended procedures for a specified application, and which is considered to be sufficient to serve as a basis for international cooperation in a given context in the field of radiocommunications."

Approval of a report is not an *a priori* indication of the technical credibility of the material contained within the report nor its value to serve as a basis for international coordination of radio services. There are no criteria for the approval of a ITU-R report other than it is done so by the responsible SG or SGs in the case of a study involving two or more SGs such as a sharing or compatibility study that involves services whose responsibilities fall under different SGs (as is the case here).

The View B proponents note the values of the proposed OOBE limits given in WAC/109 do not appear to be consistent with the Commissions' rules relating to equipment OOBE limits. The View B proponents request the Commission address this issue and if found to be the case, consider the appropriateness of the United Sates putting forward a proposal to WRC-15 at this time that is counter to the FCC's own rules.

- Proposed new values given in WAC/109 for inclusion in Table 1-1 of Resolution 750 (WRC-12) and are intended to be mandatory are:

TABLE 1-1

EESS (passive) band	**Active service band**	**Active service**	**Limits of unwanted emission power from active service stations in a specified bandwidth within the EESS (passive) band**[1]
1 400 – 1427 MHz	1 427 – 1452 MHz	Mobile	**For IMT base stations**: -75 dBW/27 MHz {Editor's note: This may have to be revised if both bands around 1400 – 1427 MHz are used for IMT.} **For IMT user equipment**: -65dBW/27 MHz

The View B proponents are also of the view that the network deployment and the power levels for the IMT equipment used in the Report RS.2336 study are not representative of how IMT/LTE networks operate or are deployed in the United States and should not be the basis for a United States proposal to modify the Radio Regulations at WRC-15. The View B proponents request the Commission verify whether the values used in the Report RS.2336 study are consistent or not with how LTE systems operate in the United States.

- The resultant values determined for the proposed OOBE values given in the table above are taken directly from Report RS.2336. These results are critically dependent upon the assumptions made regarding the deployment and power levels for LTE UE and base stations transmissions of the IMT/LTE network used in Report RS.2336.
- The Report RS.2336 study assumed 18 LTE sites per 100 square kilometers. Typical maximum values for LTE site density in North America are in the range 7-9 sites per 100 square kilometers in a 50 km area surrounding major markets and 1-2 sites per 100 square kilometers in a 50 km area surrounding minor markets in the United States.
- It is noted that AT&T Inc, Nokia Corporation, Nokia Solutions and Networks Oy, Sprint Corporation, Telefon AB – LM Ericsson, Telefónica SA, TeliaSonera AB, and Telstra Corporation submitted an input document to the ITU-R Study Group 5 meeting in

November 2014 taking issue with the IMT deployment values used in the Report RS.2336 study.

Finally, we note that the Canadian proposal to CITEL PCC II retained the proposed values in square brackets as they further study the issue. The proposed values in WAC/109 could have a substantial impact on IMT deployments in 1427-1518 MHz. In countries which already utilize the band in paired operation, the result would likely be power reduction which would result in poor network performance, as well as requiring the replacement of all existing user devices. This proposal expresses the "limits of unwanted emission power" in resolution bandwidths of 27 MHz. Considering the proposed limit is for out of band emissions and not spurious levels beyond 250% of the channel bandwidth, this means that the device transmitting at the channel closest to 1427 MHz must fulfill the -65dBW/27MHz (-35dBm/27MHz) immediately outside the channel which means the ACLR requirement would be increased to 23dBm – (-35dBm) = -58dBc which is a significant increase to the -30dBc which is currently specified.

Based upon the above, the companies listed above urge FCC to not make any changes to Resolution **750 (rev. WRC-12).** However, if the FCC decides to pursue changes to WRC Resolution 750, any proposed more stringent values should remain in Table 1-2 as shown in the attachment. Alternately, the existing values (−60 dBW in the 27 MHz of the EESS (passive) band for mobile service stations) could be implemented in Table 1-1.

ATTACHMENT TO VIEW B:
Proposed Revisions to WAC/109

Draft

United States of America

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 1.1

1.1 to consider additional spectrum allocations to the mobile service on a primary basis and identification of additional frequency bands for International Mobile Telecommunications (IMT) and related regulatory provisions, to facilitate the development of terrestrial mobile broadband applications, in accordance with Resolution **233 (WRC-12);**

Background Information: NASA operates Earth exploration-satellite service (passive) sensors in the 1 400-1 427 MHz band. NASA's ~~The~~ Aquarius passive sensor is currently flying on the ~~an~~ Argentinian satellite, SAC-D. NASA recently launched the Soil Moisture Active Passive (SMAP) satellite, which will begin operations in the near future. SMAP carries a passive sensor that operates across the 1 400-1 427 MHz band. Joint Task Group 4-5-6-7 completed compatibility studies regarding IMT in the 1374-1400 MHz and 1427-1452 MHz frequency bands and EESS (passive) in the adjacent 1 400-1 427 MHz frequency band that are contained in Report ITU-R RS.2336 jointly approved by ITU-R Study Group 7 and Study Group 5.

~~The draft CPM Report provides the following text regarding the summary of studies on unwanted emissions in the 1 400-1 427 MHz band:~~

~~"Draft new Report ITU-R RS.[EESS-IMT 1.4 GHz] (now~~ Report ITU-R RS.2336~~) shows that, in order to protect EESS (passive) systems, the unwanted emission level of −60 dBW/27 MHz as currently recommended in Resolution 750 (Rev. WRC-12) is not sufficient and that~~ proposes the following levels of unwanted emissions in the 1 400-1 427 MHz frequency band ~~are required~~:

For base stations:

−80 dBW/27 MHz in the case both 1 375-1 400 MHz and 1 427-1 452 MHz frequency bands are considered to be used simultaneously by IMT systems;

−75 dBW/27 MHz in the case only one of the 1 375-1 400 MHz or 1 427-1 452 MHz frequency bands is to be considered for IMT systems.

For user equipment:

−65 dBW/27 MHz (This value is derived under the assumption that one UE is transmitting at an average output power of 15 dBm (over all resource blocks (RB)) per sector. It would therefore have to be verified consistently according to these conditions.)

To protect U.S. spaceborne assets operating in the 1 400-1 427 MHz band from potential harmful interference by IMT operations in the adjacent 1 427-1 518 MHz band, these OOBE limits are required for IMT and need to be made mandatory in the Radio Regulations the US proposes to update Table 1-2 in Resolution 750 (Rev. WRC-12), with the appropriate IMT OOBE limits along with the existing mobile service OOBE limits..

Proposal:
MOD USA/1.1/1

RESOLUTION 750 (REV.WRC-15)

Compatibility between the Earth exploration-satellite service (passive) and relevant active services

…

TABLE 1-1

EESS (passive) band	Active service band	Active service	Limits of unwanted emission power from active service stations in a specified bandwidth within the EESS (passive) band[1]
1 400 – 1427 MHz	1 427 – 1452 MHz	Mobile	**For IMT base stations:** -75 dBW/27 MHz {**Editor's note: This may have to be revised if both bands around 1400 – 1427 MHz are used for IMT.**} **For IMT user equipment:** -65dBW/27 MHz
23.6-24.0 GHz	22.55-23.55 GHz	Inter-satellite	−36 dBW in any 200 MHz of the EESS (passive) band for non-geostationary (non-GSO) inter-satellite service (ISS) systems for which complete advance publication information is received by the Bureau before 1 January 2020, and −46 dBW in any 200 MHz of the EESS (passive) band for non-GSO ISS systems for which complete advance publication information is received by the Bureau on or after 1 January 2020
31.3-31.5 GHz	31-31.3 GHz	Fixed (excluding	For stations brought into use after 1 January 2012: −38 dBW in any 100 MHz of the EESS (passive) band. This limit does

		HAPS)	not apply to stations that have been authorized prior to 1 January 2012
50.2-50.4 GHz	49.7-50.2 GHz	Fixed-satellite (E-to-s)[2]	For stations brought into use after the date of entry into force of the Final Acts of WRC-07: −10 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain greater than or equal to 57 dBi −20 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain less than 57 dBi
50.2-50.4 GHz	50.4-50.9 GHz	Fixed-satellite (E-to-s)[2]	For stations brought into use after the date of entry into force of the Final Acts of WRC-07: −10 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain greater than or equal to 57 dBi −20 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain less than 57 dBi
52.6-54.25 GHz	51.4-52.6 GHz	Fixed	For stations brought into use after the date of entry into force of the Final Acts of WRC-07: −33 dBW in any 100 MHz of the EESS (passive) band

[1] The unwanted emission power level is the level measured at the antenna port.

[2] The limits apply under clear-sky conditions. During fading conditions, the limits may be exceeded by earth stations when using uplink power control.

TABLE 1-2

EESS (passive) band	**Active service band**	**Active service**	**Recommended maximum level of unwanted emission power from active service stations in a specified bandwidth within the EESS (passive) band**[1]
1 400-1 427 MHz	1 350- 1 400 MHz	Radiolocation[2]	−29 dBW in the 27 MHz of the EESS (passive) band
		Fixed	−45 dBW in the 27 MHz of the EESS (passive) band for point-to-point
		Mobile	−60 dBW in the 27 MHz of the EESS (passive) band for mobile service stations except transportable radio-relay stations −45 dBW in the 27 MHz of the EESS (passive) band for transportable radio-relay stations
	1 427- 1 429 MHz	Space operation (E-to-s)	−36 dBW in the 27 MHz of the EESS (passive) band
	1 427 – 1452 MHz	Mobile	**For IMT base stations**: -75 dBW/27 MHz **{Editor's note: This may have to be revised if both bands around 1400 – 1427 MHz are used for IMT.}** **For IMT user equipment**:

			-65dBW/27 MHz
	1 427- 1 429 MHz	Mobile except aeronautical mobile	−60 dBW in the 27 MHz of the EESS (passive) band for mobile service stations except IMT stations and transportable radio-relay stations[3] −45 dBW in the 27 MHz of the EESS (passive) band for transportable radio-relay stations
		Fixed	−45 dBW in the 27 MHz of the EESS (passive) band for point-to-point
	1 429- 1 452 MHz	Mobile	−60 dBW in the 27 MHz of the EESS (passive) band for mobile service stations except IMT stations and transportable radio-relay stations[3] −45 dBW in the 27 MHz of the EESS (passive) band for transportable radio-relay stations −28 dBW in the 27 MHz of the EESS (passive) band for aeronautical telemetry stations[4]
		Fixed	−45 dBW in the 27 MHz of the EESS (passive) band for point-to-point
31.3-31.5 GHz	30.0-31.0 GHz	Fixed-satellite (E-to-s)[5]	−9 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain greater than or equal to 56 dBi −20 dBW into the 200 MHz of the EESS (passive) band for earth stations having an antenna gain less than 56 dBi
86-92 GHz[6]	81-86 GHz	Fixed	$-41 - 14(f - 86)$ dBW/100 MHz for $86.05 \le f \le 87$ GHz −55 dBW/100 MHz for $87 \le f \le 91.95$ GHz where f is the centre frequency of the 100 MHz reference bandwidth expressed in GHz
	92-94 GHz	Fixed	$-41 - 14(92 - f)$ dBW/100 MHz for $91 \le f \le 91.95$ GHz −55 dBW/100 MHz for $86.05 \le f \le 91$ GHz where f is the centre frequency of the 100 MHz reference bandwidth expressed in GHz

[1] The unwanted emission power level is the level measured at the antenna port.

[2] The mean power is to be understood here as the total power measured at the antenna port (or an equivalent thereof) in the band 1 400-1 427 MHz, averaged over a period of the order of 5 s.

[3] Stations of the mobile service for cellular systems, including those complying with Recommendation ITU-R M.1457or IMT standards, are likely to meet this unwanted emission power level.

[4] The band 1 429-1 435 MHz is also allocated to the aeronautical mobile service in eight Region 1 administrations on a primary basis exclusively for the purposes of aeronautical telemetry within their national territory (No. **5.342**).

[5] The recommended maximum levels apply under clear-sky conditions. During fading conditions, these levels may be exceeded by earth stations when using uplink power control.

[6] Other maximum unwanted emission levels may be developed based on different scenarios provided in Report ITU-R F.2239 for the band 86-92 GHz.

Reasons: ~~Appropriate~~ To provide unwanted emission limits ~~are required~~ to protect EESS passive systems operating in the band 1 400-1 427 MHz from IMT stations operating in the adjacent band. ~~Canada is currently assessing the impact of the new limits. As such, in the proposal above, the unwanted emission limits contained in Report ITU-R RS-2336 are shown in square brackets.~~

MOD USA/1.1/2

5.338A In the bands 1 350-1 400 MHz, 1 427-1 452 MHz, 22.55-23.55 GHz, 30-31.3 GHz, 49.7-50.2 GHz, 50.4-50.9 GHz, 51.4-52.6 GHz, 81-86 GHz and 92-94 GHz, Resolution **750 (Rev.WRC-15)** applies. (WRC-~~12~~15)

[NOTE: consequential changes to the Table of Allocations will also be required.]

Reasons: The changes to the references in No. 5.338A are consequential to the revision of Resolution **750.**

WAC/114(20.05.15)

PROPOSED EDITS TO NTIA DRAFT PROPOSAL ON WRC-15 AI 1.1
(REF. WAC/105(20.05.15))

With Respect to 2700-2900 MHz

IWG-2 members were not able to reach consensus on a proposal for WRC-15 agenda item 1.1 regarding the 2 700-2 900 MHz frequency band and, therefore, forwards two views on how the FCC should handle this matter.

View A is supported by Aviation Spectrum Resources, Inc., EchoStar Corporation, Inmarsat, Intelsat, Lockheed Martin Corp., New Wave Spectrum Partners LLC, SES Americom, and The Boeing Company.

View B is supported by Alcatel-Lucent, AT&T, Ericsson, Intel Corporation, Motorola Mobility, Nokia Solutions and Networks, Samsung, Sprint Corporation, Telecommunications Management Group Inc. and Verizon.

VIEW A

VIEW A: SUPPORT FOR THE U.S. PROPOSAL FOR NO CHANGE UNDER AI 1.1, FOR THE FREQUENCY BAND 2700-2900 MHz IN ALL THREE ITU REGIONS

The following WAC members are of the view that IWG-2 and the WAC should accept and endorse the current United States Proposal to WRC-15, under Agenda Item 1.1, for no change (NOC) in all three ITU Regions in the frequency band 2700-2900 MHz: Aviation Spectrum Resources, Inc., EchoStar Corporation, Inmarsat, Intelsat, Lockheed Martin Corp., New Wave Spectrum Partners LLC, SES Americom, and The Boeing Company.

Document WAC/105, from NTIA, contains a draft proposal for NOC for the 2700-2900 MHz frequency range. The United States took a slightly modified version of this proposal to the CITEL PCC.II meeting in Medellin, Colombia in February 2015. This NOC proposal is now a Preliminary Proposal in CITEL. Now, IWG-2 is considering whether to accept, reject, or propose comments to the proposal the U.S. has in CITEL.

The View A proponents agree with the NTIA proposal in WAC/105 for NOC across all three ITU Regions is the appropriate proposal. The View B proponents seek to limit the NOC proposal to Region 2, despite not disputing that ITU-R compatibility studies all show that co-frequency sharing between radars and IMT systems in the same geographical area is not feasible in the 2700-2900 MHz range, and despite the fact that the band is used extensively by Federal users for air traffic control (ATC) (a safety service), weather, and defense radar systems.

The only approach the FCC and the U.S. should consider for WRC-15 under these circumstances is to propose no change under Agenda Item 1.1 for WRC-15; these facts do not justify the View B approach of saying no change for our country and region, but leaving open the possibility that other countries and regions could ask WRC-15 to take actions not technically justified that inure to the extreme detriment of existing services. The View A proponents also do not support modifying the background section of the proposal to include references to future intra-U.S. Government studies. This proposal is for WRC-15, and not the future. Again, the View A proponents agree with NTIA and the WAC/105-based current U.S. proposal that for WRC-15, the only appropriate and justifiable proposal is for NOC across all three ITU Regions.

VIEW B

VIEW B:
Proposed Edits to Proposal Regarding
2 700- 2 900 MHz for WRC-15 Agenda Item 1.1

View B (attached) proposes revisions to the US proposal as submitted to the February 2015 meeting of CITEL PCC II for the 2 700 – 2 900 MHz frequency range under WRC-15 agenda item 1.1, in response to WAC/105 (20.05.15).

View B is supported by Alcatel-Lucent, AT&T, Ericsson, Intel Corporation, Motorola Mobility, Nokia Solutions and Networks, Samsung, Sprint Corporation, Telecommunications Management Group Inc. and Verizon.

Noting that the 2 700-2 900 MHz frequency range is designated "for future study" in the NTIA Ten-year Plan and Timetable, the proponents of View B realize that the United States cannot support identification of spectrum within this frequency range to IMT due to existing operations in the United States. Therefore, the attached proposal supports NOC in 2 700- 2 900 MHz in Region 2, while not making a proposal regarding other Regions.

Important corrections to text regarding the possibility of harmonization have been made based upon CPM text. In addition, the text in the "reasons" section of the proposal has been clarified to show that the sharing studies results are for co-frequency sharing in the same geographic location.

ATTACHMENT TO VIEW B:
Proposed Edits to Proposal on 2 700- 2 900 MHz
for WRC-15 Agenda Item 1.1

Draft

United States of America

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 1.1

1.1 to consider additional spectrum allocations to the mobile service on a primary basis and identification of additional frequency bands for International Mobile Telecommunications (IMT) and related regulatory provisions, to facilitate the development of terrestrial mobile broadband applications, in accordance with Resolution **233 (WRC-12);**

Background Information: The 2012 World Radiocommunication Conference (WRC-12) recognized a need for additional radio spectrum to support the increasing mobile data traffic, and placed consideration of additional spectrum allocations for terrestrial mobile broadband applications on the agenda for WRC-15. The ITU established the Joint Task Group (JTG) 4-5-6-7 to consider spectrum requirements for IMT/mobile broadband and conduct compatibility studies taking into account protection requirements of other services from concerned ITU-R Working Parties.

The 2700-2900 MHz frequency band is allocated on a primary basis to the aeronautical Radionavigation service in all three Regions. ITU-R ~~conducted~~ carried out compatibility studies between IMT and incumbent radar systems operating in the 2 700-2 900 MHz frequency band. All these studies show co-frequency sharing is not feasible between radars and IMT systems in the same geographical location. Adjacent-frequency sharing could be possible, but only after applying modifications to both the IMT systems and existing radar systems, imposing geographic separations between IMT and radar systems, and instituting a spectrum guard band between the IMT frequencies and radar frequencies. The guard band size is dependent on the assumed IMT/radar modifications and the imposed geographic separations. These studies are contained in the working document in the final JTG 4-5-6-7 Chairman's Report (Annex 30 to document 4-5-6-7/715). Based on the JTG 4-5-6-7 compatibility studies, global harmonization of the 2 700-2 900 MHz frequency band or a portion thereof for IMT use may not be possible~~is not feasible, and any possible IMT use in portions of this frequency band would be only at the~~

~~national level, after coordination with neighboring countries, where the coordination distances potentially could be large (i.e., hundreds of kilometers), to ensure protection of their radar use.~~

In the United States, the frequency band 2 700-2 900 MHz is extensively used for air traffic control (ATC), weather, and defense radar systems. The ATC applications are a safety service, subject to the additional protections offered by Radio Regulation No. **4.10**. The radar systems utilize the full 2 700-2 900 MHz frequency band in the United States. The United States cannot accommodate the necessary adjacent-frequency sharing conditions, including the required guard band, to support IMT implementation in this frequency band. The band is designated "for future study" in the NTIA Ten-year Plan and Timetable and "…to assist in identifying additional frequency bands for potential repurposing, NTIA will work with federal agencies to complete quantitative assessments of actual spectrum use in five frequency bands", which include 2 700-2 900 MHz.[1]

Given the preliminary ITU-R sharing study results between incumbent radar systems and IMT and the use in the United States, the United States proposes no change to the ITU Radio Regulations at WRC-15 for Region 2. The United States makes no proposal regarding other Regions.~~and cannot support mobile service allocations and/or IMT identification for the 2 700-2 900 MHz frequency band.~~

Proposal:

NOC USA/1.1/1

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations
(See No. **2.1**)

2 700-2 900 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
*****	**2 700-2 900** AERONAUTICAL RADIONAVIGATION 5.337 Radiolocation 5.423 5.424	*****

[1] http://www.ntia.doc.gov/files/ntia/publications/ntia_5th_interim_progress_report_on_ten-year_timetable_april_2015.pdf

Reasons: Preliminary ITU-R studies show that co-frequency sharing ~~compatibility~~ between IMT and incumbent radar systems is not feasible in the same geographical ~~area~~location. The United States currently fully utilizes the frequency band for incumbent radar systems.

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WAC/115(20.05.15)

PROPOSED EDITS TO NTIA DRAFT PROPOSAL ON WRC-15 AI 1.1
(REF. WAC/105(20.05.15))

With Respect to 4 400-4 990 MHz

IWG-2 members were not able to reach consensus on a proposal for WRC-15 agenda item 1.1 regarding the 4 400- 4 990 MHz frequency range and, therefore, forwards two views on how the FCC should handle this matter.

View A is supported by Aerospace and Flight Test Radio Coordinating Council, Aviation Spectrum Resources, Inc., The Boeing Company, Lockheed Martin Corp., Intelsat, SES Americom, EchoStar Corporation, and New Wave Spectrum Partners LLC.

View B is supported by AT&T, Ericsson, Intel Corporation, Motorola Mobility, Nokia Solutions and Networks, Samsung, Sprint Corporation, Telecommunications Management Group Inc. and Verizon.

VIEW A

VIEW A: SUPPORT FOR THE U.S. PROPOSAL FOR NO CHANGE UNDER AI 1.1, FOR THE FREQUENCY BAND 4400-4990 MHz IN ALL THREE ITU REGIONS

The following WAC members are of the view that IWG-2 and the WAC should accept and endorse the current United States Proposal to WRC-15, under Agenda Item 1.1, for no change (NOC) in all three ITU Regions in the frequency band 4400-4990 MHz: Aerospace and Flight Test Radio Coordinating Council, Aviation Spectrum Resources, Inc., The Boeing Company, Lockheed Martin Corp., Intelsat, SES Americom, EchoStar Corporation, and New Wave Spectrum Partners LLC.

Document WAC/105, from NTIA, contains a draft proposal for NOC for the 4400-4990 MHz frequency range. The United States took a slightly modified version of this proposal to the CITEL PCC.II meeting in Medellin, Colombia in February 2015. This NOC proposal is now a Preliminary Proposal in CITEL. Now, IWG-2 is considering whether to accept, reject, or propose comments to the proposal the U.S. has in CITEL. There are two distinct segments in this frequency range – the 4400-4500 MHz band and the 4500-4800 MHz bands. The reasons for support of the NOC proposal for these two segments, as well as for the entirety of the band 4400-4990 MHz, are provided below.

4400-4500 MHz:

The frequency band 4200-4400 MHz is globally allocated to the aeronautical radionavigation service exclusively for use by radio altimeters. The operational and technical characteristics and protection criteria are provided in Recommendation ITU-R M.2059. Radio altimeters are an essential component of the safe operation of an aircraft, including precision approach, landing, ground proximity and collision avoidance systems. This band is the only frequency band used for this purpose. Aircraft relying on this frequency band transit across all three ITU regions and any restrictions placed on IMT in one region must be applied across all regions. Otherwise, the safety of passengers and aircraft cannot be guaranteed.

The CPM Report observes in section 4.1.9.4, "No studies were provided regarding protection of radio altimeters from unwanted emissions from IMT operating in the frequency band 4 400-4 900 MHz." Because no studies were conducted, the safety of aircraft and passengers cannot be guaranteed. Aircraft routinely fly between countries and between regions, spectrum in the 4400-4500 MHz frequency band that is not globally harmonized could put the safety of those aircraft in question, particularly without appropriate studies.

Given the importance of protecting the flying public, the proponents of View A believe the current U.S. proposal for NOC across all three ITU Regions is the appropriate and justifiable proposal. Changes to the proposal suggested in View B (including limiting the proposal to Region 2 and inclusion of inappropriate "position" statements in the background) would be counterproductive and could backfire on U.S. interests in other WRC-15 agenda items.

4500-4800 MHz:

The 4500-4800 MHz band is globally allocated and harmonized to provide C-Band FSS downlinks. This band is part of the Appendix 30B FSS Plan. This Plan aims to preserve orbit/spectrum resources and guarantee, for developed and developing countries equitable access to the geostationary-satellite orbit at anytime and anywhere for their use. As the CPM Report observes, Appendix 30B and its C-band plan "are envisaged and used as a supporting backbone to the telecommunication infrastructure of many developing countries, in particular those which are located in high rain fall zones/areas of the globe." CPM Report, Section 1/1.1/4.1.9.3.

