

ATTACHMENT B
to FCC Public Notice DA 19-172

**Draft Proposals presented for information and not formally agreed by the
World Radiocommunication Conference Advisory Committee**

DOCUMENT WAC/081 (11.03.19)

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:

Historically, aeronautical HF (High Frequency) Radio communications has been recognized as the primary long-range communication system for safe, efficient air travel in remote or oceanic areas beyond the range of ground-based VHF radios. Current HF analog single sideband systems are susceptible to static crashes from lightning and man-made noise, as well as selective fading as the atmosphere continually changes. Future HF voice systems can move to more advanced digital voice as many CODECS (Coder/Decoders) are now available commercially. Modem technology has evolved significantly over the last 27 years and techniques such as Automatic Link Establishment allow HF radios to find and link on the best available frequency at a given time. The use of spectrally efficient modulation techniques and bonding consecutive HF channels (for Wide-Band HF (WBHF)) will enable technology improvements that will support high rate data transmissions.

Development of the next generation of HF data communications will enable achieving Required Communications Performance (RCP)-240¹ compliance for the delivery of ATC traffic, provide for a digital voice capability that will address the frequent complaints about the noisy nature of analog HF voice communications and enable reduction in flight crew workload by automatically assigning frequencies to aircraft radios by leveraging modern protocols. This effort will allow Terrestrial HF and space-based systems (Satcom) to work well together in a complementary and synergistic fashion to offer better performance, reliability and availability than either system alone. Having both space-based and modernized terrestrial HF long range communication mitigates single point of failure concerns associated with vulnerabilities which differ for each system (e.g., solar events, rain fade, jamming, hardware failures, etc.). It is in the interest of administrations and industry to review and revise the ITU Radio Regulation Appendices 26 and 27 to provide the relevant regulatory framework to realize the above stated capabilities for aviation use (including aviation safety of life) and enable the coexistence of current HF systems alongside modernized HF systems that deliver the above mentioned capabilities. ICAO has considered modernization of the way HF spectrum is utilized and endorses² a revision of Appendix 27 for a WRC-23 Agenda Item.

Proposals

SUP USA/10(XXX)/1

RESOLUTION 810 (WRC15)

Preliminary agenda for the 2023 World Radiocommunication Conference

The World Radiocommunication Conference (Geneva, 2015),

Reasons: This Resolution must be suppressed, as WRC-19 will create a new Resolution that will include the agenda for WRC-23.

¹ Manual on Required Communication Performance, ICAO Doc 9869 AN/462, 2006

² FSMP-WG08-Flimsy07 WRC-23 Agenda Item for HF Rev1 - Final.docx

ADD **USA/10(XXX)/2**

DRAFT NEW RESOLUTION [USA-2023]

Agenda for the 2023 World Radiocommunication Conference

The World Radiocommunication Conference (Geneva, 2015),

considering

- a)* that, in accordance with No. 118 of the ITU Convention, the general scope of the agenda for a world radiocommunication conference should be established four to six years in advance and that a final agenda shall be established by the Council two years before the conference;
- b)* Article 13 of the ITU Constitution relating to the competence and scheduling of world radiocommunication conferences and Article 7 of the Convention relating to their agendas;
- c)* the relevant resolutions and recommendations of previous world administrative radio conferences (WARCs) and world radiocommunication conferences (WRCs),

resolves

to recommend to the Council that a world radiocommunication conference be held in 2023 for a maximum period of four weeks, with the following agenda:

1 on the basis of proposals from administrations, taking account of the results of WRC15 and the Report of the Conference Preparatory Meeting, and with due regard to the requirements of existing and future services in the bands under consideration, to consider and take appropriate action in respect of the following items:

1.[XXX] to consider, on the basis of ITU-R studies in accordance with Resolution [USA/10/WIDEBAND HF] (WRC-19), appropriate regulatory actions, updates to revise ITU - R Appendices 26 and 27 in support of Wideband HF;

resolves further

to activate the Conference Preparatory Meeting,

invites the Council

to finalize the agenda and arrange for the convening of WRC23, and to initiate as soon as possible the necessary consultations with Member States,

instructs the Director of the Radiocommunication Bureau

to make the necessary arrangements to convene meetings of the Conference Preparatory Meeting and to prepare a report to WRC23,

instructs the Secretary-General

to communicate this Resolution to international and regional organizations concerned.