C-band spectrum is very valuable to satellite networks for a number of reasons. One of the main reasons is its unique and important technical properties - low rain fade - which makes it appropriate for national telecommunication and broadcasting infrastructure, satellite telemetry, disaster relief, public meteorological data distribution, and aeronautical applications in various regions. Technical and regulatory mechanisms must be fully developed to ensure continued worldwide access for these services in the increasingly-congested international radiofrequency spectrum environment. Any proposal identifying IMT for these bands that relies upon administrations to individually determine a level of protection for the FSS operating within their territories would mean that continued access for these critical and highly reliable services – either worldwide or within individual ITU Regions –would be unacceptably not assured.

ITU-R studies conducted in Joint Task Group 4-5-6-7 to assess the technical feasibility of deploying IMT-Advanced systems in the 4500-4800 MHz bands conclude unequivocally that when FSS is deployed in a ubiquitous manner and/or with no individual licensing of earth stations, sharing with IMT is not feasible in the same geographical area since no minimum separation distance can be guaranteed. ITU-R studies determined that the separation distances required to protect FSS earth stations, taking the effects of terrain into account, have been found to range from at least tens of kilometers up to several hundred kilometers based on the various potential IMT Advanced macro cell and small cells deployment scenarios.
Maintenance of separation distances on this order requires a clearly specified global approach to ensure protection of the incumbent primary FSS. Mechanisms considered by proponents of an IMT identification provide a level of protection only at the border of a neighboring administration and no protection at all for earth stations operating within the country of an administration authorizing IMT. In other words, there would not be global protection for receiving earth stations. Therefore, noting that the resulting contours produced by these separation distances enclose areas of considerable size and given the considerable numbers of FSS earth stations that operate in the C-band frequencies around the world, IMT deployment in the 4500-4800 MHz band is not feasible.

The CPM Report echoes these conclusions. Section 1/1.1/4.1.9.3 states without dispute that "[w]hen FSS earth stations are deployed in a typical ubiquitous manner or with no individual licensing, sharing between IMT-Advanced and FSS is not feasible in the same geographical area since no minimum separation distance can be guaranteed." The same section of the report concludes that "[d]eployment of IMT-Advanced would constrain future FSS earth stations from being deployed in the same area in the frequency band 4 500-4 800 MHz as shown by the studies."

Given the importance of the Appendix 30B frequencies to the satellite aspirations of developing world countries, in particular, the View A proponents believe that the current U.S. proposal for NOC across all three ITU Regions is the appropriate and justifiable proposal. Changes to the proposal suggested in View B (including limiting the proposal to Region 2 and inclusion of inappropriate "position" statements in the background) would be counterproductive and could backfire on U.S. interests in other WRC-15 agenda items. If, however, there is to be a change to the U.S. proposal in the manner substantively suggested by the View B proponents, the View A proponents believe that language reflecting the conclusions of the CPM Report and the relevant ITU-R Report regarding the lack of feasibility between IMT and FSS in the 4500-4800 MHz band should be included into the background section of any such revised proposal.

4400-4990 MHz:

With two relatively small exceptions (i.e. 4825-4835 MHz and 4950-4990 MHz; see RR 5.442), the entire 4400-4990 MHz band is available for aeronautical mobile use on a worldwide basis. The band is utilized for a variety of Government-related systems and missions supported by AFTRCC Member Companies. Identification of the band for IMT would significantly constrain the operation and use of such systems.

Given the importance of the 4400-4990 MHz band for aeronautical use, the View A proponents believe that the current U.S. proposal for NOC across all three ITU Regions is the appropriate and justifiable proposal. Changes to the proposal suggested in View B (including limiting the proposal to Region 2 and inclusion of inappropriate "position" statements in the background) would be counterproductive and could backfire on U.S. interests in other WRC-15 agenda items.

VIEW B

VIEW B: Proposed Edits to Proposal Regarding
4 400- 4 990 MHz for WRC-15 Agenda Item 1.1

View B (attached) proposes revisions to the US proposal for the 4400-4990 MHz frequency range under WRC-15 agenda item 1.1, in response to WAC/105 (20.05.15).

View B is supported by AT&T, Ericsson, Intel Corporation, Motorola Mobility, Nokia Solutions and Networks, Samsung, Sprint Corporation, Telecommunications Management Group Inc. and Verizon.

The US proposal under WRC-15 agenda item 1.1 for 4400-4990 MHz, which proposes NOC in all 3 Regions, is based upon operations and future planning of the incumbent Fixed Service and Mobile Service applications in the 4 400-4 990 MHz frequency range.

In this proposed revision, important corrections have been made to existing text clarifying that the results of the studies are based upon IMT macro-cell deployments. Regarding another important issue, text regarding spectrum segmentation has also been corrected based upon CPM text.

Although co-frequency sharing may not be possible in the same geographic area, there was also an adjacent channel study which could be applicable where incumbent systems for aeronautical/ground mobile applications do not use the entire 4 400-4 990 MHz frequency band: in these countries, there could be spectrum within this frequency range available to potentially implement IMT systems on an adjacent channel.

Regarding the use of FSS systems in 4 500- 4 800 MHz, CPM text states: “Concerning sharing studies to assess the technical feasibility of deploying IMT-Advanced systems in the 4 400-4 990 MHz frequency band, that are utilized by the FSS and other services as stipulated in the RR, similar considerations on the results of sharing studies obtained in the 3 400-4 200 MHz frequency band are applicable to the 4 500-4 800 MHz frequency band.” Based upon these results, it appears that the existing regulatory conditions associated with the use of IMT in the 3 400 – 3 600 MHz band (e.g. RR. No 5.430A, 5.432A, 5432B and 5.433A) could be utilized to protect FSS systems in the 4 500 – 4 800 MHz frequency band.

The proponents of View B realize that the United States cannot support identification of spectrum within this frequency range to IMT due to the current and planned use of these Fixed Service and Mobile Service applications. Therefore, we propose no change to the frequency range in Region 2.

However, other administrations have submitted proposals to regional bodies to identify spectrum within this frequency range for IMT in response to WRC-15 agenda item 1.1. Recognizing that other countries may not utilize the entire frequency range for incumbent services, View B does not make any proposals for the other Regions.

ATTACHMENT TO VIEW B:
Proposed Edits to Proposal Regarding
4 400- 4 990 MHz for WRC-15 Agenda Item 1.1

Draft

United States of America

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 1.1

1.1 to consider additional spectrum allocations to the mobile service on a primary basis and identification of additional frequency bands for International Mobile Telecommunications (IMT) and related regulatory provisions, to facilitate the development of terrestrial mobile broadband applications, in accordance with Resolution **233 (WRC-12);**

Background Information: The 2012 World Radiocommunication Conference (WRC-12) recognized a need for additional radio spectrum to support the increasing mobile data traffic, and placed consideration of additional spectrum allocations for terrestrial mobile broadband applications on the agenda for WRC-15. The ITU established the Joint Task Group (JTG) 4-5-6-7 to develop sharing studies and draft CPM text for WRC-15 Agenda Item 1.1.

The 4400-4500 MHz and 4800-4990 MHz frequency bands are allocated to the fixed service (FS) and mobile service (MS) on a co-primary basis, while the 4500-4800 MHz frequency band is allocated on a co-primary basis to the fixed, fixed-satellite, and mobile services. ITU-R conducted compatibility studies between IMT and FS, as well as between IMT and MS systems operating in the 4 400-4 990 MHz frequency range. The final JTG 4-5-6-7 Chairman's Report (document 4-5-6-7/715) contains the completed studies between IMT systems and the FS in Annex 18; and the preliminary studies between IMT systems and the MS are in Annex 33. Study Group 5 (SG 5) approved the IMT-FS sharing studies at its November 10-11, 2014 meeting. The JTG did not agree to the IMT-MS sharing studies; consequently, SG 5 did not consider the IMT-MS sharing studies.

The ITU-R studies generally show significant separation distances (hundreds of kilometers) would be required between IMT macro stations and both FS and MS stations. These results show that co-frequency~~, co-coverage~~ sharing is difficult or infeasible between FS or MS systems and IMT macro cells in the same geographical area. The IMT macro cell-MS sharing studies show extreme separation distance requirements, including distances exceeding 500 km. ~~Moreover, the JTG did not agree on the underlying premise of the MS-IMT studies for the 4 400-4 500 and 4 800-4 990 MHz bands and that incumbent systems would have to vacate portions of~~

~~the frequency range to allow use by IMT applications. The JTG studies noted this would result in loss of spectrum for the incumbent services.~~ If systems in incumbent services, the FS and the MS, currently use the entire band, the use of adjacent channel solutions would result in a loss of spectrum for these services which may impact operations and future planning for the incumbent services. The United States believes this spectrum segmentation would negatively affect operations and future planning of the incumbent FS and MS uses in the 4 400-4 990 MHz frequency range.

Given the results of the JTG studies, and the adverse effects on the incumbent services' operations by IMT use of the bands, the United States proposes no changes to the ITU Radio Regulations for the contiguous 4 400-4 990 MHz frequency range in ~~all three regions.~~ Region 2. The United States realizes that other administrations have submitted proposals to regional bodies to identify this frequency range for IMT in response to agenda item 1.1. Recognizing the frequency range has already been allocated to the mobile service, the US does not make any proposals regarding other Regions in order to allow flexible use of the spectrum to meet different national administration priorities.

Proposal:

NOC USA/1.1/1

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations
(See No. **2.1**)

2 700-4 800 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
*****	**4 400-4 500** FIXED MOBILE 5.440A	*****
*****	**4 500-4 800** FIXED FIXED-SATELLITE (space-to-Earth) 5.441 MOBILE 5.440A	*****

4 800-5 570 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
*****	**4 800-4 990** FIXED MOBILE 5.440A 5.442 Radio astronomy 5.149 5.339 5.443	*****

Reasons: ITU-R studies show co-frequency sharing between IMT macro cells and incumbent fixed and mobile service systems is not feasible in the 4 400-4 990 MHz frequency range in the same geographical area ~~without disrupting~~ in countries where current and planned incumbent operations utilize~~in~~ the entire frequency range. Given operations and future planning of the incumbent FS and MS applications in the 4 400-4 990 MHz frequency range, the United States does not support identification to IMT in Region 2.

WAC/116(20.05.15)

WRC-15 Agenda Item 1.1

With Respect to 5 925- 6 425 MHz

IWG-2 members were not able to reach consensus on a proposal for WRC-15 agenda item 1.1 regarding 5 925- 6 425 MHz and, therefore, forwards two views on how the FCC should handle this matter.

View A is supported by 21st Century Fox, Inc., Aviation Spectrum Resources, Inc., EchoStar Corporation, Inmarsat, Intelsat, Lockheed Martin Corp., National Association of Broadcasters, New Wave Spectrum Partners LLC, Satellite Industry Association, SES Americom, and The Boeing Company.

View B is supported by AT&T, Ericsson, Intel Corporation, Motorola Mobility, Nokia Solutions and Networks, Samsung, Sprint Corporation, Telecommunications Management Group Inc. and Verizon.

VIEW A

VIEW A: Proposal for No Change in All Three ITU Regions under AI 1.1 for the 5925-6425 MHz Frequency Band

WAC members setting forth this view carefully considered that without a mechanism that: i) ensures continued satellite access, ii) protects existing U.S. satellite receive operations in all three ITU Regions, iii) addresses two-way compatibility issues, and iv) does not constrain future growth for fixed-satellite service (FSS) in the 5925-6425 MHz band, it is necessary for the United States to propose no changes (NOC) to WRC-15 under agenda item 1.1 for this band. 21st Century Fox, Inc., Aviation Spectrum Resources, Inc., EchoStar Corporation, Inmarsat, Intelsat, Lockheed Martin Corp., National Association of Broadcasters, New Wave Spectrum Partners LLC, Satellite Industry Association, SES Americom, and The Boeing Company support this view. WAC members setting forth this view include operators, manufacturers, suppliers, and customers of satellite systems and networks that operate in the 5925-6425 MHz frequency band.

The frequency band 5 925-6 425 MHz has been identified as potential candidate frequency band for International Mobile Telecommunications (IMT) systems. The 5 925-6 425 MHz frequency range is used by satellites networks in the FSS for Earth-to-space communication, and these satellite networks are often used for intercontinental communications. FSS networks typically provide service to large regions encompassing the territory of multiple administrations.

The CPM Report for this frequency band stated, without disagreement, that the ITU-R "studies showed that GSO FSS space networks would be subjected to excessive levels of interference from the aggregate operation of IMT-Advanced (small cell) base stations, irrespective of whether they are deployed outdoors or indoors." CPM Report, Section 1/1.1/4.1.13.2. Although the Report indicated that under certain conditions, co-frequency operation of FSS transmitting earth stations and an indoor IMT-Advanced small cell with no specific separation distance, this conclusion was limited to a specific case included in draft new Report ITU-R [FSS-IMT CBAND UPLINK], and did not cover the case where the bandwidth of the FSS carrier is larger than the bandwidth of the IMT-Advanced channel or larger than the aggregate bandwidth of the combined IMT-Advanced channels. The Report also specifies that "[i]t was concluded that for the protection of a single receiving IMT-Advanced base station, separation distances up to many tens of km would be required between a single transmitting FSS earth station and a single outdoor IMT-Advanced receiving base station, in order to protect the IMT-Advanced station from co-frequency interference." Although one scenario of potential interference from FSS transmitting earth stations to IMT stations formed the basis of a feasibility determination under conditions fully specified, other cases of interference to IMT (including the operational case used by most FSS networks) are not resolved. Furthermore, the case of aggregate interference to FSS satellite receive operations has also not been resolved – and this is significant, as the draft new Report states without disagreement that "[i]f deployed in these bands, it is expected IMT stations would be deployed in large numbers as part of dense mobile communication networks." *See* Introduction to draft New Report ITU-R [FSS-IMT CBAND UPLINK], Document 4/77 and 5/123. These factors led to the view in the CPM Report from some administrations, including many administrations operating FSS satellites in geostationary orbit in the 5925-6425 MHz band, "that, considering the extent of the FSS deployment worldwide in the band 5 925-6 425 MHz, there is no potential for harmonization of that band, either regionally or globally, for IMT or other mobile broadband." CPM Report, Section 1/1.1/4.1.13.2.

The proponents of View A strongly support this conclusion. As U.S. satellites authorized to receive in the 5925-6425 MHz band operate at orbital locations serving all three ITU Regions, it is imperative that the U.S. protect these operations by proposing that no IMT stations be authorized to transmit in this band anywhere in the world.

ATTACHMENT TO VIEW A:

Draft

United States of America

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 1.1

1.1 to consider additional spectrum allocations to the mobile service on a primary basis and identification of additional frequency bands for International Mobile Telecommunications (IMT) and related regulatory provisions, to facilitate the development of terrestrial mobile broadband applications, in accordance with Resolution **233 (WRC-12)**

BACKGROUND:
The frequency range 5 925-6 425 MHz, or parts thereof, is allocated to the FS, FSS and MS. The frequency bands adjacent to this frequency range are allocated to the FS, FSS, MS, ARS and RLS.

The frequency band 5 925-6 425 MHz has been identified as potentially suitable frequency range for International Mobile Telecommunications (IMT) systems. If deployed in these bands, it is expected IMT stations would be deployed in large numbers as part of dense mobile communication networks.

The 5 925-6 425 MHz frequency range is extensively used by satellites networks in the fixed satellite service (FSS) for Earth-to-space communication. By their global nature, FSS networks typically provide service to large regions encompassing the territory of multiple administrations. ITU-R studies showed that receiving space stations of GSO FSS space networks would be subjected to excessive levels of interference from IMT-Advanced base stations. Considering the extent of FSS deployment worldwide in the band 5 925-6 425 MHz, and the studies described in draft new Report ITU-R [FSS-IMT C-BAND UPLINK] (Document 4/77, 5/123), the United States concludes that there is no potential at WRC-15 for harmonization of the 5 925-6 425 MHz band, either regionally or globally, for IMT or other mobile broadband. As a result, this Administration proposes no change to the 5 925-6 425 MHz band under this agenda item.

PROPOSAL:

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations
(See No. **2.1**)

NOC USA/1.1/1

5 570-7 250 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
*****		
5 925-6 700	FIXED 5.457 FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B MOBILE 5.457C 5.149 5.440 5.458	
*****		

Reasons: The 5 925-6 425 MHz band is extremely important for FSS for Earth-to-space communications, and FSS networks typically provide service to large regions encompassing the territory of multiple administrations. ITU-R studies have demonstrated that receiving space stations of GSO FSS space networks would be subjected to excessive levels of interference from IMT-Advanced base stations. As a result, sharing between IMT or other mobile broadband systems and FSS space and earth stations is not feasible.

VIEW B

VIEW B:

The proponents of View B (attached) are of the view that the United States of America should not support a NOC proposal for all three Regions for 5925-6425 MHz for WRC-15 Agenda Item 1.1 as proposed in View A, given that CPM text and associated studies show that sharing and compatibility between IMT-Advanced systems and FSS networks in 5 925-6 425 MHz frequency band is feasible under certain conditions.

View B is supported by AT&T, Ericsson, Intel Corporation, Motorola Mobility, Nokia Solutions and Networks, Samsung, Sprint Corporation, Telecommunications Management Group Inc. and Verizon.

These View B companies note that the CPM text states that "Based on studies described in draft new Report ITU-R [FSS-IMT C-BAND UPLINK] it is concluded that sharing and compatibility between IMT-Advanced systems and FSS networks in 5 925-6 425 MHz frequency band is feasible under certain conditions. These conditions include deployment of IMT-Advanced systems only indoor and establishment of a limit on the maximum allowable e.i.r.p. for IMT-Advanced stations in this frequency range. In addition it is generally concluded that no specific separation distance is required between a FSS transmitting station and an indoor IMT-Advanced small cell."

CPM text also states "Some administrations are of the view that there is potential for harmonization in portions or the whole of the band 5 925-6 425 MHz, either regionally or globally, for IMT or other mobile broadband."

Given the importance of mobile broadband in providing connectivity to users and the results of ITU-R studies that show that sharing is feasible under certain conditions, the above signed companies respectfully submit that the United States should not oppose identification to IMT in the 5 925- 6 425 MHz band by other administrations or other Regions.

ATTACHMENT TO VIEW B:

Draft

United States of America

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 1.1

1.1 to consider additional spectrum allocations to the mobile service on a primary basis and identification of additional frequency bands for International Mobile Telecommunications (IMT) and related regulatory provisions, to facilitate the development of terrestrial mobile broadband applications, in accordance with Resolution **233 (WRC-12);**

BACKGROUND:
The frequency range 5 925-6 425 MHz, or parts thereof, is allocated to the FS, FSS and MS. The frequency bands adjacent to this frequency range are allocated to the FS, FSS, MS, and to the ARS and RLS on a secondary basis.

The frequency band 5 925-6 425 MHz has been identified as a potential candidate frequency band for International Mobile Telecommunications (IMT) systems. The 5 925-6 425 MHz frequency range is used by satellite networks in the fixed satellite service (FSS) for Earth-to-space communication.

CPM text states "Based on studies described in draft new Report ITU-R [FSS-IMT C-BAND UPLINK] it is concluded that sharing and compatibility between IMT-Advanced systems and FSS networks in 5 925-6 425 MHz frequency band is feasible under certain conditions. These conditions include deployment of IMT-Advanced systems only indoor and establishment of a limit on the maximum allowable e.i.r.p. for IMT-Advanced stations in this frequency range. In addition it is generally concluded that no specific separation distance is required between a FSS transmitting station and an indoor IMT-Advanced small cell."

The United States currently uses this band for FSS and does not support an identification for IMT in the United States under WRC-15 agenda item 1.1. However, as ITU-R studies show that sharing is feasible under certain conditions, the US takes no position on the identification for IMT by other administrations or other Regions.

PROPOSAL:

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations
(See No. **2.1**)

NOC USA/1.1/1

5 570-7 250 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
*****		
*****	**5 925-6 700** FIXED 5.457 FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B MOBILE 5.457C 5.149 5.440 5.458	*****
*****		

Reasons: The United States currently uses this band for FSS and does not support an identification for IMT in the United States under WRC-15 agenda item 1.1. However, as ITU-R studies show that sharing is feasible under certain conditions, the US takes no position on the identification for IMT by other administrations or other regions.

WAC/117rev1(20.05.15)

WRC-15 Agenda Item 10

With Respect to Broadband over HAPS

IWG-2 members were not able to reach consensus on a proposal for WRC-15 agenda item 10 regarding broadband over High Altitude Platform Stations (HAPS) and, therefore, forwards two views on how the FCC should handle this matter.

View A is supported by Alcatel-Lucent and Harris, Wiltshire and Grannis.

View B is supported by DirecTV, EchoStar Corporation, Inmarsat, Intelsat, New Wave Spectrum Partners LLC, SES Americom, and 21st Century Fox.

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VIEW A

VIEW A:

The last several years have witnessed substantial investment in the U.S. in research and development in unmanned aerial systems (UAS), including for the delivery of broadband communications. Recent test deployments of broadband provided from stations on lightweight, solar-powered aircraft operating at approximately 20 km above ground in the stratosphere have demonstrated the potential of providing connectivity to underserved communities with minimal ground-level infrastructure and maintenance. Stations operating at 20 km are high enough to provide service to a large footprint but low enough to provide dense coverage at low latency. These stations, located in the stratosphere above weather incidents, are also resilient to storms below and therefore can be an effective tool during and after a natural disaster.

Industry estimates that the economic impact of the commercial UAS industry will be more than $80 billion over the next decade.[1] President Barack Obama has recognized both the "positive economic impact" of commercial UAS use and its capacity to provide, as compared to manned aircraft, lower-cost operation and augmented capabilities[2] for a range of services. Most commercial deployments to date have been of *low altitude* UAS. Industry has also invested in research and development of UAS operating at higher altitudes, including for broadband communications. U.S. policymakers have recognized that "UAS could provide Internet service to remote areas by remaining aloft for months at a time—far longer than manned aircraft."[3]

While tests of unmanned aircraft at high altitudes for Internet service are recent, high altitude platform stations (HAPS) have been studied by the ITU-R for about two decades. High Altitude Platform Stations (HAPS) are defined in Article 1.66A of the Radio Regulations as "*[a] station located on an object at an altitude of 20 to 50 km and at a specified, nominal, fixed point relative to the Earth.*" Some entities are developing unmanned aircraft that will circle for several months at approximately 20 km in the stratosphere to maintain coverage of a constant service area on the ground. Such nominally fixed aircraft, which could be considered HAPS, are one promising model for delivery of broadband from a high altitude station, and can be used by broadband providers to offer service to underserved communities.

The ITU-R has identified three bands that may prove viable for broadband delivery from HAPS in developing countries, but most of these are subject to challenging technical restrictions, have limited geographic participation, or may not provide sufficient capacity to deliver broadband at the speeds consumers have come to expect. In the last few years, lightweight aircraft technology has improved immensely, making broadband from HAPS platforms viable. As President Obama has recognized, UAS "technology continues to improve rapidly, and increasingly UAS are able

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1 *See, e.g., The Economic Impact of Unmanned Aerial Systems Integration in the United States,* The Association of Unmanned Vehicle Systems International (AUVSI) (March 2013), available at http://www.auvsi.org/econreport

2 *See* https://www.whitehouse.gov/the-press-office/2015/02/15/presidential-memorandum-promoting-economic-competitiveness-while-safegua

3 John B. Morris Jr., *Testimony of John B. Morris, Jr., Assoc. Adm'r - Office of Policy Analysis and Dev., NTIA, Before the Subcommittee on Aviation Operations, Safety, and Security Comm. on Commerce, Science, and Transp. United States Senate* (Mar. 25, 2015) http://www.ntia.doc.gov/speechtestimony/2015/te stimony-associate-administrator-morris-senate-commerce-committee-unmanned-aircraft-systems.

to perform a variety of missions with greater operational flexibility and at a lower cost than comparable manned aircraft."[4]

With demand for broadband continuing to grow, the identifications for HAPS, now limited, may need to be expanded, geographically and spectrally, in order to allow lightweight, nominally fixed-position UAS to deliver broadband consistent with user demand. The geographic limitations imposed by existing regulations are especially acute in Caribbean, South American, and Central American nations within Region 2. Global identifications facilitating the delivery of broadband from HAPS would provide the economies of scale necessary to make this technology affordable in underserved areas, especially those with terrain features that make it challenging to deploy service and those that have suffered natural or other disasters.

The attached View A would invite WRC-19, consistent with the ITU's goals to promote reliable broadband access in underserved and remote communities, to consider, on the basis of ITU-R studies undertaken during the study cycle, appropriate regulatory actions, potentially including expansion of the frequency ranges of existing identifications for HAPS within existing fixed service allocations, identifying additional frequency ranges for use by HAPS, and revising geographic, technical, and regulatory restrictions associated with existing HAPS identifications.

4 *See supra* at n.2.

ATTACHMENT TO VIEW A:

Draft

United States of America

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 10

10 to recommend to the Council, items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences, in accordance with Article 7 of the Convention;

Background
Recent test deployments of broadband provided from stations on lightweight, solar-powered aircraft operating at approximately 20 km above ground in the stratosphere have demonstrated the potential of providing connectivity to underserved communities with minimal ground-level infrastructure and maintenance. Stations operating at 20 km are high enough to provide service to a large footprint but low enough to provide dense coverage at low latency. Thus, they can provide a high quality of service to underserved communities. These stations are also highly resilient in the face of natural disasters and therefore can be an effective tool for disaster recovery.