Reasons: The aeronautical use of the various HF frequency bands in the range 2 850 – 22 000 kHz is essential to long distance aeronautical communications in remote and oceanic areas. Since the last substantive review of Appendices 26 and 27 of the ITU Radio Regulations, use of HF by aviation has continued to change and grow, especially for HF Datalink (HFDL) services used by many aircraft. Aviation is evaluating future developments within the HF band, using new

technology to significantly improve capacity, connectivity, and quality of service for aviation data and voice, including increased channel bandwidths for greater data throughput. Such developments within existing aviation HF allocations would provide aviation with additional capabilities, improving safety, global coverage and link diversity to L-band SATCOM systems thus allowing updated HF systems to work well together in a complementary and synergistic fashion with Satcom systems to better maintain communications at all times. In light of the evolving HF technologies, Appendices 26 and 27 need to be reviewed to ensure they meet the current and future aeronautical requirements by allowing for bonding contiguous HF channels and allow digital modulations that support higher data rates while ensuring that interference outside of the assigned multi-channel bands is no greater than the interference of individually utilized channels.

ADD USA/10(XXX)/3

DRAFT NEW RESOLUTION [USA/10/XX] (WRC-19)

**UPDATE ITU RADIO REGULATION APPENDICES 26 AND 27 IN SUPPORT OF
WIDEBAND HF**

The World Radiocommunication Conference (Sharm el-Sheik Egypt, 2019),

considering

- a) That with the availability of advanced technologies and demonstrated capabilities of aeronautical wideband HF through channel bonding, faster data rates and better voice communications are possible;
- b) That aeronautical wideband HF must co-exist with current aeronautical HF systems and will not interfere with maritime HF uses;
- c) that desirable properties of HF propagation from the perspective of providing global coverage,
- d) that aeronautical analog voice and narrow band digital HF systems are the primary means for international and domestic aviation to communicate with aircraft in remote and oceanic areas;
- e) the operational need for the modernization of data link services in the HF band for messages related to the safety and regularity of flight for use by international civil aviation;
- f) that current aeronautical HF systems are limited by the available technology, and are insufficient to meet modern aviation information requirements without being augmented by aeronautical safety satellite communications;
- g) that the use of the frequencies in the frequency bands allocated to the aeronautical mobile (R) service (AM(R)S) in the bands between 2.8-22 MHz is governed by the provisions of RR Appendix 27,

noting

- a) the special arrangements clause in Appendix 27 for classes of emissions other than J3E or H2B;

- b) the existing frequency allotments for aeronautical HF and the arrangements in the HF band for maritime mobile service,
- c) that Appendix 27 provides international and regional allotments for HF channels within the AM(R)S
- d) the current HF narrow band digital communications are detailed in ITU-R Recommendation M.1458.

recognizing

- a) the need for improving HF performance in support of internationally recognized aviation performance standards as defined by ICAO;
- b) necessary improvements in HF voice communications;
- c) the ability to provide better communication capabilities including higher data rates;
- d) The link diversity that will be provided by WBHF to current Satcom solutions,
- e) The modernization of aeronautical HF communications will not require Article V allocation changes,

resolves to invite ITU-R

- a) to conduct studies
 - to identify any necessary modifications to Appendices 26 and 27 towards incorporating relevant updates that allow for advanced modulation schemes and bonding of contiguous channels in support of Wideband HF taking into account the need to ensure spectral compatibility with legacy and existing uses of HF.

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further resolves to invite WRC-23

to consider, on the basis of the studies conducted under the *resolves to invite ITU-R* above, appropriate regulatory revisions to Appendices 26 and 27

ATTACHMENT

PROPOSAL FOR FUTURE AGENDA ITEM TO UPDATE ITU RADIO REGULATION APPENDICES 26 AND 27 IN SUPPORT OF WIDEBAND HF

Subject: Proposed Future WRC Agenda Item for WRC-2023 to support updates to ITU Radio Regulations in support of Wideband HF

Origin: United States of America

Proposal: To review and update the relevant sections of ITU RR Appendices 26 and 27 in support of Wideband HF for aviation applications while ensuring compatibility with legacy HF uses.