Significant investment in unmanned aerial systems (UAS) for commercial applications has occurred in the last few years. Industry estimates that the economic impact of the commercial UAS industry will be more than $80 billion over the next decade.[1] U.S. President Barack Obama has recognized both the "positive economic impact" of commercial UAS use and its capacity to provide, as compared to manned aircraft, lower-cost operation and augment existing capabilities[2] for a range of services. Most commercial deployments to date have been of low altitude UAS. Industry has also invested in research and development of UAS operating at higher altitudes, including for broadband communications. U.S. policymakers have recognized that "UAS could

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1 See e.g. *The Economic Impact of Unmanned Aerial Systems Integration in the United States,* The Association of Unmanned Vehicle Systems International (AUVSI) (March 2013), available at http://www.auvsi.org/econreport

2 https://www.whitehouse.gov/the-press-office/2015/02/15/presidential-memorandum-promoting-economic-competitiveness-while-safegua

provide Internet service to remote areas by remaining aloft for months at a time—far longer than manned aircraft."[3]

While tests of unmanned aircraft at high altitudes for Internet service are recent, high altitude platform stations (HAPS) have been studied by the ITU-R for about two decades, beginning for WRC-1997. High Altitude Platform Stations (HAPS) are defined in Article 1.66A of the Radio Regulations as "*[a] station located on an object at an altitude of 20 to 50 km and at a specified, nominal, fixed point relative to the Earth.*" Some entities are developing unmanned aircraft that will circle for several months at approximately 20 km in the stratosphere to maintain coverage of a constant service area on the ground. Such nominally fixed aircraft, which could be considered HAPS, are one promising model for delivery of broadband from a high altitude, and can be used by broadband providers to offer service to underserved communities.

The initial HAPS identification provided for HAPS use in the fixed service at 47.2-47-5 GHz and 47.9-48.2 GHz.[4] Because of concern with rain fade in that range, WRC-2000 agreed on HAPS identification for 27.9 – 28.2 GHz (fixed downlink),[5] paired with 31.0 – 31.3 GHz (fixed uplink) outside Region 2.[6] Also at WRC-2000, the bands 1 885 – 1 980 MHz, 2 010 – 2 025 MHz and 2 110 – 2 170 MHz were identified for HAPS operating as IMT base stations. In WRC-12, five countries joined a footnote for a HAPS designation in the fixed service for 6 440 – 6 520 MHz (HAPS-ground) and 6 560-6 640 MHz (ground-HAPS).

Despite these designations, few HAPS systems have been deployed.[7] However, in the last few years, lightweight aircraft technology has improved immensely, making broadband from HAPS platforms viable. As President Obama has recognized, UAS "technology continues to improve rapidly, and increasingly UAS are able to perform a variety of missions with greater operational flexibility and at a lower cost than comparable manned aircraft."[8]

In addition, since 1997, demand for broadband has increased markedly. The designations for HAPS, now geographically limited, may need to be expanded, geographically and spectrally, in order to allow lightweight, nominally fixed-position UAS to deliver broadband consistent with user demand. The geographic limitations imposed by existing regulations are especially acute in Caribbean, South American, and Central American nations within Region 2. Global identifications facilitating the delivery of broadband from HAPS would provide the economies of scale necessary to make this technology affordable in underserved areas, especially those with terrain features that make it challenging to deploy conventional terrestrial networks and those that have suffered natural or other disasters.

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3 John B. Morris Jr., *Testimony of John B. Morris, Jr., Assoc. Adm'r - Office of Policy Analysis and Dev., NTIA, Before the Subcommittee on Aviation Operations, Safety, and Security Comm. on Commerce, Science, and Transp. United States Senate* (Mar. 25, 2015) http://www.ntia.doc.gov/speechtestimony/2015/te stimony-associate-administrator-morris-senate-commerce-committee-unmanned-aircraft-systems.

4 ITU Radio Reg. § 5.552A.

5 ITU Radio Reg. § 5.537A.

6 ITU Radio Reg. § 5.543A.

7 At least one system was deployed, the SkyNet system in Japan. *See* http://cdn.intechopen.com/pdfs-wm/9006.pdf. But generally speaking, HAPS has not seen widespread commercial deployment.

8 See supra at n.2.

In addition to expanded geographic reach, additional spectrum may be required to support modern broadband service. Therefore, the frequency bands currently allocated to the Fixed Service should be studied for additional identifications for HAPS.

Further studies on appropriate bands for links supporting HAPS would facilitate deployment of reliable broadband access in underserved communities, rural and remote areas, consistent with the ITU's goals. The following proposal puts forth a new agenda item for WRC-19 to consider the results of studies on the delivery of broadband applications by HAPS, and related ITU-R Recommendations and Resolutions, and take appropriate action.

Proposals

MOD USA/10/1

RESOLUTION 808 (WRC-15)

Agenda for the 2019 World Radiocommunication Conference

The World Radiocommunication Conference (Geneva, 2015),

Reasons: To modify the agenda for WRC-19 to add a new item.

ADD USA/10/2

2.x to consider, on the basis of ITU-R studies in accordance with Resolution [USA/10/XX], appropriate regulatory actions, potentially including expansion of the frequency ranges of existing identifications for HAPS within existing fixed service allocations, identifying additional frequency ranges for use by HAPS in accordance with Resolution [USA/10/XX], and revising geographic, technical, and regulatory restrictions associated with existing HAPS identifications.

Reasons: To facilitate access by underserved communities, as well as residents in rural and remote areas, to affordable and reliable broadband services.

ADD USA/10/3

RESOLUTION [USA/10/XX] (WRC-15)

Facilitating access to broadband applications delivered from HAPS

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that the ITU is committed to bringing the benefits of modern communication technologies to people everywhere in an efficient, safe, easy and affordable manner;

b) that existing identifications for high altitude platform stations (HAPS) are in a limited number of countries and therefore underserved communities in many countries do not benefit from global economies of scale;
c) there is an urgent need for greater broadband connectivity and telecommunications services in underserved communities and in rural and remote areas;
d) that some entities are testing the delivery of broadband over lightweight, solar-powered aircraft that are designed to circle at approximately 20 kilometers for several months at a nominal fixed point relative to the ground below;
e) that current technologies can be used to deliver broadband services from base stations operating at high altitudes;
f) that high altitude platform stations can provide broadband connectivity in remote areas, including mountainous, coast, and sandy desert areas;
g) that high altitude platform stations can provide broadband connectivity with minimal ground network infrastructure, and therefore can be effective for disaster recovery;
h) that HAPS, which operate at a fixed point relative to the earth as defined in the radio regulations, are one promising model for delivering mobile broadband;

recognizing
a) the importance of protecting existing services and users;
b) that HAPS is not a service but a type of station from which either mobile or fixed services may be provided;
c) that certain bands are presently identified for use by HAPS in limited areas of the world, including the 1 885 – 1 980 MHz,[1] 2 010 – 2 025 MHz, and 2 110 – 2 170 MHz mobile allocations[2] as well as the fixed allocations in the 6 440 – 6 520 MHz paired with 6 560 – 6 640 MHz[3]; and 27.9 – 28.2 GHz,[4] paired with 31.0 – 31.3 GHz[5] bands;
d) that the severe geographical or technical limitations in identifications for HAPS in *recognizing c)* result in no current global identifications for HAPS to deliver broadband;
e) that the existing HAPS identifications were established without reference to today's broadband needs;
f) that Recommendation ITU-R M.1456 noted that links between two High Altitude Base Stations (HAPS) and links between HAPS and HAPS system ground stations will need to be studied and coordinated;
g) that Resolution 233 (WRC-12) noted that mobile broadband systems can help reduce the digital divide between urban and rural areas, including underserved communities;

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1 ITU Radio Reg. §§ 5.388A-5.388B.
2 *Id.*.
3 ITU Radio Reg. § 5.457.
4 ITU Radio Reg. § 5.537A.
5 ITU Radio Reg. § 5.543A.

h) that Resolution 233 (WRC-12) also noted the need to continually take advantage of technological developments to increase the efficient use of spectrum and facilitate spectrum access;

i) that Resolution 233 (WRC-12) further noted that harmonized worldwide bands and harmonized frequency arrangements for mobile broadband systems are highly desirable in order to achieve the benefits of economies of scale;

Resolves to invite ITU-R

1) to study additional spectrum requirements, taking into account:

- technical and operational characteristics of HAPS systems, including the evolution of HAPS through advances in technology and spectrally-efficient techniques, and their deployment;

- the possibility of modifying the geographic, technical, and regulatory restrictions associated with existing HAPS footnote identifications listed in *recognizing c)* to facilitate access to broadband, taking into account the technical characteristics of newer configurations of stratospheric broadband systems and the evolving user needs, particularly in underserved, rural, and remote areas and areas suffering from disasters;

2) to conduct studies on the feasibility of identifying fixed service allocations for the use of HAPS in the frequency ranges of 5 925 MHz – 15.35 GHz, 21.2 GHz – 22.0 GHz, and 23.6 - 29.1 GHz which are not subject to Appendices 30, 30A, and 30B;

3) to study sharing and compatibility between broadband applications delivered over high altitude platform stations and existing services;

4) to develop ITU-R Recommendations and Reports, as appropriate, taking into account *resolves to invite ITU-R* 1, 2, and 3 above.

further resolves to invite WRC-19

to consider, on the basis of the studies conducted under the *resolves to invite ITU-R* above, appropriate regulatory actions, potentially including expansion of the frequency ranges of existing identifications for HAPS within existing fixed service allocations, identifying additional frequency ranges for use by HAPS in accordance with *resolves to invite ITU-R* 2, and revising geographic, technical, and regulatory restrictions associated with existing HAPS identifications.

Reasons: To facilitate the delivery of current generation of broadband services to underserved communications over affordable and reliable infrastructure.

ATTACHMENT

PROPOSAL FOR FUTURE AGENDA ITEM FOR BROADBAND FROM HIGH ALTITUDE BASE STATIONS

Subject: Proposed Future WRC Agenda Item for WRC-2019 to consider the results of studies on the delivery of broadband applications by HAPS, and whether changes are needed to the set of existing bands identified for use by HAPS and ITU-R Recommendations and Resolutions to facilitate the delivery of broadband to underserved communities, taking actions as appropriate.

Origin: United States of America

Proposal: To study high altitude platform station operations for broadband.

Background/reason:
Test deployments of broadband provided from stations operating at approximately 20 km above ground in the stratosphere have demonstrated the potential of providing connectivity to underserved communities with minimal ground-level infrastructure and maintenance. Stations operating at 20 km are high enough to provide service to a large footprint but low enough to provide dense coverage at low latency. Thus, they can provide a high quality of service to underserved communities at reasonable cost. These stations are also highly resilient in the face of natural disasters and therefore can be an effective tool for disaster recovery. The ITU-R has recognized that broadband systems contribute to global economic and social development and that broadband systems can help reduce the digital divide between urban and rural areas, including underserved communities. Studies are required, however, to ensure that existing ITU-R HAPS identifications are sufficient to enable the current generation of broadband technologies to be delivered over HAPS and to possibly identify additional ranges for identifications.

Radiocommunication services concerned: Amateur, Amateur-satellite, Broadcasting-Satellite, Earth Exploration Satellite, Fixed, Fixed-Satellite (space-to-Earth, and Earth-to-space), Inter-Satellite, Meteorological Satellite, Mobile, Mobile Satellite, Radio Astronomy. Radiolocation, Radiolocation-satellite, Radionavigation, Radionavigation-Satellite, Space research (space-to-Earth, and Earth-to-space), Standard frequency and time signal-satellite (space-to-Earth, and Earth-to-space).

Indication of possible difficulties: None foreseen.

Previous/ongoing studies on the issue: Recs. ITU-R F.1569, F.1570, F.1607, F.1609, F.1612, F.1764, F.1891, and F.2011, provide requirements and studies on the provision of HAPS operating in the fixed service. Recs. ITU-R M.1456 and M.1641 provide requirements and studies on the provision of mobile services from HAPS using certain bands around 1.9/2.1 GHz. Recs. ITU-R SF.1601 and SM.1633 provide propagation, interference mitigation, compatibility, and other technical analyses regarding the operation of HAPS.

Studies to be carried out by: SG 5	***with the participation of:*** SG 4 and SG 7

ITU-R Study Groups concerned: SG 4, 5, 6, and 7

ITU resource implications, including financial implications (refer to CV126): Minimal

Common regional proposal: Yes/No ***Multicountry proposal:*** Yes/No
Number of countries:

Remarks

VIEW B

VIEW B: Alternative Formulation of Potential Future Agenda Item Regarding HAPS That Limits Frequency Bands to be Studied and Provides Protection for Existing Services

View B (attached) proposes revisions to the draft proposal in View A for a future agenda item to address the use of HAPS for mobile broadband services.

View B is supported by DirecTV, EchoStar Corporation, Inmarsat, Intelsat, New Wave Spectrum Partners LLC, SES Americom, and 21st Century Fox.

There are four areas where View B proponents differ from View A proponents on the formulation of the potential future WRC agenda item to accommodate HAPS:

First, in *resolves to invite ITU-R* 2, the View B proponents do not agree to the broad frequency band ranges that are included for study. We find the ranges are too broad – particularly with the formulation in the latest version of View A, which calls for studies on the entire ranges of 5925 MHz-15.3 GHz and 23.6-29.1 GHz (other than the App. 30/30A/30B bands), rather than "portions" of those bands as proposed prior to the latest iteration. We are not prepared to endorse studies of HAPS feasibility in several frequency ranges that are heavily used for FSS services (including the C-band uplink spectrum, Ku-band uplink and downlink spectrum, and Ka-band uplink spectrum). We could endorse *resolves to invite ITU-R 2* if it were revised to read as follows:

> "2) to conduct studies on the feasibility of identifying portions of the fixed service allocations in the frequency ranges of 7.075-8.5 GHz, 10.0-10.68 GHz, 14.8-15.35 GHz, 21.2-21.4 GHz, 22.0-23.6 GHz and 24.75-27.0 GHz which are not subject to Appendices 30 and 30B for the use of HAPS;

Second, the View B proponents do not agree to the formulation of the *resolves to invite ITU-R* insofar as they fail completely to address protection of existing services. In prior versions of the draft proposal in View A, there was language that called for taking account of the requirements of existing services and users in bands to be studied (including both bands currently identified for HAPS and bands to be considered anew). The View B proponents had proposed consolidating this language as it initially appeared in *resolves to invite ITU-R* 1 and 4 from Document IWG-2/063R4 into a new version of *resolves to invite ITU-R* 3 that replicated the core protections for existing services that is found in this well-balanced aspect of Resolution 233 (WRC-12) for IMT/mobile broadband. Unfortunately, in the version of the draft proposal that is included in View A, the View A proponent retained the removal of the protection concept from *resolves to invite ITU-R* 1 and 4, and rejected in full the consolidated, balanced approach to *resolves to invite ITU-R* 3 the View B proponents had proposed. This is a dramatic and significant step backwards on the path to possible consensus, and is unacceptable to the View B proponents. As a result, there are no provisions in the *resolves* of the View A draft resolution calling for protection of existing services. We could endorse *resolves to invite ITU-R* 3 if it were revised to read as follows:

> "3) that the studies referred to in *resolves to invite ITU-R* 1 and 2 include sharing and

compatibility studies with services already having allocations in the current and potential future bands identified for HAPS and in adjacent bands, as appropriate, taking into account the current and planned use of these bands by the existing services, as well as the applicable studies already performed in ITU-R;"

Third, a minor change should be made to the *further resolves to invite WRC-19* to improve readability and remove ambiguity. In particular, we are confused by the proposed reference generally to "identifying additional frequency ranges for use by HAPS …" when even in the View A version, those additional ranges are limited to bands with current fixed service allocations.

Finally, with respect to the phrasing of the proposed WRC-19 agenda item itself, the View A proponents have now proposed to integrate the idea that the potential bands for identification for HAPS would not be limited to fixed service allocations. Although the wording now states that any identification of additional frequency ranges for HAPS beyond fixed service allocations would be "in accordance with" the proposed resolution, the View B proponents emphasize that their view of the frequency allocations to be considered for any expansion of HAPS would be limited to specific fixed service allocations, as explained above. Accordingly, the View B proponents prefer that any formulation of the proposed agenda item for HAPS be limited to consideration of any additional frequency ranges that are within existing fixed service allocations.

In the Attachment to View B, we show all of the changes we propose to the draft proposal in View A to make this acceptable. We have reproduced here only the agenda item, *resolves to invite ITU-R* and *further resolves to invite WRC-19* portions of the proposal. We have no disagreement with the reasons or the early portions of the Draft Resolution USA/10/XX, Facilitating access to broadband applications derived from HAPS. We neither agree nor disagree with the background section of the proposal, where the View A proponents apparently envision that HAPS platforms of the type they wish to study would also be considered on some level to be unmanned aerial systems (UAS).

ATTACHMENT TO VIEW B:

I. Changes to Draft WRC-19 Agenda Item:

ADD USA/10/2

2.x to consider, on the basis of ITU-R studies in accordance with Resolution [USA/10/XX], appropriate regulatory actions, potentially including expansion of the frequency ranges of existing identifications for HAPS within existing fixed service allocations~~, identifying additional frequency ranges for use by HAPS~~ in accordance with Resolution [USA/10/XX], and revising geographic, technical, and regulatory restrictions associated with existing HAPS identifications.

II. Changes to Resolves Portion of Draft Resolution USA/10/XX, Facilitating access to broadband applications derived from HAPS:

~~*Resolves*~~ *resolves to invite ITU-R*

1) to study additional spectrum requirements, taking into account:

   – technical and operational characteristics of HAPS systems, including the evolution of HAPS through advances in technology and spectrally-efficient techniques, and their deployment;

   – the possibility of modifying the geographic, technical, and regulatory restrictions associated with existing HAPS footnote identifications listed in *recognizing c)* to facilitate access to broadband, taking into account the technical characteristics of newer configurations of stratospheric broadband systems and the evolving user needs, particularly in underserved, rural, and remote areas and areas suffering from disasters;

2) to conduct studies on the feasibility of identifying portions of the fixed service allocations in the frequency ranges of 7.075-8.5 GHz, 10.0-10.68 GHz, 14.8-15.35 GHz, 21.2-21.4 GHz, 22.0-23.6 GHz and 24.75-27.0 ~~5 925 MHz – 15.35 GHz 21.2 GHz – 22.0 GHz, and 23.6 - 29.1~~ GHz which are not subject to Appendices 30~~,~~ ~~30A,~~ and 30B for the use of HAPS;

3) that the studies referred to in *resolves to invite ITU-R* 1 and 2 include sharing and compatibility studies with services already having allocations in the current and potential future bands identified for HAPS and in adjacent bands, as appropriate, taking into account the current and planned use of these bands by the existing services, as well as the applicable studies already performed in ITU-R~~to study sharing and compatibility between broadband applications delivered over high altitude platform stations and existing services~~;

4) to develop ITU-R Recommendations and Reports, as appropriate, taking into account *resolves to invite ITU-R* 1, 2, and 3 above.

further resolves to invite WRC-19

to consider, on the basis of the studies conducted under the *resolves to invite ITU-R* above, appropriate regulatory actions, potentially including expansion of the frequency ranges of existing identifications for HAPS within existing fixed service allocations, ~~identifying additional frequency ranges for use by HAPS in accordance with *resolves to invite ITU-R* 2,~~ and revising geographic, technical, and regulatory restrictions associated with existing HAPS identifications.

WAC/118rev1(20.05.15)

WRC-15 Agenda Item 10

With Respect to IMT in bands above 6 GHz

IWG-2 members were not able to reach consensus on a proposal for WRC-15 agenda item 10 regarding IMT in bands above 6 GHz and, therefore, forwards two views on how the FCC should handle this matter.

View A is supported by Alcatel-Lucent, AT&T, Ericsson, Intel Corporation, Motorola Mobility, Nokia Solutions and Networks, Samsung, Sprint Corporation, Telecommunications Management Group Inc. and Verizon.

View B is supported by ARRL, EchoStar Corporation, Inmarsat, Intelsat, Iridium, Lockheed Martin Corp., New Wave Spectrum Partners, SES Americom, The Boeing Company, ViaSat, and 21st Century Fox.

VIEW A

VIEW A: Support Agenda Item 10 Proposal for IMT in bands above 6 GHz

View A (attached) provides a WRC-15 agenda item 10 proposal seeking a WRC-19 agenda item for the identification for IMT in bands above 6 GHz, in order to help meet the tremendous demand for mobile broadband.

View A is supported by Alcatel-Lucent, AT&T, Ericsson, Intel Corporation, Motorola Mobility, Nokia Solutions and Networks, Samsung, Sprint Corporation, Telecommunications Management Group Inc. and Verizon.

Mobile broadband plays a crucial role in providing access to businesses and consumers worldwide. According to ITU statistics, "Mobile broadband remains the fastest growing market segment, with continuous double-digit growth rates in 2014."[1] Mobile broadband users are also demanding higher data rates and are increasingly using mobile devices to access audio-visual content.

The mobile industry continues to drive technological innovations in order to meet these evolving user demands. In early 2012, ITU-R began to develop "IMT for 2020 and beyond". Research and development efforts from both industry as well as academia are facilitating the use of spectrum in bands above 6 GHz for mobile broadband. These efforts span the globe, including research in Europe, China, Japan, Korea, and the United States.

Regional preparatory groups including the Asia Pacific Preparatory Group, CITEL PCC II, and Europe's Conference Preparatory Group PTA have recognized the need for additional spectrum for terrestrial IMT in higher frequency bands and are actively developing potential proposals for WRC-19.

The United States has been one of the leading countries in the deployment of advanced mobile services. The "Presidential Memorandum: Unleashing the Wireless Broadband Revolution" emphasizes the importance of additional spectrum for mobile broadband: "America's future competitiveness and global technology leadership depend, in part, upon the availability of additional spectrum." The success of the recent AWS-3 auction provides compelling objective evidence of the vital importance of spectrum for mobile broadband. America's future competitiveness and technology leadership is also vitally important. The European Union, China, Japan, Korea, and others are moving forward to facilitate the deployment of "5G" systems including in bands above 6 GHz. It is crucial that the United States, as a global technology leader, join these efforts.

In order to help the US attain these important objectives, the View A proponents modeled the proposal in attachment A on the Resolution **423 (WRC-12)**, which was successfully utilized by WAIC for WRC-15 agenda item 1.17). This structure focuses studies on bands which already have an existing allocation to the relevant service.

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[1] https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2014-e.pdf, p1.

Given the growing demand for mobile broadband and the technological advances which will be able to support IMT networks in higher frequency bands, it is essential to ensure the timely availability of additional spectrum in bands above 6 GHz to support the future growth of IMT in the years 2020 and beyond.

Therefore, the companies listed above urge FCC to consider the attached WRC-15 agenda item 10 proposal supported by View A, which proposes a WRC-19 agenda item to consider the identification of frequency bands for the terrestrial component of IMT in bands above 6 GHz.

This proposal does not address the status of Resolution 233 (WRC-12). The proponents note that View B proposes to suppress Resolution 233 (WRC-12). However, the proponents of View A propose that the US await the results of WRC-15 agenda item 1.1 before determining a position on studies on the bands below 6 GHz. It would be ill-advised to prejudge the outcome of the WRC regarding those lower bands.

ATTACHMENT TO VIEW A:
Agenda Item 10 Proposal Regarding IMT in Bands above 6 GHz

Draft

United States of America

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 10

10 to recommend to the Council, items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences, in accordance with Article 7 of the Convention;

Introduction
Since 2000, terrestrial IMT networks have served a crucial role in providing access to businesses and consumers worldwide. According to ITU statistics, "Mobile cellular subscriptions will reach almost 7 billion by end 2014, corresponding to a penetration rate of 96%," including a penetration rate of 90% in developing countries and 121% in developed countries.[1]

IMT networks contribute to global economic and social development. IMT systems provide a wide range of multimedia applications, including telemedicine, teleworking, distance learning, and public protection and disaster relief, with even more applications envisioned. IMT systems also help reduce the digital divide between urban and rural areas, including underserved communities.

[1] https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2014-e.pdf, p 3.

The growth rate of mobile broadband has been phenomenal. According to ITU statistics, "Mobile broadband remains the fastest growing market segment, with continuous double-digit growth rates in 2014. By end 2014, the number of mobile-broadband subscriptions will reach 2.3 billion globally, almost 5 times as many as just six years earlier (in 2008)." [2]

In order to meet this growing demand as well as to provide increased capabilities to users, IMT systems have continually incorporated technological improvements, from the first IMT-2000 networks to IMT-Advanced. In early 2012, ITU-R began to develop "IMT for 2020 and beyond", setting the stage for research activities that are emerging around the world. ITU-R studies include Report ITU-R M.2320, which provides information on the technology trends of terrestrial IMT systems considering the time frame 2015-2020 and beyond, [PDN] Report ITU-R M.[IMT.ABOVE 6 GHz] which studies the technical feasibility of IMT in bands above 6 GHz, and [PDN] Recommendation ITU-R M.[IMT.VISION] which describes the framework and overall objectives of the future development of IMT for 2020 and beyond.

The year 2020 is seen as a beginning for next generation of mobile broadband communication systems beyond IMT-Advanced, which currently are known as 'IMT for 2020 and beyond' systems, sometimes also referred to as '5G'. Globally, mobile industries, academia, governments, ITU-R and regional groups are conducting research activities to address the growth in traffic and user demands for year 2020 and beyond. Correspondingly, frequency allocation and regulatory frameworks issues also need to be addressed in parallel so that the development of the technology can proceed.

Research efforts globally on "5G" systems are progressing.[3] In Asia, the Chinese 5G initiative, named 'IMT-2020', is a combination of three government agencies and has established eight working groups with the aim of promoting the development of 5G technologies in the country, while Japan has "2020 and Beyond Ad Hoc" (20B AH) group focused on delivering commercial 5G services at the 2020 Olympic Games and in South Korea, the '5G Forum' was founded by the Ministry of Science, ICT (information and communications technology) and Future Planning (MSIP) to lead the development of 5G mobile wireless communications and to commercialize 5G technology by 2020. In Europe, work includes the METIS 2020 Project as well as the 5G Infrastructure Public Private Partnership (5G PPP), a joint European Commission/industry effort which will facilitate research into solutions, architectures, technologies and standards for 5G infrastructure. In the US, academic and research efforts on 5G are also underway (e.g. 5G Brooklyn and 5G Forum). In the U.S., major research efforts are underway at a number of academic institutions as well as industry.[4]In addition, manufacturers worldwide have invested resources in research and development efforts, while mobile operators have begun "lab trials".

Within the scope of the wide ranging development for future mobile broadband, and in addition to the work on-going for IMT in the lower frequency bands, considerable research has been carried out by various organizations on a global scale on the feasibility of terrestrial IMT in

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[2] https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2014-e.pdf, p1.

[3] More information is available at https://gsmaintelligence.com/research/?file=141208-5g.pdf&download, Appendix A.

[4] For example, see http://brooklyn5gsummit.com/ and http://brooklyn5gsummit.com/.

spectrum above 6 GHz. The corresponding results presented at various workshops and conferences have been positive towards the feasibility of utilizing higher frequencies for terrestrial IMT and mobile broadband usage. It is expected that usage of higher frequencies will be one of the key enabling components of future IMT as the state of the art in technological developments unlocks the spectrum above 6 GHz. In the US, the FCC has already expressed interest in the use of higher frequency bands for mobile broadband services.

Regional preparatory groups have also recognized the need for additional spectrum for terrestrial IMT in higher frequency bands and are actively developing potential proposals for WRC_19. For example, in the Asia Pacific Preparatory Group, multiple administrations have proposed a WRC-19 agenda item for IMT in higher frequency bands. Within Europe, the Conference Preparatory Group PTA is also progressing a proposal for an agenda item at WRC-19 to identify spectrum for IMT applications in frequency bands above 6 GHz. In the UK, Ofcom issued a Call for Inputs on "Spectrum above 6 GHz for future mobile communications" to inform their strategy on these bands, including international discussions on bands above 6 GHz that could be considered at the World Radiocommunications Conference (WRC) in 2019.[5]

Given the growing demand for mobile broadband and the technological advances which will be able to support IMT networks in higher frequency bands, it is essential to ensure the timely availability of additional spectrum in bands above 6 GHz to support the future growth of IMT in the years 2020 and beyond. Therefore, the United States proposes a WRC-19 agenda item to consider the identification of frequency bands for the terrestrial component of IMT in bands above 6GHz.

Proposal:

MOD USA/10/1

RESOLUTION 806 (WRC-15)

Agenda for the 2019 World Radiocommunication Conference

The World Radiocommunication Conference (Geneva, 2015),

ADD USA/10/2

1.[IMT] to consider spectrum requirements and identification of frequency bands for the terrestrial component of International Mobile Telecommunications (IMT) in bands above 6 GHz, including appropriate mobile allocations if needed, to facilitate the development of mobile broadband applications, in accordance with Resolution **[IMT] (WRC-2015)**;

[5] http://stakeholders.ofcom.org.uk/binaries/consultations/above-6ghz/summary/spectrum_above_6_GHz_CFI.pdf

Reasons: To support the requirement for additional spectrum being identified for the terrestrial component of International Mobile Telecommunications (IMT)

ADD USA/10/3

RESOLUTION [IMT] (WRC-15)

Consideration of identification of frequency bands for the terrestrial component of International Mobile Telecommunications (IMT) in bands above 6 GHz, including appropriate mobile allocations if needed, to facilitate the development of mobile broadband applications

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that International Mobile Telecommunications (IMT) systems have been the main method of delivering wide area mobile broadband applications;

b) that IMT and other mobile broadband systems contribute to global economic and social development by providing a wide range of multimedia applications, such as mobile telemedicine, teleworking, distance learning and other applications;

c) that in all countries where terrestrial IMT systems are deployed there is a continuing significant growth in the number of users of IMT systems and in the quantity and rate of data carried, the latter being driven to a large extent by audiovisual content;

d) that IMT and other mobile broadband systems have helped reduce the digital divide between urban and rural areas, including underserved communities;

e) that in many developing markets the main delivery mechanism for broadband access is expected to be through mobile devices;

f) that adequate and timely availability of spectrum and supporting regulatory provisions is essential to support the future growth of IMT and other mobile broadband systems;

g) that there is a need to continually take advantage of technological developments in order to increase the efficient use of spectrum and facilitate spectrum access;

h) that harmonized worldwide bands and harmonized frequency arrangements for IMT and other mobile broadband systems are highly desirable in order to achieve global roaming and the benefits of economies of scale; and

i) the need to protect existing services when considering changes to the table of frequency allocations;

recognizing

a) that there is a fairly long lead time between the identification of frequency bands by world radiocommunication conferences and the deployment of systems in those bands, and timely availability of spectrum is therefore important to support the development of IMT and other terrestrial mobile broadband applications;

b) that IMT systems have been in operation since the year 2000;

c) the use of relevant parts of the spectrum by other radiocommunication services, many of which involve significant investment in infrastructure or represent significant societal benefit, and the evolving needs of these services,
d) that IMT encompasses both IMT-2000 and IMT-Advanced collectively, as described in Resolution ITU-R 56;
e) that Resolution ITU-R 57 addresses the principles for the process of development of IMT-Advanced, and Question ITU-R 77-7/5 considers the needs of developing countries in the development and implementation of IMT;
f) that Question ITU-R 229-3/5 seeks to address the further development of IMT;
g) that Recommendations ITU-R M.1457 and ITU-R M.2012 contain detailed specifications of the terrestrial radio interfaces of IMT-2000 and IMT-Advanced, respectively,
h) that Report ITU-R M.2320 provides information on the technology trends of terrestrial IMT systems considering the time frame 2015-2020 and beyond.
i) that [PDN] Report ITU-R M.[IMT.ABOVE 6 GHz] studies the technical feasibility of IMT in bands above 6 GHz
j) that [PDN] Recommendation ITU-R M.[IMT.VISION] describes the framework and overall objectives of the future development of IMT for 2020 and beyond.

resolves

that WRC-19 consider, based on the results of ITU-R studies in *invites ITU-R* 1 and 2, possible identification of frequency bands for the terrestrial component of International Mobile Telecommunications (IMT) in bands above 6 GHz, including appropriate mobile allocations if needed, to facilitate the development of mobile broadband applications.

invites ITU-R

1) to conduct, and complete in time for WRC-19, the appropriate studies to determine the spectrum requirements for the terrestrial component of IMT in bands above 6 GHz;
2) to conduct sharing and compatibility studies, based on the results of *invites ITU-R* 1, to determine appropriate frequency bands
3) when conducting studies in accordance with *invites ITU-R* 2, to consider
i) frequency bands within existing allocations to the mobile service on a primary basis in the table of frequency allocations on a regional or global basis, other than those in No. **5.340**.
ii) additional frequency bands if spectrum requirements cannot be met in frequency bands studied under *invites ITU-R* 3 i)

invites administrations

to participate actively in these studies by submitting contributions to ITU-R.

ATTACHMENT

PROPOSAL FOR ADDITIONAL AGENDA ITEM FOR CONSIDERATION OF IDENTIFICATION OF FREQUENCY BANDS FOR THE TERRESTRIAL COMPONENT OF INTERNATIONAL MOBILE TELECOMMUNICATIONS (IMT) IN BANDS ABOVE 6 GHZ, INCLUDING APPROPRIATE MOBILE ALLOCATIONS IF NEEDED, TO FACILITATE THE DEVELOPMENT OF MOBILE BROADBAND APPLICATIONS

Subject: Proposed Future WRC Agenda Item for WRC-2019 for consideration of identification of frequency bands for the terrestrial component of International Mobile Telecommunications (IMT) in bands above 6 GHz, including appropriate mobile allocations if needed, to facilitate the development of mobile broadband applications

Origin: United States of America

Proposal: *To consider the identification of frequency bands for the terrestrial component of International Mobile Telecommunications (IMT) in bands above 6 GHz, including appropriate mobile allocations if needed, to facilitate the development of mobile broadband applications*

Background/reason:

ITU statistics show that "Mobile broadband remains the fastest growing market segment, with continuous double-digit growth rates in 2014. By end 2014, the number of mobile-broadband subscriptions will reach2.3 billion globally, almost 5 times as many as just six years earlier (in 2008)."[1] In order to meet this growing demand as well as support new user capabilities, terrestrial IMT networks continue to incorporate technological advances.

In early 2012, ITU-R began to develop "IMT for 2020 and beyond", setting the stage for research activities that are emerging around the world, including support for networks in bands above 6 GHz. Technological advances described in PDN Report [IMT.ABOVE 6 GHz] can facilitate the development and deployment of IMT networks to help meet this growing capacity demands for mobile broadband. Given the growing demand for mobile broadband and the technological advances which will be able to support IMT networks in higher frequency bands, it is essential to ensure the timely availability of spectrum in bands above 6 GHz to support the future growth of IMT in the years 2020 and beyond**.** There are currently no bands above 6 GHz identified for IMT.

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[1] https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2014-e.pdf

Radiocommunication services concerned: Mobile Service
Indication of possible difficulties: None foreseen.

Previous/ongoing studies on the issue: Report ITU-R M.2320 provides information on the technology trends of terrestrial IMT systems in 2015-2020 and beyond. ITU-R Working Party 5D is finalizing studies on [PDN] Report ITU-R M.[IMT.ABOVE 6 GHz] which studies the technical feasibility of IMT in bands above 6 GHz and [PDN] Recommendation ITU-R M.[IMT.VISION] which describes the framework and overall objectives of the future development of IMT for 2020 and beyond.

Studies to be carried out by: ITU-R WP5D	***with the participation of:*** other WPs as required

ITU-R Study Groups concerned: SG 5 and others as needed

ITU resource implications, including financial implications (refer to CV126): This proposed agenda item will be studied within the normal ITU-R procedures and planned budget. As the responsible group on IMT studies, ITU-R WP 5D usually has meetings three times a year which last 6 days each.

Common regional proposal: Yes/No ***Multicountry proposal:*** Yes/No
Number of countries:

Remarks

VIEW B

VIEW B: Opposition to Document IWG-2/069 and Presentation of Alternative Strategy for IMT in Frequency Bands Above 6 GHz for WRC-19 and Beyond

WAC members setting forth this view include operators, manufacturers, suppliers, and customers of satellite systems and networks that operate in frequency bands above 6425 MHz ("> 6 GHz"). For the reasons provided below, we have great difficulty with the proposal for a new IMT agenda item presented by the mobile community in Document IWG-2/069. It simply is not possible for the ITU-R to conduct the necessary sharing and compatibility studies covering existing services (including planned usage) in potentially all RF spectrum above 6 GHz within the next WRC cycle. We envision that the United States would be better served by taking a two-WRC approach, with the agenda for WRC-19 to be focused on establishment of IMT station and system characteristics in bands above 6 GHz, and a preliminary agenda item for WRC-23 that takes a balanced approach relative to the protection of existing services in specific bands/band ranges. ARRL, EchoStar Corporation, Inmarsat, Intelsat, Iridium, Lockheed Martin Corp., New Wave Spectrum Partners, SES Americom, The Boeing Company, ViaSat, and 21st Century Fox support this view.

I. The WRC-19 Agenda Item proposed in Document IWG-2/069 requires significant refinement and must take existing services into account.

- The Draft Proposal in View A is too open-ended.

Although View A generally identifies frequency bands with existing allocations to the mobile service as the target for proposals, the scope of the spectrum included in this categorization is extremely broad. First, between 6425 MHz and 100 GHz (roughly 94 GHz of spectrum), 59.375 GHz is allocated to the mobile service on a primary basis in at least one region, and in all three regions for the vast majority of bands. Each band is also allocated on a primary basis to other services – including most of the bands allocated to satellite services. Second, the draft resolution contemplates that the studies could extend to the remaining 37% of frequency bands between 6425 MHz and 100 GHz, as well as all mobile and non-mobile spectrum above 100 GHz, if the spectrum requirements of the mobile industry cannot be met in 60,000 MHz of spectrum below 100 GHz already allocated to mobile on a primary basis.

It is not possible for the ITU-R to conduct the broad studies contemplated by the View A proposal within the time allotted for the next WRC preparation cycle. In particular, it is unreasonable to expect industry representatives of existing services to expend time and resources to conduct studies in this wide swath of spectrum, particularly when (as discussed in more detail below) the technical characteristics of the proposed IMT services remain undefined.

- The Draft Proposal in View A fails to take existing services into account.

Resolution 233 from WRC-12 reflected a balance between the interests of the mobile broadband advocates and existing services. View A should be modified to reflect such a balance. Specifically, Resolution 233 called for protection of existing services, and sharing and compatibility studies involving services with existing allocations in both the potential candidate bands and adjacent bands (taking into account current/planned usage by existing services and studies already performed in the ITU-R). The draft resolution in View A fails to address

protection of existing services, adjacent band allocations, current/planned usage by existing services, and studies already performed in the ITU-R.

- The Draft Proposal in View A fails to propose suppression of Resolution 233 (WRC-12) and thus would result in reopening determinations made regarding bands below 6 GHz.

The proposed resolution and agenda item in View A for WRC-19 do not propose the suppression of Resolution 233 (WRC-12), and effectively would result in reopening determinations that WRC-15 will have already made about bands below 6 GHz. In other words, all spectrum below 6 GHz would be subject to further consideration and study for the next cycle as well. We believe that the studies under Resolution 233 are complete, and that WRC-15 will have considered all that there is to consider in bands below 6 GHz. While it is possible that a new, specific agenda item for a limited number of discrete bands from the potential candidate frequency band list in the CPM Report could be needed as a result of incomplete deliberations on proposals to WRC-15, that can be determined at the WRC. In the meantime, any future agenda item proposal on IMT/mobile broadband from the United States must include the suppression of Resolution 233 (WRC-12).

- The Draft Proposal in View A contains background text that does not belong in a putative U.S. proposal to a world radiocommunication conference.

The background section of the draft proposal in Document IWG-2/069 contains a number of passages that do not seem appropriate for inclusion in a WRC proposal. Specifically, statements describing views and positions ostensibly being developed in other countries and regional groups preparing for WRC-15 are not appropriate for a United States proposal. Any such statements belong, if anywhere, in a delegation position paper. We note that this is not a case where there is CPM text or existing studies to point toward.

* * *

For all of these reasons, the Commission should reject the draft AI 10 proposal for spectrum above 6 GHz that is presented in View A.

II. <u>It is premature for the United States to propose an agenda item that envisions IMT/mobile broadband allocations and/or identifications in bands above 6 GHz at WRC-19.</u>

- There are no IMT/mobile broadband system/station characteristics that can be used in studies in the coming ITU-R cycle.

With Resolution 233 (WRC-12), there was the general understanding that IMT/mobile broadband system and station characteristics (particularly for operations in the bands below 3 GHz, but also for the 3-6 GHz range) would be able to be input to enable the ITU-R to undertake meaningful sharing and compatibility studies with existing services in time for WRC-15. This expectation, for whatever reason, never fully was met by the IMT/mobile broadband community in the JTG 4-5-6-7 process. As a result, many key studies that should have provided valuable technical input for the deliberations to be undertaken at WRC-15 were either not completed or

contain conclusions that are rendered less than definitive by the lack of clarity on the IMT/mobile broadband side.

If studies move forward as envisioned in the draft resolution in View A, the same deficiencies would exist during the coming study cycle. Critically, there are no identifiable characteristics for IMT/mobile broadband at this time, as recognized in View A. The proponents acknowledge that they are still at the stage of determining the very "feasibility of utilizing higher frequencies for terrestrial IMT and mobile broadband usage." The U.S. itself is not even that far, with the FCC issuing a notice of inquiry focusing on the feasibility of mobile broadband use of spectrum above 24 GHz just last year. The View A proponents include in their resolution a pair of *considerings* that focus on work, incomplete even in Working Party 5D, that remains at the feasibility and vision quest stages of IMT mobile broadband development in bands above 6 GHz.

In order to meaningfully address the proposals for IMT/mobile broadband, it is essential to have representative technical characteristics of the proposed services, as well as a reasonably tailored range of the spectrum bands that are being proposed for IMT and mobile broadband usage. It is unreasonable to expect that the complex core questions on sharing and compatibility will be able to be answered in the ITU-R in time for WRC-19 in the complete absence of this type of information. We do not think it is feasible given the current status of WP 5D that has been reported by the mobile community. No new IMT identification/allocation can even be considered for a WRC agenda until a reasonable set of IMT/mobile broadband technical characteristics are available for use in meaningful studies, which there is no reason to believe will occur in time for WRC-19, particularly as "5G" has not even been defined. Thus, even with a balanced resolution that properly addresses the protection of existing services (including planned usage), the View A proposal for a WRC-19 agenda item should be rejected as premature.

III. <u>One possible way forward on IMT/mobile broadband spectrum above 6 GHz would be for the U.S. to propose dividing the matter between two WRCs – by bringing an agenda item to WRC-19 that calls for identification of spectrum requirements and system characteristics for IMT/mobile broadband, and by bringing a proposal for a preliminary agenda item for WRC-23 to address sharing and compatibility studies with existing services in specific frequency bands (and adjacent bands, as appropriate).</u>

We recognize the importance of mobile broadband to U.S. national telecommunications policy and broader national interests. Agenda Item 1.1 for WRC-15 ostensibly has been a top national priority, and we and other existing services have engaged constructively in the multi-year effort to find a set of solutions that works. However, as we note above, it is incumbent upon the IMT/mobile broadband community to provide reliable and stable IMT/mobile broadband system/station characteristics needed to allow our industry, and others, to conduct the necessary studies, which is unlikely to be feasible in the WRC-19 cycle.

It is undisputed that system design and characteristic development for IMT/mobile broadband systems that could use spectrum above 6 GHz is not particularly advanced. Indeed, none of the View A proponents has asserted that there are reliable and stable IMT/mobile broadband

system/station characteristics to use in ITU-R sharing and compatibility studies with existing services.

To allow progress to be made, and to utilize the time and resources of existing services and the ITU-R in an efficient and effective manner, we believe that it might be appropriate for the U.S. to take a longer view on potential actions to accommodate IMT/mobile broadband in spectrum above 6 GHz. In this regard, the interval between WRC-15 and WRC-19 would be used exclusively for the development of elements of the types that are found in *resolves to invite ITU-R* 1 of Resolution 233 (WRC-12). This means studying IMT/mobile broadband spectrum requirements in bands above 6 GHz, technical and operational characteristics of IMT systems, evolving needs for IMT and other terrestrial mobile broadband applications; the needs of developing countries; and the time frame within which spectrum would be required. Inter-service considerations would not be part of this study program, and thus all work could be performed exclusively within Working Party 5D (or perhaps in Working Parties 5D and 5A), and not require inter-service deliberations. We understand that much of this work is underway to some degree now in Working Party 5D, and that WRC-15 action would not be needed to initiate work not yet started or progress work underway. We are prepared, however, to endorse a suitable WRC-19 agenda item to this end, feeding into the preliminary WRC-23 agenda item to be proposed in parallel, to establish firmly our national intent to proceed in some fashion.

For WRC-23's preliminary agenda, we envision specifying a balanced sharing/compatibility study approach with respect to existing services of the type found in Resolution 233. However, in contrast to Resolution 233, our concept of a preliminary agenda item for WRC-23 would include specific frequency ranges (expressed as XXX-YYY MHz/GHz) that are to be determined based on the results of study from the WRC-19 agenda item.

We believe this is a fair, constructive, and efficient approach that balances multiple interests is the best path forward given the nascent state of IMT/mobile broadband technology in bands above 6 GHz. We would be happy to develop this idea further within the WRC-15 delegation in the weeks and months to come, and hope it is something the FCC could support.

Space Services

WAC/119(20.05.15)

2015 WORLD RADIOCOMMUNICATION CONFERENCE
DRAFT PROPOSAL FOR THE WORK OF THE CONFERENCE

Agenda Item 1.5: *to consider the use of frequency bands allocated to the fixed-satellite service not subject to Appendices **30**, **30A** and **30B** for the control and non-payload communications of unmanned aircraft systems (UAS) in non-segregated airspaces, in accordance with Resolution **153 (WRC-12)***

Background Information:

The development of Unmanned Aircraft Systems (UAS) is based on recent technological advances in aviation, electronics and structural materials, making the economics of UAS operations more favorable, particularly for more repetitive, routine and long duration applications. The current state of the art in UAS design and operation, is leading to the rapid development of UAS applications to fill many diverse requirements. There are a large variety of existing and envisioned applications of UAS such as cargo transportation, fire-fighting, flood monitoring, search and rescue, disaster operations management, oceanographic and atmospheric observations, weather forecasting, geological survey, monitoring of gas pipelines and electricity distribution systems, city and highway traffic, border patrol, law enforcement, counter drug operations, crop and harvest monitoring, broadcast and airborne relay-type services, as well as, of course, national security purposes. As further evidence of this growth, the United States has recently licensed six UAS research and test site operators across the country, set up a center of excellence (COE) to better understand how UAS can be integrated into the National Airspace System, and developed the first annual UAS Roadmap to address current and future policies, regulations, technologies and procedures that will be required as UAS operations increase in the nation's airspace. Further details on UAS applications in non-segregated airspace can be found in Report ITU-R M.2171.

The operation of UAS outside segregated airspace requires addressing the same issues as manned aircraft, namely safe and efficient integration into the air traffic control system. In the context of this agenda item, a UAS consists of an UA with an Earth station on-board to interconnect the UA and the associated Earth station of the unmanned aircraft control station (UACS) through a satellite operating in the FSS. UA are aircraft that do not carry a human pilot but that are piloted remotely, i.e. through a reliable communication link. UAS operations up to now have been limited to segregated airspace. However, it is planned to expand UAS deployment outside of segregated airspace.

It is the role of the ITU to address the spectrum and regulatory provisions for the command and control of UAS. It is the role of ICAO to establish the necessary SARPS.

Report ITU-R M.2171 identified the spectrum requirements for unmanned aircraft system (UAS) command and non-payload communication (CNPC) links that would be needed to support flight through non-segregated airspace. Those requirements identified the need for both line of sight (LOS) and beyond line of sight (BLOS) spectrum. While the LOS requirements were addressed at the last World Radiocommunication Conference (WRC) held in 2012, the BLOS requirements were only partially addressed. As a result a new agenda item for the 2015 WRC (agenda item 1.5) was established to investigate whether fixed satellite networks, not subject to Appendix 30, 30A and 30B could be used to provide additional capacity for UAS CNPC links. This agenda item supports the addition of technical and regulatory provisions to enable use of portions of bands allocated to the fixed satellite service (FSS) for UAS CNPC links, provided studies demonstrate compatibility with incumbent services and that the requirements of aviation authorities are satisfied. ITU actions must address providing a regulatory framework for the safe operation of UAS CNPC links in FSS bands under the ITU Radio Regulations and thus obtaining international recognition along with the basis for avoiding harmful interference.

Studies within the ITU-R have provided information on the CNPC radio link performance under various UAS operating conditions. These results along with other information will be used by ICAO in the future as it develops the required communications performance and eventual standards and recommended practices (SARPS) for UAS CNPC. Other studies within the ITU-R also address the compatibility between this application of the FSS and other services that may be authorized by administrations. All of these studies, as well as the CNPC performance requirements, can then be used by ICAO to determine the particular UAS CNPC applications and scenarios that may be used safely in the different types of airspace within, and by, each administration. ICAO UAS CNPC SARPS are in the early stage of development.

More than 100 geostationary satellite communication networks operate in frequency bands allocated to the FSS in the bands 10.7-12.75, 13.75-14.5, 17.3-20.2, and 27.5-30.0 GHz. Report ITU-R M.2171 identifies a large variety of prospects for UAS that would need to fly long-distances (worldwide) through airspaces controlled by civil air traffic control (ATC). Immediate access to this globally existing capacity would provide great advantages for UAS fleet operators fostering new applications, enabling faster developments of new markets, while providing planning stability for significant investments. Studies under this agenda item investigated the link feasibilities and sharing conditions for using UAS CNPC links over typical frequency spectrum allocated in several FSS allocations.

Report ITU-R M.2233 contains examples of technical characteristics for UA CNPC including FSS systems operating in portions of the frequency ranges 10.95-14.5 GHz and 17.3-30.0 GHz. These examples indicated that it may be possible to operate UAS CNPC links in these bands while meeting the desired link performance. It is recognized that a further Report may be available by the time of WRC-15.

The U.S. proposal provides a regulatory framework for the safe operation of UAS CNPC links in FSS bands under the ITU Radio Regulations; thus obtaining international recognition along with the basis for avoiding harmful interference. It includes text for a footnote to the appropriate FSS bands which points to a Resolution that spells out the conditions of use for supporting safe and efficient operation of UAS. The deployment of UAS is accelerating. A key component of the ITU's mandate is to promote the extension of the benefits of new telecommunication technologies to all the world's inhabitants (CS6).

It is critical that the ITU address the spectrum and regulatory provisions for UAS CNPC links at WRC-15 to extend the benefits of UAS globally.

Proposal:

MOD USA/1.5/1

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations
(See No. **2.1**)

10-11.7 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
10.7-11.7 FIXED FIXED-SATELLITE (space-to-Earth) 5.441 5.484A ADD 5.XXX (Earth-to-space) 5.484 MOBILE except aeronautical mobile	**10.7-11.7** FIXED FIXED-SATELLITE (space-to-Earth) 5.441 5.484A ADD 5.XXX MOBILE except aeronautical mobile	

11.7-14 GHz

<table>
<tr><th colspan="3">Allocation to services</th></tr>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr><td rowspan="3">11.7-12.5
FIXED
MOBILE except aeronautical mobile
BROADCASTING
BROADCASTING-SATELLITE
5.492

5.487 5.487A</td><td>11.7-12.1
FIXED 5.486
FIXED-SATELLITE (space-to-Earth) 5.484A 5.488 ADD 5.XXX
Mobile except aeronautical mobile
5.485</td><td rowspan="2">11.7-12.2
FIXED
MOBILE except aeronautical mobile
BROADCASTING
BROADCASTING-SATELLITE
5.492

5.487 5.487A</td></tr>
<tr><td>12.1-12.2
FIXED-SATELLITE (space-to-Earth) 5.484A 5.488
ADD 5.XXX
5.485 5.489</td></tr>
<tr><td>12.2-12.7
FIXED
MOBILE except aeronautical mobile
BROADCASTING
BROADCASTING-SATELLITE
5.492

5.487A 5.488 5.490</td><td>12.2-12.5
FIXED
FIXED-SATELLITE (space-to-Earth) ADD 5.XXX
MOBILE except aeronautical mobile
BROADCASTING

5.484A 5.487</td></tr>
<tr><td>12.5-12.75
FIXED-SATELLITE (space-to-Earth) 5.484A
ADD 5.XXX (Earth-to-space)

5.494 5.495 5.496</td><td>12.7-12.75
FIXED
FIXED-SATELLITE (Earth-to-space)
MOBILE except aeronautical mobile</td><td>12.5-12.75
FIXED
FIXED-SATELLITE (space-to-Earth) 5.484A
ADD 5.XXX
MOBILE except aeronautical mobile
BROADCASTING-SATELLITE 5.493</td></tr>
<tr><td colspan="3">…</td></tr>
<tr><td>13.75-14</td><td colspan="2">FIXED-SATELLITE (Earth-to-space) 5.484A ADD 5.XXX
RADIOLOCATION
Earth exploration-satellite
Standard frequency and time signal-satellite (Earth-to-space)
Space research
5.499 5.500 5.501 5.502 5.503</td></tr>
</table>

14-15.414.5 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
14-14.25	FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B 5.484A 5.506 5.506B ADD 5.XXX RADIONAVIGATION 5.504 Mobile-satellite (Earth-to-space) 5.504B 5.504C 5.506A Space research 5.504A 5.505	
14.25-14.3	FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B 5.484A 5.506 5.506B ADD 5.XXX RADIONAVIGATION 5.504 Mobile-satellite (Earth-to-space) 5.504B 5.506A 5.508A Space research 5.504A 5.505 5.508	
14.3-14.4 FIXED FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B 5.484A 5.506 5.506B ADD 5.XXX MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) 5.504B 5.506A 5.509A Radionavigation-satellite 5.504A	**14.3-14.4** FIXED-SATELLITE (Earth-to-space) 5.457A 5.484A 5.506 5.506B ADD 5.XXX Mobile-satellite (Earth-to-space) 5.506A Radionavigation-satellite 5.504A	**14.3-14.4** FIXED FIXED-SATELLITE (Earth-to-space) 5.457A 5.484A 5.506 5.506B ADD 5.XXX MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) 5.504B 5.506A 5.509A Radionavigation-satellite 5.504A
14.4-14.47	FIXED FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B 5.484A 5.506 5.506B ADD 5.XXX MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) 5.504B 5.506A 5.509A Space research (space-to-Earth) 5.504A	
14.47-14.5	FIXED FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B 5.484A 5.506 5.506B ADD 5.XXX MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) 5.504B 5.506A 5.509A Radio astronomy 5.149 5.504A	
...		

~~17.3~~15.4-18.4 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
...		
17.3-17.7 FIXED-SATELLITE (Earth-to-space) 5.516 (space-to-Earth) 5.516A 5.516B ADD 5.XXX Radiolocation 5.514	**17.3-17.7** FIXED-SATELLITE (Earth-to-space) 5.516 BROADCASTING-SATELLITE Radiolocation 5.514 5.515	**17.3-17.7** FIXED-SATELLITE (Earth-to-space) 5.516 Radiolocation 5.514
17.7-18.1 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A (Earth-to-space) 5.516 MOBILE	**17.7-17.8** FIXED FIXED-SATELLITE (space-to-Earth) 5.517 (Earth-to-space) 5.516 BROADCASTING-SATELLITE Mobile 5.515	**17.7-18.1** FIXED FIXED-SATELLITE (space-to-Earth) 5.484A (Earth-to-space) 5.516 MOBILE
	17.8-18.1 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A (Earth-to-space) 5.516 MOBILE 5.519	
18.1-18.4	FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B ADD 5.XXX (Earth-to-space) 5.520 MOBILE 5.519 5.521	

18.4-22~~20.2~~ GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
18.4-18.6	FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B ADD 5.XXX MOBILE	
18.6-18.8 EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) 5.522B ADD 5.XXX MOBILE except aeronautical mobile Space research (passive) 5.522A 5.522C	**18.6-18.8** EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) 5.516B 5.522B ADD 5.XXX MOBILE except aeronautical mobile SPACE RESEARCH (passive) 5.522A	**18.6-18.8** EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) 5.522B ADD 5.XXX MOBILE except aeronautical mobile Space research (passive) 5.522A
…		
19.7-20.1 FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B ADD 5.XXX Mobile-satellite (space-to-Earth) 5.524	**19.7-20.1** FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B ADD 5.XXX MOBILE-SATELLITE (space-to-Earth) 5.524 5.525 5.526 5.527 5.528 5.529	**19.7-20.1** FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B ADD 5.XXX Mobile-satellite (space-to-Earth) 5.524
20.1-20.2	FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B ADD 5.XXX MOBILE-SATELLITE (space-to-Earth) 5.524 5.525 5.526 5.527 5.528	
…		

~~27.5~~24.7-29.9 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
…		
27.5-28.5	FIXED5.537A FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.539 ADD 5.XXX MOBILE 5.538 5.540	
28.5-28.6~~29.1~~	FIXED FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.523A 5.539 ADD 5.XXX MOBILE Earth exploration-satellite (Earth-to-space) 5.541 5.540	
28.6-29.1	FIXED FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.523A 5.539 MOBILE Earth exploration-satellite (Earth-to-space) 5.541 5.540	
…		
29.5-29.9 FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.539 ADD 5.XXX Earth exploration-satellite (Earth-to-space) 5.541 Mobile-satellite (Earth-to-space) 5.540 5.542	**29.5-29.9** FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.539 ADD 5.XXX MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (Earth-to-space) 5.541 5.525 5.526 5.527 5.529 5.540 5.542	**29.5-29.9** FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.539 ADD 5.XXX Earth exploration-satellite (Earth-to-space) 5.541 Mobile-satellite (Earth-to-space) 5.540 5.542

29.9-34.230 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
29.9-30	FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.539 ADD 5.XXX MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (Earth-to-space) 5.541 5.543 5.525 5.526 5.527 5.538 5.540 5.542	
...		

Reasons: To provide a footnote allowing the use of UAS CNPC links in the fixed-satellite service not subject to Appendices 30, 30A and 30B.

ADD USA/1.5/2

5.XXX Resolution **[FSS-UA-CNPC] (WRC-15)** shall apply. (WRC-15)

ADD USA/1.5/3

RESOLUTION [FSS-UA-CNPC] (WRC-15)

Regulatory provisions related to Earth stations on board unmanned aircraft which operate with geostationary satellites in the fixed-satellite service in a Region where the frequency band is not subject to the Plans or Lists of Appendices 30, 30A, and 30B for the control and non-payload communications of unmanned aircraft systems

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that worldwide use of unmanned aircraft systems (UAS) ,which includes the unmanned aircraft (UA) and the unmanned aircraft control station (UACS), is expected to increase significantly in the near future;

b) that UA need to operate seamlessly with piloted aircraft in non-segregated airspace;

c) that the operation of UAS in non-segregated airspace requires reliable control and non-payload communication (CNPC) links, in particular to relay air traffic control communications and for the remote pilot to control the flight;

d) that there is a demand for the control of UAS CNPC links via satellite communication networks for communications beyond the radio horizon while operating in non-segregated airspace as shown in Annex 1;

e) that there is a need to provide internationally harmonized use of spectrum for UAS CNPC links;

f) that the use of fixed satellite service (FSS) frequency assignments by UAS CNPC links should take into account their Article **11** notification status;

considering further

a) that there is a need to limit the amount of communication equipment onboard a UA;

b) that there is urgency to conclude on the regulatory basis for the use of the FSS frequency bands to support short- and medium term implementation of UAS CNPC links because a dedicated satellite system for this application is not likely to be implemented in this time frame;

c) that there are various technical methods that may be used to increase the reliability of digital communication links, e.g. modulation, coding, redundancy, etc. that can be used to ensure safe operation of UAS in all air space;

d) that UAS CNPC relate to the safe operation of UAS and have certain technical, operational, and regulatory requirements;

e) that the requirements in *considering further d)* can be specified for UAS use of FSS networks,

noting

a) that Report ITU-R M.2171 provides information on the vast number of applications for UAS needing access to non-segregated airspaces;

b) that although Recommendation **724 (WRC-07)** notes that FSS is not a designated safety service FSS can be used, under certain conditions, on a permanent or temporary basis for safeguarding human life or property;

recognizing

a) that the power flux-density limits in Section V of Article 21 apply to space-to-Earth transmissions for communications with Unmanned Aircraft Systems;

b) that the UAS CNPC links shall be operated in accordance with international standards and recommended practices and procedures established in accordance with the Convention on International Civil Aviation;

c) that in this context, ITU develops the conditions for operation of CNPC links, and then, International Civil Aviation Organization (ICAO) would be in a position to develop further operational conditions to ensure safe UAS operation,

resolves

1 that FSS networks in this frequency band in a Region where the frequency band is not subject to the provisions of Appendices 30, 30A, and 30B may be used for the control and non-payload communications of unmanned aircraft systems;

2 that earth stations on-board UA can communicate with a space station operating in the fixed satellite service, including while the UA is in motion;

3 that the use of UAS CNPC links and their associated performance requirements shall be in accordance with the international standards and recommended practices (SARPS) and procedures established by ICAO consistent with Article 37 of the Convention on International Civil Aviation;

4 that earth stations on-board UA operating in accordance with *resolves* 2 shall meet all the technical and regulatory requirements for fixed satellite service earth stations operating in the same frequency band as well as the additional technical requirements identified in Annex 2;

5 that UAS CNPC earth stations shall operate within the FSS associated parameters and shall not cause more interference and shall not claim more protection than a typical FSS earth station located on the surface of the Earth;

6 that the freedom from harmful interference to UAS CNPC links is imperative to ensure safe operation and administrations shall act immediately when their attention is drawn to any such harmful interference;

7 that the FSS operator will ensure that the assignments associated with the FSS networks to be used for UAS CNPC links (see figure 1 in Annex 1) have obtained the necessary protected status under

the provisions of No. **11.32**, **11.32A**, **11.42**, or **11.42A** including the examinations made by the BR and have been successfully registered in the MIFR;

8 that real-time interference monitoring and predicting interference risks, and planning solutions for potential interference scenarios, shall be addressed in the specific agreements between FSS operators and UAS operators with guidance from aviation authorities;

9 that the protection of the incumbent fixed service from UAS CNPC transmissions shall be ensured by implementing measures shown in Annex 2,

encourages concerned administrations

to cooperate with administrations which license UAS CNPC while seeking agreement under the abovementioned provisions,

instructs the Secretary-General

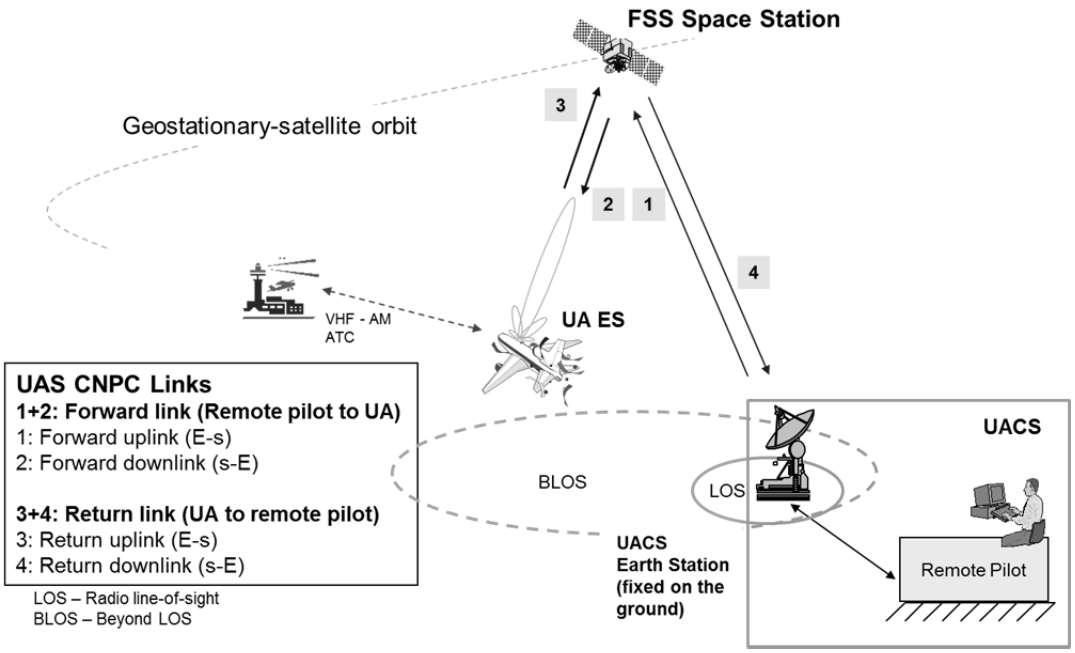
to bring this Resolution to the attention of the Secretary-General of the ICAO.

ANNEX 1 TO RESOLUTION [FSS-UA-CNPC] (WRC-15)

UA CNPC links

FIGURE 1

Elements of UAS architecture using the FSS



ANNEX 2 TO RESOLUTION [FSS-UA-CNPC] (WRC-15)

Protection of the fixed service and of other fixed-satellite service networks from UA CNPC emissions

1 Introduction

Because of the fundamental assumption made that to use the frequency bands allocated to the FSS the UAS CNPC link must operate within the same regulatory and performance limitations as any other FSS earth station or space station and that, from an interference perspective, it must perform its function in exactly the same manner as any other FSS earth station or space station, there are only a limited number of additional requirements, over and above those of a typical FSS, that need to be imposed on UAS CNPC operations to ensure compatibility with other services sharing the same frequency bands. These additional requirements are listed in Sections 2, 3, and 4 of this Annex.

2 Protection of the fixed service

The fixed service is allocated by footnotes in several countries with a co-primary status to the FSS. Conditions of UA using CNPC shall be such that the fixed service is protected from any harmful interference as defined below.

1) UA shall not operate at latitudes above 70 degrees.

2) UA shall not operate on frequencies in the band 14.00 to 14.5 GHz in altitudes below 5000 ft.

3) UA shall not operate on frequencies in the band 27.5-28.6 GHz in altitudes below 3000 ft.

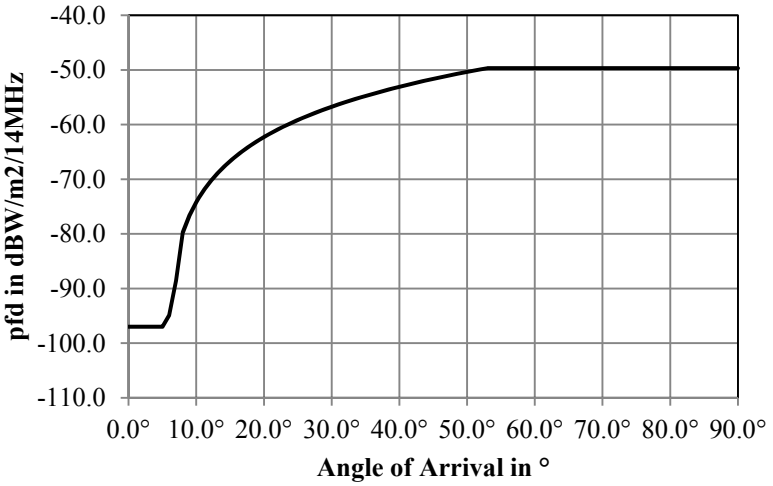
4) Earth station on UA shall comply with the two band-specific PFD masks described below.

In the 14-14.5 GHz frequency band as used by fixed service networks, within line-of-sight of the territory of an administration where fixed service networks are operating in this band, the maximum pfd produced at the surface of the Earth by emissions from a single UA should not exceed:

-97	$dB(W/(m^2 \cdot 14MHz))$	for	$\theta \leq 5°$
$-97 + 2.1 \cdot (\theta - 5°)^2$	$dB(W/(m^2 \cdot 14MHz))$	for	$5° < \theta \leq 7.5°$
$-91.7 - 25 \cdot \log_{10}(\theta)$	$dB(W/(m^2 \cdot 14MHz))$	for	$7.5° < \theta \leq 53°$
-49.7	$dB(W/(m^2 \cdot 14MHz))$	for	$53° < \theta \leq 90°$

where θ is the angle of arrival of the radio-frequency wave (degrees above the horizontal).

NOTE 1 The aforementioned limits relate to the pfd and angles of arrival that would be obtained under free-space propagation conditions.



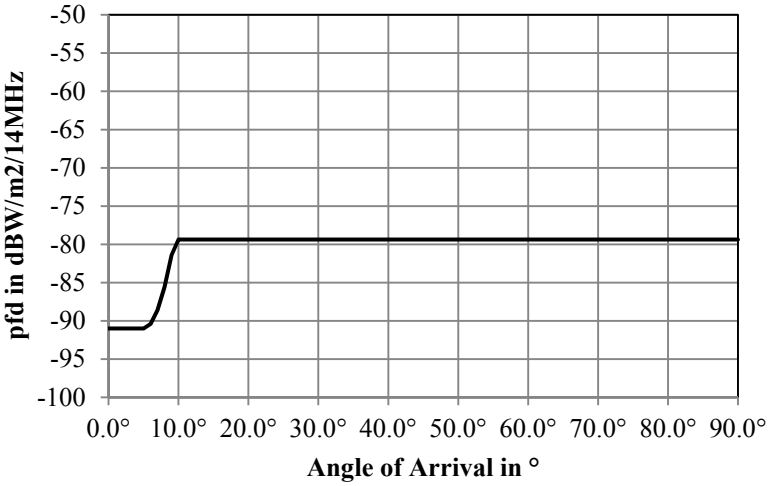
PFD mask as function of angle of arrival for 14.0-14.5 GHz

In the 27.5-28.6 GHz frequency band as used by fixed service networks, within line-of-sight of the territory of an administration where fixed service networks are operating in this band, the maximum pfd produced at the surface of the Earth by emissions from a single UA should not exceed:

-91	dB(W/(m^2 · 14MHz))	for	$\theta \leq 5°$
-91 + 0.6 · (θ - 5°)^2	dB(W/(m^2 · 14MHz))	for	$5° < \theta \leq 9.4°$
-79.4	dB(W/(m^2 · 14MHz))	for	$9.4° < \theta \leq 90°$

where θ is the angle of arrival of the radio-frequency wave (degrees above the horizontal).

NOTE 1 The aforementioned limits relate to the pfd and angles of arrival that would be obtained under free-space propagation conditions.



PFD mask as function of angle of arrival for 27.5-28.6 GHz

3 Protection of other fixed-satellite service networks

Conditions of UA using CNPC shall be such that the fixed-satellite service is protected from any harmful interference as defined below.

1) UAS CNPC shall comply with ITU-R S.524, or other coordinated levels agreed between administrations, at all times including when the aircraft is maneuvering.

WAC/120(20.05.15)

2015 WORLD RADIOCOMMUNICATION CONFERENCE

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

TITLE: To develop a regulatory framework that provides specific regulatory provisions for NGSO systems operating in the FSS frequency bands 37.5-42.5 GHz (space-to-Earth) and 42.5-43.5 GHz, 49.2-50.2 GHz and 50.4-51.4 GHz (Earth-to-space).

AGENDA ITEM 10: *to recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences, in accordance with Article 7 of the Convention,*

U.S. PROPOSAL: The US proposes the adoption of an agenda item for the next WRC with the following scope:

- To develop a regulatory framework that provides specific regulatory provisions for NGSO FSS satellite systems operating in the 37.5-42.5 GHz (space-to-Earth) and 42.5-43.5 GHz, 49.2-50.2 GHz and 50.4-51.4 GHz (Earth-to-space) frequency bands, while at the same time ensuring adequate protection to GSO satellite networks;

- To develop, for NGSO satellite systems operating in the above frequency bands, sharing conditions with GSO networks.

- To ascertain whether the current out-of-band limits on the FSS in Resolution **750 (Rev WRC-12)** Table 1-1 are still appropriate taking into account updated information on NGSO satellite systems.

- To incorporate into the Radio Regulations mechanisms to establish the coordination procedures applicable to NGSO systems operating in the above frequency bands.

These mechanisms will be determined by the relevant ITU study groups.

The proposed agenda item does not seek to change any allocations or status of allocations within the frequency bands to be considered.

BACKGROUND

WRC-97 adopted **5.523A** whereby the use of certain frequency bands by geostationary and non-geostationary fixed satellite service networks is subject to the application of the provisions of No. **9.11A** and No. **22.2** does not apply.

This WRC action allows NGSO satellite systems to operate in the bands referred to in **5.523A** subject to coordination on a first come first served basis with respect to GSO satellite networks.

WRC-97 also adopted provisional equivalent pfd (epfd) and aggregate epfd limits to be met by NGSO satellite systems operating in certain frequency bands. WRC-2000 adopted definitive epfd limits and expanded the ranges of frequency where they would apply. A NGSO satellite system meeting the epfd limits in the relevant frequency bands is deemed to be compliant with Article **22.2** with respect to any GSO satellite network regardless of priority date.

Both of these measures contributed to provide a well-defined regulatory framework for NGSO systems operating in the associated frequency bands.The same types of approaches could be studied and

considered for NGSO FSS systems that may operate in the frequency bands 37.5-42.5 GHz (space-to-Earth) and 42.5-43.5 GHz, 49.2-50.2 GHz and 50.4-51.4 GHz (Earth-to-space).

Moreover, there are currently no mechanisms in the RR establishing coordination procedures applicable to NGSO systems operating in the frequency bands currently allocated to the FSS in the range from 37.5 to 51.4 GHz, such as application of **9.12**. This also contributes to uncertainty among potential operators of NGSO satellite systems in these bands, and should be resolved as soon as possible by a competent WRC.

STATUS OF ITU FILINGS

As of April, 2015, there was only one GSO satellite network notified in the frequency range 37.5-39.5 GHz, no notified networks in the frequency range 39.5-40.5 GHz, and two notified GSO satellite networks in the frequency range 40.5-42.5 GHz (space-to-Earth allocations). Additionally, there were 23 GSO satellite networks notified in the frequency range 42.5-43.5 GHz, one GSO satellite network notified in the frequency range 49.2-50.2 GHz and no satellite networks notified in the frequency range 50.4-51.4 GHz (Earth-to-space allocations).

Proposals

MOD USA/10/1

RESOLUTION 808 (WRC-15)

Agenda for the 2019 World Radiocommunication Conference

The World Radiocommunication Conference (Geneva, 2015),

Reasons: To modify the agenda for WRC-18 to add a new item.

ADD USA/10/2

XX To develop a regulatory framework that provides specific regulatory provisions for NGSO FSS satellite systems operating in the 37.5-42.5 GHz (space-to-Earth) and 42.5-43.5 GHz, 49.2-50.2 GHz and 50.4-51.4 GHz (Earth-to-space) frequency bands in accordance with Resolution [USA/10/NGSO V-BAND] (WRC-15).

Reasons: To eliminate the regulatory uncertainty inherent in the application of No. **22.2** to NGSO satellite systems operating in the FSS frequency bands 37.5-42.5 GHz (space-to-Earth) and 42.5-43.5 GHz, 49.2-50.2 GHz and 50.4-51.4 GHz (Earth-to-space) and the absence of coordination conditions applicable to such systems in these frequency bands.

ADD USA/10/3

DRAFT RESOLUTION [USA/10/NGSO V-BAND] (WRC-15)

Development of a regulatory framework for NGSO FSS satellite systems that may operate in the 37.5-42.5 GHz (space-to-Earth) and 42.5-43.5 GHz, 49.2-50.2 GHz and 50.4-51.4 GHz (Earth-to-space) frequency bands

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that the International Telecommunication Union has, among its purposes, "to promote the extension of the benefit of the new telecommunication technologies to all the world's inhabitants" (No. 6 of the Constitution of the International Telecommunication Union - Edition 2011);

b) that it is desirable, in this respect, to promote systems capable of providing universal service;

c) that new telecommunication services need advanced and reliable networks permitting high-capacity communications;

d) the need to encourage the development and implementation of new technologies;

e) that systems based on the use of new technologies associated with both geostationary (GSO) and non-geostationary (non-GSO) satellite constellations are capable of providing high-capacity and low-cost means of communication even to the most isolated regions of the world;

f) that the Radio Regulations should allow flexibility for the operation of as many systems as possible to ensure efficient use of the spectrum;

g) that the Radio Regulations must be sufficiently flexible to accommodate the introduction and implementation of innovative technologies as they evolve;

h) that the application of No. **22.2** can result in uncertainty for non-GSO FSS systems unless provisions are adopted to specify what is required to protect future GSO FSS networks;

i) that there are plans to operate GSO FSS networks and non-GSO FSS systems in the 37.5-51.4 GHz frequency bands allocated to the FSS;

j) that technical studies are required in order to ascertain the extent to which sharing of the frequency ranges 37.5-42.5 GHz (space-to-Earth) and 42.5-43.5 GHz, 49.2-50.2 GHz and 50.4-51.4 GHz (Earth-to-space) is feasible: 1) between GSO and non-GSO systems and 2) between non-GSO systems;

k) that currently there are no regulatory provisions establishing mechanisms for coordination among NGSO satellite systems in the frequency bands allocated to the FSS in the range 37.5-51.4 GHz,

noting

a) that filing information for GSO FSS satellite networks in the frequency bands 37.5-42.5 GHz (space-to-Earth) and 42.5-43.5 GHz, 49.2-50.2 GHz and 50.4-51.4 GHz (Earth-to-space) has been communicated to the Bureau;

b) that some of these networks are in operation and others will be operated in the near future and, consequently, difficulties may be experienced in modifying their characteristics;

c) the need to take into account the current and planned use of these bands by the existing services,

recognizing

a) that WRC 2000 adopted provisions to protect GSO FSS satellite networks from NGSO FSS satellite systems in the 10-30 GHz frequency range;

b) that No. **5.516B** identifies the frequency bands 39.5-40 GHz (space-to-Earth) in Region 1, 40-40.5 GHz (space-to-Earth) in all Regions, 40.5-42 GHz (space-to-Earth) in Region 2, and 48.2-50.2 GHz (Earth-to-space) in Region 2 for use by high-density applications in the fixed-satellite service;

c) that No. **5.552** urges Administrations to take all practicable steps to reserve the band 47.2-49.2 GHz for feeder links for the broadcasting-satellite service operating in the band 40.5-42.5 GHz;

d) that No. **5.544A** limits the use of the bands 47.5-47.9 GHz, 48.2-48.54 GHz and 49.44-50.2 GHz by the fixed-satellite service (space-to-Earth) to geostationary satellites;

e) that No. **21.16** contains power flux-density limits applicable to NGSO satellite systems to protect fixed and mobile services with allocations in the 37.5-42.5 GHz frequency band;

f) that the frequency band 50.2-50.4 GHz is allocated on a primary basis to the EES (passive) and SR (passive) services, which must be adequately protected,

g) that the Mobile-Satellite Service (MSS) is allocated on a primary basis in the 39.5-40.5 GHz frequency band (space-to-Earth);

h) that the Broadcasting Satellite Service (BSS) is allocated on a primary basis in the 40.5-42.5 GHz frequency band,

resolves to invite ITU-R

1 To study and develop possible alternative technical and regulatory provisions for NGSO FSS satellite systems that may operate in the frequency bands 37.5-42.5 GHz (space-to-Earth) and 42.5-43.5 GHz, 49.2-50.2 GHz and 50.4-51.4 GHz (Earth-to-space) that will ensure adequate protection of GSO satellite networks in the FSS, MSS and BSS;

2 To study and determine whether the current out-of-band limits on the FSS in Resolution **750 (Rev WRC-12)** Table 1-1 are still appropriate taking into account updated information on NGSO satellite systems;

3 To study and develop sharing conditions between NGSO FSS systems operating in the bands listed in 1 above,

further resolves

to invite WRC-19 to consider the results of the above studies and take appropriate action,

invites administrations

to participate in the studies by submitting contributions to ITU-R.

ATTACHMENT

PROPOSAL FOR ADDITIONAL AGENDA ITEM AIMING AT DEVELOPING A REGULATORY FRAMEWORK FOR NGSO FSS SATELLITE SYSTEMS THAT MAY OPERATE IN THE 37.5-42.5 GHZ (SPACE-TO-EARTH) AND 42.5-43.5 GHZ, 49.2-50.2 GHZ AND 50.4-51.4 GHZ (EARTH-TO-SPACE) FREQUENCY BANDS

Subject: Proposal for an Agenda Item for WRC-19 aiming at developing a regulatory framework for NGSO FSS satellite systems that may operate in the 37.5-42.5 GHz (space-to-Earth) and 42.5-43.5 GHz, 49.2-50.2 GHz and 50.4-51.4 GHz (Earth-to-space) frequency bands

Origin: United States of America

Proposal: *To develop a regulatory framework that provides specific regulatory provisions for NGSO FSS satellite systems operating in the 37.5-42.5 GHz (space-to-Earth) and 42.5-43.5 GHz, 49.2-50.2 GHz and 50.4-51.4 GHz (Earth-to-space) frequency bands in accordance with Resolution [USA/10/NGSO V-BAND] (WRC-15).*

Background/reason: According to the current provisions of the Radio Regulations, NGSO systems operating in the frequency range from 37.5 to 51.4 GHz have to protect current and future GSO satellite networks operating in the same frequency range, according to No. **22.2**, which creates considerable regulatory uncertainty to potential NGSO satellite service providers. Moreover, there are currently no mechanisms in the RR establishing coordination procedures applicable to NGSO systems operating in these frequency bands, such as application of No. **9.12**. This also contributes to uncertainty among potential operators of NGSO satellite systems in these bands.

Radiocommunication services concerned: FSS, MSS and BSS

Indication of possible difficulties: None foreseen

Previous/ongoing studies on the issue: Previous WRCs addressed similar issues in the 11/12/13/14 and 20/30 GHz bands.

Studies to be carried out by: SG4	***with the participation of:***

ITU-R Study Groups concerned: SG4

ITU resource implications, including financial implications (refer to CV126): Minimal

Common regional proposal: Yes/No	***Multicountry proposal:*** Yes/No ***Number of countries:***

Remarks

WAC/121(20.05.15)

2015 WORLD RADIOCOMMUNICATION CONFERENCE

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

TITLE: To consider spectrum requirements for the satellite services operating in the fixed satellite services and possible regulatory actions, including additional allocations, for both geostationary and non-geostationary orbit use, taking into account existing services in the band and the results of ITU-R studies.

AGENDA ITEM 10: *to recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences, in accordance with Article 7 of the Convention*

U.S. PROPOSAL: The US proposes the adoption of an Agenda item for WRC-19 aiming at the consideration of spectrum requirements for the development of fixed satellite services, and possible regulatory actions, including additional allocations to the fixed satellite service for both geostationary and non-geostationary orbit use in the Earth-to-space and space-to-Earth directions of transmission within the following frequency bands: 8.5 - 9 GHz and 32.3-37 GHz.

BACKGROUND

Today satellite operators provide a wide range of broadband services to a rapidly growing customer base, with more systems to come before 2019. Advances in satellite technologies are allowing a variety of new services including innovative broadband, video and mobile services covering all corners of the globe and providing service to places and regions not covered by traditional terrestrial services and that, accordingly, are missing out on the benefits of new and innovative telecommunications services. Fixed satellite services can support a number of important public interest initiatives including tele-health, tele-education and public protection and disaster relief. Just to name a few examples, high throughput satellites are bringing broadband connectivity to rural and remote areas, thereby advancing countries' broadband objectives. New state of the art satellites that provide next generation satellite broadband**,** high quality video programming (including 3D and 4K programming), or mobile satellite services using Ka-band frequencies have recently been launched or will be launched shortly.

This is not by chance; the technological progress in radio communication enables the satellite industry to offer much more capacity today with much less spectrum. This applies to the fixed satellite service whether operating in the geostationary or non-geostationary orbits. The satellite

industry takes this development into account by using the most spectrum efficient technologies, including advances in spot-beam technologies and frequency re-use. In addition, for some satellite applications, such as gateways, sharing with Radiocommunication services could be more easily accomplished. However, even with this efficiency, demand for fixed satellites services outpaces the spectrum available for this service today.

Nonetheless, there is growing demand for fixed satellite services, including broadband and data services which in many rural and remote locations are the only ways of receiving these important communication services,. Today, with C, Ku and Ka bands reaching capacity, satellite frequencies are heavily used and are nearing saturation for many applications. Therefore, Satellite operators are seeking access to additional fixed satellite service spectrum to satisfy existing and anticipated requirements for existing and new services, including broadband services. In the North America, for instance, over one million and a half customers currently rely on satellite broadband services and that number is growing each day.

The United States proposes these bands for consideration for fixed satellite services: 8.5 - 9 GHz; and 32.3-37 GHz. Other services shall be taken into account and this analysis shall include the possibility of sharing with existing uses of the bands.

Proposals

MOD USA/10/1

RESOLUTION 808 (WRC-15~~12~~)

~~Preliminary a~~Agenda for the 201~~8~~9 World Radiocommunication Conference

The World Radiocommunication Conference (Geneva, 201~~2~~5),

Reasons: To modify the agenda for WRC-19 to add a new item.

ADD USA/10/2

XX To consider spectrum requirements for the development of fixed satellite services and possible regulatory actions, including possible additional spectrum allocations in these bands (8.5 - 9 GHz; and 32.3-37 GHz) to the fixed satellite service for both geostationary and non-geostationary orbit use, taking into account existing services in the bands and the results of ITU-R studies in accordance with Resolution [USA/10/FIXED SATELLITE SERVICE] (WRC-15).

Reasons: To support the requirement for additional spectrum being allocated to the fixed-satellite service.

ADD USA/10/3

DRAFT RESOLUTION [USA/10/FIXED SATELLITE SERVICE] (WRC-15)

Studies relating to the spectrum requirements and the possible identification of frequency bands to be allocated to the fixed-satellite service

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that satellite technology is increasingly being used to deliver broadband services and can help enable universal broadband access, essential to 21st century life;

b) that fixed satellite services contribute to the public in a number of areas including tele-health, tele-medicine, telework, and public protection and disaster response;

c) that next-generation end-user satellite broadband will dramatically increase speeds as 45 mbps is already available, with significantly faster rates expected in the near future;

d) that first responders and relief workers can coordinate response efforts domestically, regionally and globally through the use of satellites;

e) that satellite connectivity is available quickly and only requires ground units for the connection of each site;

f) that the frequency bands proposed herein are being utilized by a number of services and these uses must be taken into account;

g) that satellite operators provide a wide range of broadband services to a growing customer base, with more systems to come before 2019;

h) that technological developments such as advances in spot-beam technologies and frequency re-use are used by the fixed satellite service in order to increase the efficient use of spectrum; and

i) that certain satellite applications, such as gateways, are more conducive to sharing with other Radiocommunications services,

noting

a) that, by Resolution 71 (Rev. Guadalajara 2010) of the Plenipotentiary Conference, ITU adopted its strategic plan for the period 2012-2015, which contains, as one of the strategic goals of ITU-R: "To seek ways and means to ensure rational, equitable, efficient and economical use of the radio-frequency spectrum and satellite-orbit resources and to promote flexibility for future expansion and new technological developments",

recognizing

a) that satellites take years to design and construct;
b) the need for regulatory certainty regarding the available spectrum for satellite design and planning purposes; and
c) the need to protect existing services when considering frequency bands for possible additional allocations to any service,

resolves to invite the ITU-R

to conduct, and complete in time for WRC-19:

1) studies considering additional spectrum requirements for the development of fixed satellite services taking into account the bands currently allocated to the fixed satellite service, the technical conditions of their use, and the possibility of optimizing the use of these bands with a view to increasing spectrum efficiency;

2) sharing and compatibility studies with existing services;

3) studies on possible regulatory actions, including additional co-primary allocation to the fixed satellite service for both geostationary and non-geostationary orbit use in the following frequency bands: 8.5 - 9 GHz; and 32.3-37 GHz,

further resolves

to invite WRC-19 to consider the results of the above studies and take appropriate actions,

invites administrations

to participate actively in these studies by submitting contributions to ITU-R.

ATTACHMENT

PROPOSAL FOR ADDITIONAL PRELIMINARY AGENDA ITEM AIMING AT THE CONSIDERATION OF SPECTRUM REQUIREMENTS FOR THE DEVELOPMENT OF FIXED SATELLITE SERVICES AND POSSIBLE REGULATORY ACTIONS, INCLUDING ADDITIOANL ALLCOATIONS TO THE FIXED SATELLITE SERVICE FOR BOTH GEOSTATIONARY AND NON-GEOSTGATIONARY ORBIT USE IN THE EARTH TO SPACE AND SPACE TO EARTH DIRECTIONS OF TRANSMISSION WITHIN THE FOLLOWING FREQUENCY BANDS; 8.5-9.0 GHZ AND 32.3-37.0 GHZ.

Subject: Proposes the adoption of an Agenda item for WRC-19 aiming at the consideration of spectrum requirements for the development of fixed satellite services, and possible regulatory actions, including additional allocations to the fixed satellite service for both geostationary and non-geostationary orbit use in the Earth-to-space and space-to-Earth directions of transmission within the following frequency bands: 8.5 - 9 GHz and 32.3-37 GHz.

Origin: United States of America

Proposal: To develop a preliminary Agenda item aiming at the consideration of spectrum requirements for the development of fixed satellite services and possible regulatory actions, including additional allocations to the Fixed Satellite Service for both Geostationary and Non-Geostationary Orbit Use in the Earth to Space and Space to Earth Directions of Transmission with the following frequency bands: 8.5-9.0 GHz and 32.3-37.0 GHz

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Background/reason: Today satellite operators provide a wide range of broadband services to a rapidly growing customer base, with more systems to come before 2019. Advances in satellite technologies are allowing a variety of new services including innovative broadband, video and mobile services covering all corners of the globe and providing service to places and regions not covered by traditional terrestrial services and that, accordingly, are missing out on the benefits of new and innovative telecommunications services. Fixed satellite services can support a number of important public interest initiatives including tele-health, tele-education and public protection and disaster relief. Just to name a few examples, high throughput satellites are bringing broadband connectivity to rural and remote areas, thereby advancing countries' broadband objectives.

This is not by chance; the technological progress in radio communication enables the satellite industry to offer much more capacity today with much less spectrum. This applies to the fixed satellite service whether operating in the geostationary or non-geostationary orbits. The satellite industry takes this development into account by using the most spectrum efficient technologies, including advances in spot-beam technologies and frequency re-use. In addition, for some satellite applications, such as gateways, sharing with Radiocommunication services could be more easily accomplished. However, even with this efficiency, demand for fixed satellites services outpaces the spectrum available for this service today.

Nonetheless, there is growing demand for fixed satellite services, including broadband and data services which in many rural and remote locations are the only ways of receiving these important communication services,. Today, with C, Ku and Ka bands reaching capacity, satellite frequencies are heavily used and are nearing saturation for many applications. Therefore, Satellite operators are seeking access to additional fixed satellite service spectrum to satisfy existing and anticipated requirements for existing and new services, including broadband services. In the North America, for instance, over one million and a half customers currently rely on satellite broadband services and that number is growing each day.

Radiocommunication services concerned: FSS

Indication of possible difficulties: None foreseen

Previous/ongoing studies on the issue: Previous WRCs addressed similar issues in the 11/12/13/14 and 20/30 GHz bands.

Studies to be carried out by: SG4	***with the participation of:***

ITU-R Study Groups concerned: SG4

ITU resource implications, including financial implications (refer to CV126): Minimal

Common regional proposal: Yes/No	***Multicountry proposal:*** Yes/No ***Number of countries:***

Remarks

WAC/122(20.05.15)

2015 WORLD RADIOCOMMUNICATION CONFERENCE

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

TITLE: Earth stations on aircraft operating in the FSS in the frequency band 12.75-13.25 GHz (Earth-to-space).

AGENDA ITEM 10: *to recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences, in accordance with Article 7 of the Convention,*

U.S. PROPOSAL: The US proposes the adoption of an agenda item for the next WRC with the aim of developing regulatory means and associated conditions to allow operation of earth stations on aircraft in the FSS in the frequency band 12.75-13.25 GHz (Earth-to-space).

BACKGROUND

The frequency band 12.75-13.25 GHz is currently allocated on a primary basis to the fixed, mobile and fixed-satellite (Earth-to-space)[1] services, and on a secondary basis to the space research (deep space) (space-to-Earth) services.

Currently, satellite networks operating in this frequency band can provide services to earth stations while in motion only under No. **4.4**, which requires the associated transmissions not to cause harmful interference to, and not to claim protection from harmful interference caused by, a station operating according to primary or secondary frequency allocations.

On the other hand, WRC-03 adopted regulatory provisions to allow operation of aircraft earth stations in the FSS in frequency band 14.0-14.5 GHz (Earth-to-space), where the same types of services with current allocation in the frequency band 12.75-13.25 GHz also operate.

Given the similarity of the services allocated in both frequency bands, it is proposed to study the viability of allowing the operation of earth stations on aircraft in the FSS in the 12.75-13.25 GHz (Earth-to-space) frequency band, with the aim of developing regulatory means and associated conditions for this type of application.

Proposals

MOD USA/10/1

RESOLUTION 808 (WRC-~~12~~15)

~~Preliminary a~~Agenda for the ~~2018~~ 2019 World Radiocommunication Conference

The World Radiocommunication Conference (Geneva, ~~2012~~2015),

[1] The use of the band 12.75-13.25 GHz (Earth-to-space) by geostationary-satellite systems in the fixed-satellite service is in accordance with the provisions of Appendix **30B** according to No. **5.441**.

Reasons: To modify the agenda for WRC-19 to add a new item.

ADD USA/10/2

XX To develop regulatory means and associated conditions to allow the operation of earth stations on aircraft in the FSS in the frequency band 12.75-13.25 GHz (Earth-to-space) in accordance with Resolution [USA/10/FSS 12.75-13.25 GHZ] (WRC-15).

Reasons: To extend to the frequency band 12.75-13.25 GHz of the FSS the possibility to operate earth stations on aircraft as is currently the case in the 14.0-14.5 GHz frequency band.

ADD USA/10/3

DRAFT RESOLUTION [USA/10/FSS 12.75-13.25 GHZ] (WRC-15)

Possible operation of earth stations on aircraft in the FSS in the frequency band 12.75-13.25 GHz (Earth-to-space)

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that the frequency band 12.75-13.25 GHz is currently allocated on a primary basis to the fixed, mobile and fixed-satellite (Earth-to-space) services, and on a secondary basis to the space research (deep space) (space-to-Earth) services;

b) that fixed-satellite service (FSS) networks operating in this frequency band are also used for the provision of services to earth stations while in motion on a non-interference and non-protected basis, under No. **4.4**;

c) that it is desirable to extend to the FSS frequency band 12.75-13.25 GHz the possibility to operate earth stations on aircraft as is currently the case for the 14.0-14.5 GHz FSS frequency band;

d) that such operations should not jeopardize or cause harmful interference to currently allocated services or uses;

e) that the same types of services currently allocated in the frequency band 12.75-13.25 GHz also operate in the 14.0-14.5 GHz frequency band, where the effective use of services has been possible simultaneously with transmissions from earth stations on aircraft operating in the FSS,

recognizing

a) that FSS satellite networks operating in the 12.75-13.25 GHz frequency band can currently provide services to earth stations in motion only under No. **4.4**, which requires the associated transmissions not to cause harmful interference to, and not to claim protection from harmful interference caused by, a station operating according to primary or secondary frequency allocations;

b) that Nos. **5.504B** and **5.504C** establish conditions for operation of earth stations on aircraft in the FSS frequency band 14.0-14.5 GHz in accordance with No. **5.504A**;

c) that the use of the band 12.75-13.25 GHz (Earth-to-space) by geostationary-satellite systems in the fixed-satellite service is in accordance with the provisions of Appendix **30B** according to No. **5.441**,

resolves to invite ITU-R

1 to carry out studies toward the development of regulatory means and associated conditions that allow the operation of earth stations on aircraft in the FSS in the frequency band 12.75-13.25 GHz (Earth-to-space) taking into account the current and planned use of these bands by the existing services;

2 to complete studies in time for WRC-19,

resolves to invite WRC-19

to review the results of these studies with a view to adopt regulatory means and associated conditions that allow the operation of earth stations on aircraft in the FSS in the frequency band 12.75-13.25 GHz (Earth-to-space),

invites administrations

to participate actively in the studies by submitting contributions to ITU-R.

ATTACHMENT

PROPOSAL FOR AN ADDITIONAL AGENDA ITEM AIMING AT DEVELOPING REGULATORY MEANS AND ASSOCIATED CONDITIONS THAT ALLOW THE OPERATION OF EARTH STATIONS ON AIRCRAFT IN THE FSS IN THE FREQUENCY BAND 12.75-13.25 GHZ (EARTH-TO-SPACE)

Subject: Proposal for an Agenda Item for WRC-19 aiming at developing regulatory means and associated conditions that allow the operation of earth stations on aircraft in the FSS in the frequency band 12.75-13.25 GHz (Earth-to-space)

Origin: United States of America

Proposal: *To develop regulatory means and associated conditions that allow the operation of earth stations on aircraft in the FSS in the frequency band 12.75-13.25 GHz in accordance with Resolution [USA/10/FSS 12.75-13.25 GHZ] (WRC-15).*

Background/reason: According to the provisions of the Radio Regulations, FSS satellite networks operating in the 12.75-13.25 GHz frequency band can currently provide services to earth stations in motion only under No. **4.4.** This provision requires the associated transmissions not to cause harmful interference to, and not to claim protection from harmful interference caused by, a station operating according to primary or secondary frequency allocations. On the other hand, WRC-03 adopted regulatory provisions that allow operation of earth stations on aircraft in the FSS in frequency band 14.0-14.5 GHz (Earth-to-space), where the same types of services with current allocation in the frequency band 12.75-13.25 GHz also operate. It may therefore be feasible to extend to the FSS frequency band 12.75-13.25 GHz (Earth-to-space) the possibility to operate earth stations on aircraft as is currently the case for the 14.0-14.5 GHz FSS frequency band, which would allow more capacity for the provision of such services with additional regulatory certainty.

Radiocommunication services concerned: FSS, FS, MS and SRS (deep space)

Indication of possible difficulties: None foreseen

Previous/ongoing studies on the issue: Previous WRCs addressed similar issues in the 14.0-14.5 GHz band.

Studies to be carried out by: SG4	***with the participation of:***

ITU-R Study Groups concerned: SG4, SG5 and SG7

ITU resource implications, including financial implications (refer to CV126): Minimal

Common regional proposal: Yes/No	***Multicountry proposal:*** Yes/No ***Number of countries:***

Remarks

WAC/129(20.05.15)

PROPOSED EDITS TO NTIA DRAFT PROPOSAL ON WRC-15 AI 10
(REF. WAC/105(20.05.15)

Agenda Item 10: *to recommend to the Council, items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences, taking into account Resolution* ***806 (WRC-07)***

Background Information: Prediction and detection of disruptive geomagnetic storms and other space perturbations (hereinafter "space weather") are critical to many economic and infrastructure areas~~,~~ globally. A definition of Space Weather [will be/has been] proposed to the CCV by the May 2015 meeting of Working Party 7C. Some of the larger vulnerable economic areas are satellite operations, air transport and electric power distribution. Failure to detect and predict disruptive conditions could result in loss of life and property as well severe impact to the economy. ~~This is not intended to imply in any way that these operations are part of a safety service; rather that these space~~ Space weather observations are critical to many aspects of national economies and the world population.

The motivating factor behind this proposal is the concern that space weather sensor technology has been developed and operational systems have been deployed without much regard for domestic or international spectrum regulations, or for the potential need for protection from interference. Systems of importance to national economies and the safety of the world population should have some level of recognition and protection in the international Radio Regulations.

It was recognized that obtaining protection from harmful interference to these systems after the fact may be challenging, at best. Given their importance, exploring the options for protection without placing additional restrictions on incumbent services has merit. Study Group 7 has agreed to a Question at its October 2014 meeting to study the technical and operational characteristics and spectrum requirements of space weather detection systems. The Question also calls for the study to determine the most appropriate service or designation for space weather sensors.

The proposal is being made to add this issue to the preliminary agenda of WRC-21, providing adequate time to properly complete the required studies and allow all interested parties, including incumbent radio services, sufficient time to properly consider the matter. Inclusion on the WRC-19 agenda would likely result in insufficient time to complete all work to the satisfaction of all incumbent services.

Proposal:

MOD USA/10/1

RESOLUTION [PRELIM WRC-21 AGENDA]

Agenda for the ~~2018~~ 2021 World Radiocommunication Conference

The World Radiocommunication Conference (Geneva, 2015),

ADD USA/10/2

X.X in accordance with Resolution AAA, to review the results of studies relating to the technical and operational characteristics, spectrum requirements and appropriate radio service designations for space weather sensors with a view to providing appropriate recognition and protection in the Radio Regulations without placing additional constraints on incumbent services.

Reasons: To provide recognition and protection of space weather sensors in the Radio Regulations.

ADD USA/10/3

RESOLUTION AAA (WRC-15)

Spectrum Requirements and Protection of Space Weather Sensors

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that space weather observations are becoming increasingly important in detecting solar activity events that could impact services critical to the economy, safety and security of administrations;

b) that these observations are made from platforms that may be ground based, airborne, or space-based;

c) that some of the sensors operate by receiving low level natural emissions of the Sun or the Earth's atmosphere, and therefore may suffer harmful interference at levels which could be tolerated by other radio systems;

d) that space weather sensor technology has been developed and operational systems have been deployed without much regard for domestic or international spectrum regulations, or for the potential need for protection from interference,

recognizing

a) that no frequency bands have been allocated or documented in any manner in the Radio Regulations for space weather sensor applications;

b) that the ITU-R has a Study Question in force (7/102) to study the technical and operational characteristics, frequency requirements, and appropriate radio service designation for space weather sensors;

c) that any regulatory action associated with space weather sensor applications should take into account incumbent services that are already operating in the frequency bands of interest,

resolves *to invite WRC-21*

~~that,~~ while taking into account the results of ITU-R studies and without placing additional constraints on incumbent services, ~~WRC-21~~ to consider regulatory provisions necessary to provide protection to space weather sensors operating in the appropriately designated radio service that is to be determined during ITU-R studies,

invites the ITU-R

1 to document, in time for WRC-19, the technical and operational characteristics of space weather sensors;

2 to determine, in time for WRC-19, the appropriate radio service designations for space weather sensors;

3 to conduct, in time for WRC-21, any necessary sharing studies for incumbent systems operating in frequency bands used by space weather sensors, with the objective of determining regulatory protection that can be provided while not placing additional constraints on incumbents services,

invites administrations

to participate actively in the studies and provide the technical and operational characteristics of the systems involved by submitting contributions to the ITU-R,

instructs the Secretary General

to bring this resolution to the attention of the World Meteorological Organization (WMO), Space Frequency Coordination Group (SFCG) and other international and regional organizations concerned.

Reasons: A resolution will support the ITU-R studies needed under the relevant WRC-21 agenda item.

ATTACHMENT

PROPOSAL FOR ADDITIONAL PRELIMINARY AGENDA ITEM STUDYING TECHNICAL AND OPERATIONAL CHARACTERISTICS, SPECTRUM REQUIREMENTS AND PROTECTION OF SPACE WEATHER SENSORS

Subject: Proposed Future WRC Agenda Item for WRC-2021 studying appropriate service designations and protection requirements for space weather measurements

Origin: United States of America

Proposal: in accordance with Resolution AAA, to review the review the results of studies relating to the technical and operational characteristics, spectrum requirements and appropriate radio service designations for space weathers sensors with a view to providing appropriate recognition and protection in the Radio Regulations without placing additional constraints on incumbent services.

Background/reason: Prediction and detection of disruptive geomagnetic storms and other space perturbations (hereinafter "space weather") are critical to many economic and infrastructure areas, globally. Some of the larger vulnerable economic areas are satellite operations, air transport and electric power distribution. Failure to detect and predict disruptive conditions could result in loss of life and property as well severe impact to the economy. ~~This is not intended to imply in any way that these operations are part of a safety service; rather that these s~~Space weather observations are critical to many aspects of national economies and the world population. Space weather sensor technology has been developed and operational systems have been deployed without much regard for domestic or international spectrum regulations, or for the potential need for protection from interference. Systems of importance to national economies and the safety of the world population should have some level of recognition and protection in the International Radio Regulations.

Radiocommunication services concerned: To be determined

Indication of possible difficulties: None foreseen

Previous/ongoing studies on the issue: ITU-R Study Question 7/102 in force with studies underway to document technical and operational characteristics and spectrum requirements.

Studies to be carried out by: SG7	*with the participation of:*

ITU-R Study Groups concerned: SG4, SG 5, SG 6

ITU resource implications, including financial implications (refer to CV126): **Minimal**

Common regional proposal: Yes/No ***Multicountry proposal:*** Yes/No
Number of countries:

Remarks

Regulatory Issues

WAC/123(20.05.15)

COMMENTS ON AI 7, ISSUE D PROPOSAL
(REF. WAC/105(20.05.15))

The following reflects comments of IWG-4 on the NTIA draft proposal for Agenda Item 7, Issue D, from Document WAC/105. In the proposal, suggested changes are shown in yellow highlighting. Most changes, but not all, are to align the draft U.S. proposal with the single method for Agenda Item 7, Issue D, that is presented in Section 5/7/4.6 of the CPM Report to WRC-15. Changes proposed to *resolves 3* of Resolution 907, and to *noting a)* of Resolution 908 include changes that are intended to clarify the regulatory text.

* * *

UNITED STATES OF AMERICA

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 7: *to consider possible changes in response to Resolution 86 (Rev. Marrakesh, 2002) of the Plenipotentiary Conference, advance publication, coordination, notification and recording procedures for frequency assignments pertaining to satellite networks, in accordance with Resolution **86 (Rev.WRC-07)** to facilitate rational, efficient, and economical use of radio frequencies and any associated orbits, including the geostationary-satellite orbit*

Issue D: General use of modern electronic means of communications in coordination and notification procedures

Background Information: ~~Business~~ Communication efficiencies can be achieved by using modern electronic means compared to older technologies, and that there are advantages to using a generic reference to modern electronic means instead of naming specific technologies, e.g., "telegram", "telex", and "fax" in regulatory text.

Resolution **907 (WRC-12)** is directly related to this issue and the United States proposes to amend it to ensure that, wherever the words "telegram", "telex" or "fax" are inserted in provisions related to coordination, ~~and~~ notification and recording procedures of satellite networks (including Articles **9** and **11** of the Radio Regulations and Appendices **30**, **30A** and~~,~~ **30B** ~~and relevant Resolutions~~), modern electronic means should~~ean~~ be used instead. The BR would also continue to be tasked to implement the resolves part and to report to administrations on such an implementation. The proposed modifications to Res **907 (WRC-12)** preserve the rights of administrations to continue to use the traditional means of communications specified in the Radio Regulations.

Similarly, Res **908 (WRC-12)** deals with electronic submission and publication of advance publication of information. The BR's SpaceWISC application fulfills the mandate of this Resolution (see Circular Letter CR/376). Building upon this, the United States proposes to expand the scope of this Resolution to all kind of satellite network filings and to request the BR to analyze whether it is possible to have a single consolidated interface for both the submission of satellite network filings and the related correspondence

(correspondence between the BR and the notifying administration, comments submitted following the publication of the special section, correspondence between administrations about the special section, etc.).

These proposals are substantively aligned with the single method proposed in the CPM ~~text~~ Report for WRC-15 agenda item 7, Issue D.

Proposals:

MOD USA/7/1

RESOLUTION 907 (WRC-~~12~~15)

Use of modern electronic means of communication for administrative correspondence related to advance publication, coordination and notification of satellite networks including that related to Appendices 30, 30A and 30B, earth stations and radio astronomy stations

The World Radiocommunication Conference (Geneva, 20~~12~~15),

considering

that the use of electronic means of communication for administrative correspondence related to advance publication, coordination and notification of satellite networks, earth stations and radio astronomy stations would facilitate the tasks of the Radiocommunication Bureau and of administrations and has the potential to improve the coordination and notification process by reducing the amount of duplicated correspondence,

noting

that Decision 5 (Rev. ~~Guadalajara~~Busan, 2014~~2010~~) includes, in its Annex 2, paragraph 28~~20~~, which proposes to "Discontinue to the greatest extent possible communications by fax and traditional postal mail between the Union and Member States and replace it with modern electronic communication methods~~move, to the extent practicable, from present communications by fax between the Union and Member States to modern electronic communication methods~~",

recognizing

that administrations could use the time freed by a reduction of administrative correspondence to effect coordination,

resolves

1 that modern electronic means of communication shall be used whenever possible in the administrative correspondence between administrations and the Radiocommunication Bureau related to the advance publication, coordination, ~~and~~ notification and recording processes, including correspondence related to Appendices **30**, **30A** and **30B** ~~and relevant Resolutions~~, ~~where applicable, to due diligence~~ for satellite networks, earth stations and radio astronomy stations;

2 that, wherever the words "telegram", "telex" or "fax" are inserted in provisions related to the advance publication, coordination, ~~and~~ notification and recording processes of satellite networks, earth stations and radio astronomy stations, including the provisions contained in Appendices **30**, **30A**~~,~~ and **30B** ~~and relevant Resolutions~~, modern electronic means shall be used ~~instead~~, ~~whenever~~ to the utmost possible;

~~2~~3 that the ~~other,~~ traditional means of communication referred to in *resolves 2* ~~can~~shall continue to be used unless the administration informs the Bureau of its willingness to discontinue such use~~if modern electronic means are not available~~,

instructs the Radiocommunication Bureau

1 to provide administrations with the necessary technical means to ensure that the modern electronic correspondence between administrations and the Radiocommunication Bureau is secure;

2 to inform administrations of the availability of such means and of the associated schedule of implementation;

3 to automatically acknowledge receipt of all electronic correspondence;

4 to report to the next world radiocommunication conference on the experience gained in the application of this Resolution, with a view to making any necessary consequential amendments to the Radio Regulations,

urges administrations

to use, to the extent possible, modern electronic means of communication in the administrative correspondence between themselves related to advance publication, coordination and notification of satellite networks, including that related to Appendices **30**, **30A** and **30B**, and to earth stations and radio astronomy stations, recognizing that other means of communication may still be used if necessary (see also *resolves* ~~2~~3).

Reasons: To specifically address replacement of the words "telegram", "telex", and "fax" with the generic phrase modern electronic means.

MOD USA/7/2

RESOLUTION 908 (WRC-~~12~~15)

Electronic submission and publication of ~~advance publication information~~ satellite network filings

The World Radiocommunication Conference (Geneva, 20~~12~~15),

considering

a) that the volume of advance publication information (API), coordination requests (CR/C), notification, application of Appendices **30**, **30A** and **30B** ~~on~~ for satellite networks or systems ~~subject to the coordination procedure under Section II of Article **9** of the Radio Regulations~~ has been steadily increasing in recent years;

~~*b)* that this increasing trend may be due in part to the fact that there is no cost-recovery fee for these APIs;~~

~~*c)* that the Bureau has also observed that many of the APIs are not followed by a coordination request within the period of 24 months prescribed under No. **9.5D**;~~

~~*d*~~*b)* that a significant amount of effort is ~~therefore~~ required to ~~update~~ maintain the relevant databases ~~by deleting either in total or partially the obsolete APIs,~~;

~~*considering further*~~

~~*a*~~*c)* that a paperless electronic approach for the submission of ~~APIs on~~ satellite network~~s~~ filings would make ~~API~~ this information readily accessible to all, and would limit the workload for administrations and the Bureau in the processing of ~~APIs for satellite networks or systems subject to coordination~~these filings~~;~~,

~~*b)* that, at the end of 24-month period prescribed in No. **9.5D**, the entries will automatically be removed from the list;~~

~~*c)* that coordination requests that are submitted within the 24-month period, together with relevant API information (date of receipt, nominal orbital position), will then be processed and entered in the SNS database in the normal way,~~

noting

~~*a)* that the API requested under Section IB of Article **9** of the Radio Regulations contains only a limited amount of information, the most pertinent being the date of receipt of complete information, the frequency bands and, for GSO networks, the orbital position;~~

~~*b)* that the current API publication will continue to apply to the advance publication of information on satellite networks or systems which are not subject to coordination procedures under Section II of Article **9**,~~

a) that, through Circular Letters CR/363 and CR/~~363~~376, the Bureau informed administrations about, and ~~that~~ implemented as of 1 March 2015, a web-based application (SpaceWISC) ~~, as of 1 March 2015,was developed~~ for the submission and publication of API notices for satellite networks or systems subject to coordination and for the administrations' comments under No. **9.5B**;

b) that, through Circular Letter CR/360, the Bureau informed administrations that a web-based on-line distribution of the International Frequency Information Circular BR IFIC (Space services) on DVD-ROM in ISO format was developed, allowing the data to be available without delay on the BR IFIC publication date and administrations to get a secure local reproduction of the BR IFIC (Space services) DVD-ROM,

resolves

that administrations shall submit ~~API~~ all satellite network filings~~, under Articles **9** and **11** as well as Appendices **30**, **30A**, **30B** and relevant Resolutions,~~ using a secure paperless electronic approach upon being advised that the means for such an electronic submission of ~~API~~ a satellite network filing for satellite networks or systems ~~subject to coordination~~ has been implemented and upon receiving assurances that such means are indeed secure,

instructs the Director of the Radiocommunication Bureau

1 to implement a secure paperless electronic approach for the electronic submission and publication of ~~API~~ satellite network filings for satellite networks or systems ~~subject to coordination~~, taking into account the conditions mentioned in the *resolves* of this resolution~~.~~;

2 to study and implement, as appropriate, a consolidated approach for both the electronic submission of satellite network filings and their related correspondence.

Reasons: To 'extend' Res **908 (WRC-12)** from the successfully implemented secure paperless electronic approach for submission and publication of APIs (SpaceWISC) to all satellite network filings.

WAC/124(20.05.15)

DRAFT PROPOSAL FOR AI 7, ISSUE G

The following is a draft proposal for Agenda Item 7, Issue G (clarification of bringing into use information provided under RR Nos. **11.44/11.44B**). This proposal aligns with the method to satisfy Issue G that is presented in 5/7/7.5 in the CPM Report to WRC-15.

UNITED STATES OF AMERICA

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 7: *to consider possible changes, and other options, in response to Resolution 86 (Rev. Marrakesh, 2002) of the Plenipotentiary Conference, an advance publication, coordination, notification and recording procedures for frequency assignments pertaining to satellite networks, in accordance with Resolution **86 (Rev.WRC 07)** to facilitate rational, efficient, and economical use of radio frequencies and any associated orbits, including the geostationary satellite orbit;*

Resolution **86 (Rev.WRC 07)**: *Implementation of Resolution 86 (Rev. Marrakesh, 2002) of the Plenipotentiary Conference*

ISSUE G: Clarification of bringing into use information provided under RR Nos. 11.44/11.44B

Background

In adopting No. **11.44B**, WRC-12 introduced a new provision to define the bringing into use (BiU) of frequency assignments to geostationary-orbit space stations in terms of the capability of a space station to transmit and receive at a nominal orbital position for a continuous period of 90 days. No. **13.6** of the Radio Regulations provides a mechanism for the Bureau to make inquiries of administrations whenever it appears from reliable information that a recorded assignment has not been brought into use, but there is not presently a mechanism for the Bureau to use whenever it appears from reliable information that an assignment that has been notified, but not yet recorded, has not been brought into use. In other words, there is no provision in Article **11** of the Radio Regulations that allows the Bureau to seek clarification regarding the information provided by the notifying administrations relating to the bringing into use of frequency assignments to a satellite network.

The Bureau and the Radio Regulations Board have considered this matter, and there is now a new paragraph under the Rule of Procedure for No. **11.44** that specifies that whenever it appears from reliable information available that an assignment has not been brought into use in accordance with Nos. **11.44/11.44B** of the Radio Regulations**,** the provisions of No. **13.6** of the Radio Regulations shall apply.

This is an important clarification that should be reflected in the Radio Regulations themselves, and not only in a Rule of Procedure. The proposal below is for a new regulatory provision that enables the Bureau to seek clarification from the notifying administrations under RR Nos. **11.44** and **11.44B**. In the case of space stations in the geostationary satellite orbit, it would ensure that information provided under

RR No. **11.44B** corresponds to the deployed space station, with the capability of transmitting and receiving the assigned frequencies.

Proposal:

MOD USA/7/G/1

ARTICLE 11

Notification and recording of frequency assignments[1, 2, 3, 4, 5, 6, 7, 7*bis*] (WRC-12)

Section II − Examination of notices and recording of frequency assignments in the Master Register

11.44 The notified date[20, 21, ADD *21bis*] of bringing into use of any frequency assignment to a space station of a satellite network shall be not later than seven years following the date of receipt by the Bureau of the relevant complete information under No. **9.1** or **9.2**, as appropriate. Any frequency assignment not brought into use within the required period shall be cancelled by the Bureau after having informed the administration at least three months before the expiry of this period. (WRC-~~12~~15)

Reasons: To add a new footnote to enable No. **13.6** processes to be applied to frequency assignments that are notified, but have not yet been recorded, where the Bureau has information the assignments are not yet brought into use.

MOD USA/7/G/2

11.44B A frequency assignment to a space station in the geostationary-satellite orbit shall be considered as having been brought into use when a space station in the geostationary-satellite orbit with the capability of transmitting or receiving that frequency assignment has been deployed and maintained at the notified orbital position for a continuous period of ninety days. The notifying administration shall so inform the Bureau within thirty days from the end of the ninety-day period.[ADD *21bis*] (WRC-~~12~~15)

Reasons: To add a new footnote to enable No. **13.6** processes to be applied to frequency assignments that are notified, but have not yet been recorded, where the Bureau has information the assignments are not yet brought into use.

ADD USA/7/G/3

ADD 21*bis* **11.44.3** and **11.44B.1** Upon receipt of this information and whenever it appears from reliable information available that a notified assignment has not been brought into use in accordance with Nos. **11.44** and/or **11.44B**, as the case may be, the consultation procedures and the subsequent applicable course of action prescribed in No. **13.6** shall apply, as appropriate. (WRC-15)

Reasons: To add a new footnote to enable No. **13.6** processes to be applied to frequency assignments that are notified, but have not yet been recorded, where the Bureau has information the assignments are not yet brought into use.

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WAC/125(20.05.15)

Proposed Edits to
WRC-15 Agenda Item 7 Issue H
(REF. WAC/108(20.05.15))

Discussion

In considering that part of document WAC/108 regarding a draft proposal on WRC-15 Agenda item 7, Issue H, IWG-4 noted that some of the text included in the draft proposal was related to an early study in the draft CPM text which was later deleted before the CPM text was finalized. As such, text related to that deleted study is proposed for deletion in the draft WRC proposal. The edited proposal, as proposed by IWG-4, is shown in its entirety immediately below.

Agenda Item 7: *to consider possible changes, and other options, in response to Resolution 86 (Rev. Marrakesh, 2002) of the Plenipotentiary Conference, an advance publication, coordination, notification and recording procedures for frequency assignments pertaining to satellite networks, in accordance with Resolution **86 (Rev. WRC-07)** to facilitate rational efficient, and economical use of radio frequencies and any associated orbits, including the geostationary-satellite orbit*

Issue H: Using one space station to bring frequency assignments at different orbital locations into use within a short period of time

Background Information: No. **11.44B** and No. **11.49** of the Radio Regulations were revised at WRC-12 in order to clarify issues regarding the bringing into use, or resumption of use after a suspension, of frequency assignments associated with satellite networks.

While adopting these revised provisions WRC-12 recognized that the issue of using one space station to bring frequency assignments at different orbital locations into use within a short period of time was not the intent of these revised provisions. WRC-12 also noted, "There are legitimate reasons why an administration or operator may need to move a spacecraft from one orbital position to a new orbital position, and care should be taken not to constrain the legitimate use of fleet maneuvers and management." In its plenary meeting, WRC-12 also requested the BR, until ITU-R studies are completed, to query to administrations as to the last previous orbital location/frequency assignments brought into use with that satellite and make such information available, where an administration brings into use frequency assignments at a given orbital location using an already in-orbit satellite.

~~The current draft CPM text for the subject issue includes examples of some cases where a single satellite is used to bring into use (BIU) frequency assignments at multiple orbital locations within a short period of time. However, several of these examples mix this issue with that of a satellite failure during the BIU process, whereas others include some examples that could be argued are actually legitimate cases of fleet management by a satellite operator. These examples are used to conclude that the only "justifiable" reason for using one space station to bring into use frequency assignments at multiple locations is a~~

~~satellite failure. Methods in the draft CPM text then attempt to address this issue with a proposal for a regulatory provision to prevent "abuse".~~

In practice, multiple examples exist of cases where a single satellite may be required to bring into use frequency assignments at different locations in a short period of time. ~~While a satellite failure is one example, there are other examples that do not involve satellite failure.~~ These cases include where the timing of events may change the evaluation of whether a case is considered "justifiable" or not. What does seem to emerge from consideration of all of the cases in the draft CPM text is that the possibility for misuse of the BIU and suspension provisions only seems to arise for cases of an in-orbit satellite bringing into use frequency assignments at multiple orbital locations within a short period of time, while at the same time leaving one or more of the previously occupied orbital locations vacant for some period of time. However, even under these circumstances, there do appear to be cases where such actions could be justified as reflected in the draft CPM text. As such, it is not possible to construct specific regulatory provisions to address the case of a single satellite bringing into use frequency assignments at multiple orbital locations within a short period of time. At best, it may be possible to require Administrations, in certain cases, to provide additional information when declaring that frequency assignments have been brought into use using an in-orbit satellite.

Therefore, the United States supports Method H2, no change to Article **11** of the Radio Regulations, as the Radiocommunication Bureau can already query an administration in those cases where an in-orbit satellite is used to BIU an orbital location.

Proposals:

NOC USA/AI 7/1

ARTICLE 11

Notification and recording of frequency assignments[1, 2, 3, 4, 5, 6, 7] (WRC-07)

Reasons: It is not possible to address unjustifiable cases of satellite hopping without potentially constraining the legitimate use of satellite fleet manoeuvres and management.

WAC/126(20.05.15)

DRAFT PROPOSAL FOR AI 7, ISSUE I

The following is a draft proposal for Agenda Item 7, Issue I (excessive filings). This proposal aligns with Method I1.4 from Sections 5/7/9.5.1.4 in the CPM Report to WRC-15.

UNITED STATES OF AMERICA

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 7: *to consider possible changes in response to Resolution 86 (Rev. Marrakesh, 2002) of the Plenipotentiary Conference, advance publication, coordination, notification and recording procedures for frequency assignments pertaining to satellite networks, in accordance with Resolution **86 (Rev.WRC-07)** to facilitate rational, efficient, and economical use of radio frequencies and any associated orbits, including the geostationary-satellite orbit*

Issue I: Possible method to mitigate excessive satellite network filings issue

Background Information:

Issue I focuses on the potential issue of excessive satellite network filings from two perspectives – supposedly excessive filings at the coordination (CR/C) stage, and supposedly excessive filings at the advance publication (API) stage. The supposed problem area targeted in Issue I is not one of Administrations incorrectly applying the Radio Regulations but it is instead the observation that many Administrations with active satellite network filings (i.e. API and CR/C) do not affirmatively suppress their filings even when it becomes clear that the frequency assignments will not be brought into use prior to the end of the regulatory lifetime of the filing. There is no requirement in the Radio Regulations for Administrations to affirmatively suppress a filing at any time. Adding additional interim filing obligations on Administrations during the regulatory lifetime of the filing would substantially increase burdens and costs both for Administrations and for the Bureau without having any real impact on the availability of the orbital/spectrum resource or reducing coordination burden for Administrations actively seeking to implement their satellite network filings.

The United States agrees that Administrations should be encouraged, in keeping with guiding principles of the ITU, to either not make satellite network filings they do not intend to implement, or to relinquish filings made that they no longer intend to use or are unable to implement. The United States does not agree, however, that the establishment of mandatory mechanisms for these purposes is either necessary or justified. There is indeed real congestion in some satellite frequency bands, and identifying available orbital/spectrum resources often is a challenge. At the same time, the coordination process, as refined and being refined over the years, generally provides Administrations and operators intent on implementing their satellite network filings the opportunity to do so. The system is not perfect, but it is being improved at each WRC through refinements to Articles **9** and **11**, and **13**, and Appendices **30**, **30A**, and **30B** that are designed to minimize unnecessary and artificial barriers to new entry, and to provide the BR with improved tools to ensure that the MIFR contains only networks actually in use.

To this end, the United States does not see that any revisions to the CR/C process that would add additional filing obligations during the regulatory lifetime are likely to reduce the number of filings in the ITU database. Nor are such revisions likely to ease a filing Administration's path to implementation of its planned satellite networks. The United States thus proposes no change under the CR/C component of Issue I (in keeping with Method I1.4 in Section 5/7/9.1.5.4 of the CPM Report).

With respect to the API process, the United States believes that elimination of the six-month period between API and receipt of the CR/C would provide some benefits in terms of processing of satellite network filings and reducing the number of APIs and, by association, CR/Cs submitted, by eliminating some of the inherent uncertainties in the current API and CR/C process. For this reason, the United States proposes changes to the Radio Regulations under Issue C to eliminate that gap (in keeping with Option B to Method C3 in Section 5/7/3.5.3 of the CPM Report). That proposal, under Issue C, is not reproduced here.

Proposals:

NOC USA/7/I/1

ARTICLE 9

Procedure for effecting coordination with or obtaining agreement of other administrations [1, 2, 3, 4, 5, 6, 7, 8, 8*bis* (WRC-12)]

Reasons: There is no need to change the Radio Regulations specifically to address the supposed issue of excessive CR/C filings.

NOC USA/7/I/2

ARTICLE 11

Notification and recording of frequency assignments[1, 2, 3, 4, 5, 6, 7 (WRC-07)]

Reasons: There is no need to change the Radio Regulations specifically to address the supposed issue of excessive CR/C filings.

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WAC/127(20.05.15)

Comments on US Proposal for AI 9.1.2

The attached document proposes modifications to the background of the U.S. proposal for AI 9.1.2 in order to align it with the CPM Report. Changes effected at the CPM meeting significantly altered the contents of the methods. Prior to the conference only one method advocated no change to the ΔT/T criterion. Now three of the methods propose NOC to the criterion used in application of No. **9.41**. Consequently, more emphasis is necessary on the reasons for no change to the criterion used in evaluations under RR No. **11.32A**, as this is the main differentiator among the methods under *resolves to invite ITU-R 1* of Resolution **756 (WRC-12)**.

UNITED STATES OF AMERICA

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 9: *to consider and approve the Report of the Director of the Radiocommunication Bureau, in accordance with Article 7 of the Convention:*

Agenda Item 9.1: *on the activities of the Radiocommunication Sector since WRC-12;*

Issue 9.1.2: *Studies on possible reduction of the coordination arc and technical criteria used in application of No. 9.41 in respect of coordination under No. 9.7 (Resolution **756** (WRC-12))*

Background Information: The ITU-R has sought improved ways to accommodate new satellite networks and facilitate more efficient use of the spectrum resources while at the same time ensuring adequate protection of networks operating in accordance with the Radio Regulations. WRC-12 agreed to reduce the coordination arc in the 6/4, 14/10/11/12 and 21.4-22 GHz frequency bands, but did not come to a decision regarding the 30/20 GHz frequency bands. To continue studies, WRC-12 adopted Resolution **756 (WRC-12)**, which *resolves to invite ITU-R:*

> *1 to carry out studies to examine the effectiveness and appropriateness of the current criterion (ΔT/T > 6%) used in the application of No. **9.41** and consider any other possible alternatives (including the alternatives outlined in Annexes 1 and 2 to this Resolution), as appropriate, for the bands referred to in recognizing e);*
>
> *2 to study whether additional reductions in the coordination arcs in RR Appendix **5** **(Rev.WRC-12)** are appropriate for the 6/4 GHz and 14/10/11/12 GHz frequency bands, and whether it is appropriate to reduce the coordination arc in the 30/20 GHz band,*

The ITU-R has conducted studies related to *resolves* 1 and 2 for the 6/4, 14/10/11/12, 21.4-22, and 30/20 GHz frequency bands.

Resolves 1

It is recognized that *resolves* 1 considers the effects of changing both the criterion itself (currently ΔT/T) and the equivalent criterion threshold (currently 6%). In the ~~draft~~ Conference Preparatory Meeting (CPM) ~~text~~ Report for this issue, Option~~s~~ 1A ~~and 1B~~ propose~~s~~ changes to both the criterion and the equivalent criterion threshold, aligning No. 9.41 with the No. 11.32A evaluations while converting the Rule of Procedure on No. 11.32A into regulatory text. Option~~s~~ 1~~C proposes changing the criterion, but not the equivalent criterion threshold.~~ B and 1C propose no change to the criterion or the criterion threshold under No. 9.41, but propose changing the criterion for No. 11.32A evaluation to a PFD mask. Option 1D proposes no change to either ~~to~~ the criterion or the criterion threshold under Nos. 9.41 and 11.32A. The United States supports Option 1D.

With regard to Option~~s~~ 1A ~~and 1B~~:

- There is general concern that changing two items simultaneously may result in unforeseen consequences / difficulties in implementation.

- ~~With regard to Options 1A and 1B, t~~The ΔT/T value of 6 % is justified based on the fact that satellite links have typical interference margins of 1dB. This is particularly relevant for coordination of networks with larger orbital separations than the coordination arc value. The figures of ΔT/T for networks within

the coordination arc are not relevant as ΔT/T is a parameter used to launch the coordination process but not for conducting detailed coordination between networks.

~~With regard to Options 1A, 1B, and 1C:~~

- It is noted that the ITU-R WP 4A Chairman's Report (4A/591) states, "this draft CPM text calls for, in part, converting the existing Rule of Procedure on RR No. 11.32A into regulatory text, and this could prove to be a very challenging task."

- Studies submitted to the ITU have shown that changing the criterion from ΔT/T to C/I (while not changing the equivalent criterion threshold) does not significantly reduce the number of Affected Administrations that must be dealt with in order to complete coordination of a satellite network. The United States' experience is that the number of Affected Administrations is a more important qualitative determinant of how difficult it will be to complete coordination, more so than the number of networks.

- It is noted the Radiocommunication Bureau (BR) Director's contribution (4A/579) supports ΔT/T as the criterion, stating,

> *The Bureau concludes that the C/I criterion alone for identifying potentially affected administrations / networks under RR Nos. 9.7 and 9.41 would not significantly reduce coordination requirement. Results of simulation demonstrate that the orbital separation required establishing coordination requirement using C/I criterion would not significantly improve the situation in the absence of any other mechanism.*
>
> *The Bureau considers that simple transition to C/I would not address the problem of "effectiveness and appropriateness" of the existing and proposed criteria while increasing the workload of the Bureau to implement the changes and the process.*

With regard to Options 1A, 1B, and 1C:

- A study submitted to the ITU has shown that the proposed PFD masks will not provide uniform protections to incumbent networks. The study particularly showed that PFD masks calculated on the basis of the ΔT/T = 6% and 20% criteria will not protect networks already in operation or notified in accordance with the provisions of the RR.

- It is noted that the PFD masks were created using the reference earth station power limits contained in RR Article 21 and, however, are not shown to adequately protect networks that are more sensitive.

- Studies performed before the beginning of the cycle w~~h~~ere inconclusive. The report on those studies stated: "Further study is required to determine a set of appropriate assumptions about C/N degradation values that are representative of the environment in which deployed satellites operate." Yet no additional studies w~~h~~ere presented to the ITU on the subject under this agenda item,

Resolves 2

In the ~~draft~~ CPM ~~text~~ Report for this issue, Option 2A proposes changes to the coordination arc for the 6/4 and 14/10/11/12 GHz frequency bands. Option 2B proposes changes to the coordination arc for the 6/4, 14/10/11/12 and 30/20 GHz frequency bands. Option 2C proposes no changes. The United States supports Option 2A, noting that the content of Option 2A (i.e., reducing the 6/4 GHz coordination arc to 6° and reducing the 14/10/11/12 GHz coordination arc to 5°) was originally studied and proposed during the WRC-12 cycle but was not implemented.

With regard to Option 2B, an ITU-R study evaluated the density of GSO FSS space stations using the 29.5-30.0 GHz/19.7-20.2 GHz bands that have actually been brought into use (active) or placed into construction (planned) according to publicly available publications. The analysis indicated that the current deployment of Ka-band networks is not uniformly dense throughout the GSO. While the average orbital separation between stations was on the order of 5 degrees, its standard deviation was greater than 5 degrees and the maximum separation was at least 27 degrees when taken both active and planned networks into account. This reveals that it is not yet appropriate for the protection of incumbent Ka-band networks to reduce the coordination arc in the 29.5-30.0 GHz / 19.7-20.2 GHz bands from its current value as contained in Appendix **5** of the Radio Regulations.

With regard to Option 2C, the United States notes that changes to the coordination arc were studied prior to WRC-12 and that some of the changes proposed in Options 2A and 2B (i.e., reducing the 6/4 GHz coordination arc to 6° and reducing the 14/10/11/12 GHz coordination arc to 5°) were originally proposed during the WRC-12 cycle.

Summary

Based on studies conducted within the ITU-R related to *resolves* 1 and 2 for the 6/4, 14/10/11/12 and 30/20 GHz frequency bands, the United States supports ~~draft~~ CPM ~~text~~ Report's Options 1D and 2A, as shown in the summary chart below.

		Res 756 (WRC-12)				
		Resolves 1				Resolves 2
		9.41		11.32A		
		Criterion	Criterion Threshold	Criterion	Criterion Threshold	Coord Arc
Band	6/4	NOC (ΔT/T)	NOC (6%)	NOC (C/I)	NOC (12 dB)	8° → 6°
	14/10/11/12	NOC (ΔT/T)	NOC (6%)	NOC (C/I)	NOC (12 dB)	7° → 5°
	30/20	NOC (ΔT/T)	NOC (6%)	NOC (C/I)	NOC (12 dB)	NOC (8°)

The No Change aspects of the proposal are reflected in Articles **9** and **11** and Appendices **5** and **8**. The changes made by this proposal are in Appendix **5**.

Proposals:

NOC USA/9.1.2/1

ARTICLE 9

Procedure for effecting coordination with or obtaining agreement of other administrations[1, 2, 3, 4, 5, 6, 7, 8, 8*bis*] (WRC-12)

Reasons: No changes to the provisions of RR Articles **9** in respect of *resolves* 1.

NOC USA/9.1.2/2

ARTICLE 11

Notification and recording of frequency assignments[1, 2, 3, 4, 5, 6, 7, 7bis] (WRC-12)

Reasons: No changes to the provisions of RR **11** in respect of *resolves* 1.

MOD USA/9.1.2/3

APPENDIX 5 (REV.WRC-12)

Identification of administrations with which coordination is to be effected or agreement sought under the provisions of Article 9

TABLE 5-1 (REV.WRC-~~12~~15)

Technical conditions for coordination
(see Article **9**)

Reference of Article 9	**Case**	**Frequency bands (and Region) of the service for which coordination is sought**	**Threshold/condition**	**Calculation method**	**Remarks**
No. 9.7 GSO/GSO	A station in a satellite network using the geostationary-satellite orbit (GSO), in any space radiocommunication service, in a frequency band and in a Region where this service is not subject to a Plan, in respect of any other satellite network using that orbit, in any space radiocommunication service in a frequency band and in a Region where this service is not subject to a Plan, with the exception of the coordination between earth stations operating in the opposite direction of transmission	1) 3 400-4 200 MHz 5 725-5 850 MHz (Region 1) and 5 850-6 725 MHz 7 025-7 075 MHz 2) 10.95-11.2 GHz 11.45-11.7 GHz 11.7-12.2 GHz (Region 2) 12.2-12.5 GHz (Region 3) 12.5-12.75 GHz (Regions 1 and 3) 12.7-12.75 GHz (Region 2) and 13.75-14.5 GHz	i) Bandwidth overlap, and ii) any network in the fixed-satellite service (FSS) and any associated space operation functions (see No. 1.23) with a space station within an orbital arc of ±~~8~~6° of the nominal orbital position of a proposed network in the FSS i) Bandwidth overlap, and ii) any network in the FSS or broadcasting-satellite service (BSS), not subject to a Plan, and any associated space operation functions (see No. 1.23) with a space station within an orbital arc of ±~~7~~5° of the nominal orbital position of a proposed network in the FSS or BSS, not subject to a Plan		With respect to the space services listed in the threshold/condition column in the bands in 1), 2), 3), 4), 5), 6), 7) and 8), an administration may request, pursuant to No. 9.41, to be included in requests for coordination, indicating the networks for which the value of $\Delta T/T$ calculated by the method in § 2.2.1.2 and 3.2 of Appendix **8** exceeds 6%. When the Bureau, on request by an affected administration, studies this information pursuant to No. 9.42, the calculation method given in § 2.2.1.2 and 3.2 of Appendix **8** shall be used

Reason: No changes with respect to *resolves* 1 (in the Remarks column); change the coordination arc in 6/4, 14/10/11/12 GHz frequency bands (*resolves* 2)

NOC USA/9.1.2/4

APPENDIX 5 (REV.WRC-12)

Identification of administrations with which coordination is to be effected or agreement sought under the provisions of Article 9

TABLE 5-1 (*continued*) (REV.WRC-12)

Reference of Article 9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
No. 9.7 GSO/GSO (*cont.*)		3) 17.7-20.2 GHz, (Regions 2 and 3), 17.3-20.2 GHz (Region 1) and 27.5-30 GHz	i) Bandwidth overlap, and ii) any network in the FSS and any associated space operation functions (see No. **1.23**) with a space station within an orbital arc of ±8° of the nominal orbital position of a proposed network in the FSS		
		4) 17.3-17.7 GHz (Regions 1 and 2)	i) Bandwidth overlap, and ii) a) any network in the FSS and any associated space operation functions (see No. **1.23**) with a space station within an orbital arc of ±8° of the nominal orbital position of a proposed network in the BSS, or b) any network in the BSS and any associated space operation functions (see No. **1.23**) with a space station within an orbital arc of ±8° of the nominal orbital position of a proposed network in the FSS		

TABLE 5-1 (*continued*) (REV.WRC-12)

Reference of Article 9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
No. 9.7 GSO/GSO (*cont.*)		5) 17.7-17.8 GHz	i) Bandwidth overlap, and ii) a) any network in the FSS and any associated space operation functions (see No. **1.23**) with a space station within an orbital arc of ±8° of the nominal orbital position of a proposed network in the BSS, or b) any network in the BSS and any associated space operation functions (see No. **1.23**) with a space station within an orbital arc of ±8° of the nominal orbital position of a proposed network in the FSS NOTE – No. **5.517** applies in Region 2.		
		6) 18.0-18.3 GHz (Region 2) 18.1-18.4 GHz (Regions 1 and 3)	i) Bandwidth overlap, and ii) any network in the FSS or meteorological-satellite service and any associated space operation functions (see No. **1.23**) with a space station within an orbital arc of ±8° of the nominal orbital position of a proposed network in the FSS or the meteorological-satellite service		

TABLE 5-1 (*continued*) (REV.WRC-12)

Reference of	Case	Frequency bands (and Region) of the service	Threshold/condition	Calculation method	Remarks

Article 9		**for which coordination is sought**			
No. 9.7 GSO/GSO (*cont.*)		6*bis*) 21.4-22 GHz (Regions 1 and 3)	i) Bandwidth overlap; and ii) any network in the BSS and any associated space operation functions (see No. **1.23**) with a space station within an orbital arc of ±12° of the nominal orbital position of a proposed network in the BSS (see also Resolutions **554 (WRC-12)** and **553 (WRC-12)**).		No. **9.41** does not apply.
		7) Bands above 17.3 GHz, except those defined in § 3) and 6)	i) Bandwidth overlap, and ii) any network in the FSS and any associated space operation functions (see No. **1.23**) with a space station within an orbital arc of ±8° of the nominal orbital position of a proposed network in the FSS (see also Resolution **901 (Rev.WRC-07)**)		
		8) Bands above 17.3 GHz except those defined in § 4), 5) and 6*bis*)	i) Bandwidth overlap, and ii) any network in the FSS or BSS, not subject to a Plan, and any associated space operation functions (see No. **1.23**) with a space station within an orbital arc of ±16° of the nominal orbital position of a proposed network in the FSS or BSS, not subject to a Plan, except in the case of a network in the FSS with respect to a network in the FSS (see also Resolution **901 (Rev.WRC-07)**)		

Reason: No changes with respect to resolves 1 (in the Remarks column). No change in 30/20 GHz frequency band (resolves 2).

NOC USA/9.1.2/5

APPENDIX 8 (Rev.WRC-03)

Method of calculation for determining if coordination is required between geostationary-satellite networks sharing the same frequency bands

Reason: No changes to RR Appendix **8** with respect to *resolves* 1.

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WAC/128(20.05.15)

UNITED STATES OF AMERICA

PROPOSALS FOR THE WORK OF THE CONFERENCE

AGENDA ITEM 10

10 to recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences, in accordance with Article 7 of the Convention,

Background information

Appendix **30** contains provisions for use of the broadcasting-satellite service (BSS) Plans and Regions 1 and 3 List, as well as for modifying the Plan (in the case of Region 2) or the List (in the case of Regions 1 and 3). It is a self-contained Appendix, including provisions for modifying the Plan or List (Article 4), notifying Plan or List assignments and for coordinating other services in the frequency bands vis a vis the Plan and List (Articles 6 and 7).

Appendix **30** also contains detailed criteria for sharing between the Plan/List and other services. Specifically, Annex 1 to Appendix **30** provides criteria for determining whether the service of an administration is affected by a proposed modification to the Region 2 Plan or by a proposed new or modificed assignment in the Regions 1 and 3 List; Annex 4 to Appendix **30** provides criteria to determine the need to coordinate the fixed-satellite service (FSS) (or BSS not subject to a Plan) with the assignments of the Plans; and finally Annex 7 to Appendix **30** contains orbital position limitations on modifications to the BSS Plan or List.

The Ku band frequencies are not globally harmonized, so, for example, the range 11.7-12.2 GHz is BSS in Region 1 and FSS in Region 2, the range 12.5-12.7 GHz is FSS in Region 1 and BSS in Region 2, and the range 12.2-12.5 GHz is BSS in both Regions 1 and 2. The Annex 7 orbital position limitations on modifications to the BSS Plan or List were designed to facilitate BSS sharing with the FSS in the shared part of the orbital arc between Regions 1 and 2, and are specifically applicable to Region 2 BSS in 12.2-12.7 GHz and to Region 1 BSS in 11.7-12.2 GHz.

The Annex 7 orbital position limitations were maintained at WRC-2000 (the most recent BSS Planning conference, which focused on Regions 1 and 3) for the reason that during a Planning conference, many new BSS slots could be adopted at once, which could significantly limit the future access of FSS to the shared portion of the orbital arc. Some of the criteria of Annex 1 and Annex 4 to Appendix **30** were updated at WRC-2003. Since then there has been considerable experience in working with the Plans and the criteria of Annexes 1 and 4 to Appendix **30**. It is questionable at this point if the constraints of Annex 7 to Appendix **30** are still required, or if they could be removed or modified to provide additional access to this valuable spectrum resource.

Proposals

MOD USA/10/1

RESOLUTION 808 (REV.WRC-~~12~~15)

~~Preliminary a~~Agenda for the ~~2018~~ 2019 World Radiocommunication Conference

The World Radiocommunication Conference (Geneva, 20~~12~~15),

...

resolves to give the view

...

ADD USA/10/1

1 to review the need for the orbital position limitations on modifications to the BSS Plans and List contained in Annex 7 to Appendix **30**, conduct the necessary studies and consider possible modifications to Annex 7 to Appendix **30** in accordance with Resolution **[USA/A10/ANNEX7-APPENDIX30] (WRC-15)**.

Reasons: Based on studies to date regarding the orbital separations allowed between BSS and FSS from the coordination triggers in Annexes 1 and 4 of Appendix **30** , representative BSS and FSS systems serving different regions could successfully exist with orbital separations as small as 0.5 and 2 degrees, depending on the carrier parameters and geographic discrimination assumed.

ADD USA/10/2

RESOLUTION [USA/A10/ANNEX7-APPENDIX30] (WRC-15)

Review the orbital position limitations on modifications to the Broadcasting-Satellite Service (BSS) Plans and List contained in Annex 7 to Appendix 30, and consider possible modifications to Annex 7 to Appendix 30

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that Appendix **30** contains provisions for use of the BSS Plans and Regions 1 and 3 List, as well as for modifying the Plan (in the case of Region 2) or the List (in the case of Regions 1 and 3);

b) that Appendix **30** is a self-contained Appendix, including provisions for modifying the Plan or List (Article 4), notifying Plan or List assignments and for coordinating other services in the frequency bands vis a vis the Plan and List (Articles 6 and 7);

c) that Appendix **30** also contains detailed criteria for sharing between the Plan/List and other services;

d) that both BSS and the fixed-satellite service (FSS) may proceed at the same time to access the shared orbit resource outside of a planning conference;
e) that special consideration may need to be given to operational systems implemented under the Annex 7 to Appendix **30** regime;
f) that parity between the regions and services with BSS subject to orbital position limitations while FSS in the same frequency bands are not,

recognizing
a) that Article 4 of Appendix **30** contains procedure for proposed modifications to the BSS Plan or List to coordinate with unplanned FSS or BSS;
b) that Article 7 of Appendix **30** contains procedure for unplanned BSS or FSS networks to coordinate with BSS Plan or List assignments or previously filed modifications to the Plan or List;
c) that Annex 1 to Appendix **30** contains the criteria to determine if a proposed modification to the BSS Plan or List needs to coordinate with unplanned FSS or BSS networks;
d) that Annex 4 to Appendix **30** contains the criteria to determine if an unplanned FSS or BSS network needs to coordinate with the BSS Plan or List assignments or previously filed modifications to the Plan or List.
e) that Annex 6 to Appendix **30** contains the summary of the assumptions used to develop the power flux density (pfd) levels contained in Annexes 1 and 4 to Appendix **30**.
f) that Annex 7 to Appendix **30** contains orbital position limitations on modifications to the BSS Plan or List, as well as associated e.i.r.p. limits for Region 1 BSS in a portion of the arc,

recognizing further
a) that the limitations in Annex 7 to Appendix **30** were designed to facilitate sharing with the fixed-satellite service (FSS) in the shared part of the orbital arc between the Regions;
b) that in the Ku band frequencies, the BSS allocations are not global, so, for example, 11.7-12.2 GHz is BSS in Region 1 and FSS in Region 2;
c) that the orbital position limitations in Annex 7 to Appendix **30** were maintained at WRC-2000 during the last Regions 1 and 3 planning conference, as during a planning conference, many new BSS assignments could be adopted at once which could significantly limit the future access of FSS to the shared portion of the orbital arc,

resolves to invite ITU-R
to review the need for the orbital position limitations on modifications to the BSS Plans and List contained Annex 7 to Appendix **30**, including conducting the necessary studies,

resolves to invite WRC-15
to consider appropriate modifications to Annex 7 to Appendix **30** based on proposals from administrations, and paying particular attention to the systems referred to in *considering e)*,

invites administrations
to participate actively in the review and studies by submitting contributions to ITU-R,

Reasons: To review the need for the orbital position limitations on modifications to the BSS Plans and List contained Annex 7 to Appendix **30** with a view to modify Annex 7 to Appendix **30**.

Attachment: 1

ATTACHMENT

Proposal for an agenda item to review the orbital position limitations on modifications to the BSS Plans and List contained Annex 7 to Appendix 30, and consider possible modifications to Annex 7 to Appendix 30

Subject: Proposed agenda item for WRC-19 to review the need for the orbital position limitations on modifications to the BSS Plans and List contained Annex 7 to Appendix **30**, and consider possible modifications to Annex 7 to Appendix **30**.

Origin: United States of America

Proposal: to review the need for the orbital position limitations on modifications to the BSS Plans and List contained Annex 7 to Appendix **30**, conduct the necessary studies, and consider possible modifications to Annex 7 to Appendix **30** in accordance with Resolution **[USA/A10/ANNEX7-APPENDIX30] (WRC-15)**

Background/reason: Based on studies to date regarding the orbital separations allowed between BSS and FSS from the coordination triggers in Annexes 1 and 4 of Appendix **30**, representative BSS and FSS systems serving different regions could successfully exitst with orbital separations as small as 0.5 and 2 degrees, depending on the carrier parameters and geographic discrimination assumed. These small orbital separations suggest that additional measures, such as the orbital position limitations in Annex 7, could no longer be needed outside of a planning conference.

Radiocommunication services concerned: fixed-satellite service, broadcasting-satellite service

Indication of possible difficulties: None foreseen

Previous/ongoing studies on the issue: TBD

Studies to be carried out by: WP 4A	***with the participation of:***

ITU-R Study Groups concerned: Study Group 4

ITU resource implications, including financial implications (refer to CV126): Minimal

Common regional proposal: Yes/No	***Multicountry proposal:*** Yes/No ***Number of countries:***

Remarks