Background/reason:

The aeronautical use of the various HF frequency bands in the range 2 850 – 22 000 kHz is essential to long distance aeronautical communications in remote and oceanic areas. Since the last substantive review of Appendices 26 and 27 of the ITU Radio Regulations, use of HF by aviation has continued to change and grow, especially for HF Datalink (HFDL) services used by many aircraft. Aviation is evaluating future developments within the HF band, using new technology to significantly improve capacity, connectivity, and quality of service for aviation data and voice, including increased channel bandwidths for greater data throughput. Such developments within existing aviation HF allocations would provide aviation with additional capabilities, improving safety, global coverage and link diversity to L-band SATCOM systems thus allowing updated HF systems to work well together in a complementary and synergistic fashion with Satcom systems to better maintain communications at all times. In light of the evolving HF technologies, Appendices 26 and 27 need to be reviewed to ensure they meet the current and future aeronautical requirements by allowing for bonding contiguous HF channels and allow digital modulations that support higher data rates while ensuring that interference outside of the assigned multi-channel bands is no greater than the interference of individually utilized channels.

Radiocommunication services concerned:

Terrestrial HF Radio communication

Indication of possible difficulties: none foreseen

Previous/ongoing studies on the issue: N/A

Studies to be carried out by: ITU-R WP5B	with the participation of:
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ITU-R Study Groups concerned: SG 5

ITU resource implications, including financial implications (refer to CVI26): minimal

Common regional proposal: Yes/No

Multicountry proposal: Yes/No

Number of countries:

Remarks

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 Information:

Administrations are re-allocating spectrum away from Electronic News Gathering (ENG), also known as Services Ancillary to Broadcast and Program Making (SAP/SAB) and Programme Making & Special Events (PMSE), to accommodate wireless technologies, such as International Mobile Telecommunications (IMT). Some of this re-purposed spectrum is in the 600 MHz and 700 MHz bands which are heavily used by ENG. There is a general incompatibility in co-channel spectrum sharing between IMT and wireless ENG tools, particularly wireless microphones (where the definition of wireless microphones includes a wide variety of production tools such as intercom systems, in-ear monitors, and interruptible fold-back systems). For example, in the United States the repurposing of the 700 MHz band in 2010, and 600 MHz band currently in transition, not only has and will reduce TV broadcast spectrum, but will also displace a large portion of ENG operations. Other countries are now, or soon will be, undergoing a similar process. This re-purposing of spectrum from traditional TV broadcast to mobile broadband is an issue of the *distribution* of content. ENG fuels the *creation* of content and live event programs.

Demand for news and entertainment content has never been more robust, and is accelerating. Wireless microphones are used in the creation of virtually all content today, regardless of how that content is consumed: through TV, radio, laptop, tablet, cell phone, or in person. Furthermore, productions are increasingly more sophisticated, requiring more audio channels, many of them with high definition resolution. This long-term trend is clear and will inevitably continue. Worldwide, virtually all professional wireless microphones currently operate in the UHF TV band because this spectrum fulfills the requirements of demanding microphone applications, but will need alternative spectrum because of declining available of UHF TV spectrum in the 600 and 700 MHz bands, and increasing demand for content. Some administrations, including the United States, have recognized the importance and ubiquitous nature of wireless microphones and are attempting to accommodate the strong demand for news and content creation by permitting wireless microphones to also operate in alternative bands, outside TV spectrum, that are suitable for ENG applications, including 169-172 MHz and 941.5-960 MHz. As other administrations also transition from analogue TV to digital TV and mobile broadband, it is in the interests of administrations and industry to study and harmonize frequency bands and tuning ranges, as intended by Resolution ITU-R 59-1. Harmonization would provide economies of scale and logistical practicality, especially for networks and production companies that must cover events in

multiple countries, such as global news, elections, international sport events, conferences, and concert tours. ENG crews also provide early and essential disaster alert information.

Proposal:

SUP **USA/10(XXX)/1**

RESOLUTION 810 (WRC-15)

Preliminary agenda for the 2023 World Radiocommunication Conference

The World Radiocommunication Conference (Geneva, 2015),

Reasons: This Resolution must be suppressed, as WRC-19 will create a new Resolution that will include the agenda for WRC-23.

ADD **USA/10(XXX)/2**

DRAFT NEW RESOLUTION [USA-2023]

Agenda for the 2023 World Radiocommunication Conference

The World Radiocommunication Conference (Geneva, 2015),

considering

- a)* that, in accordance with No. 118 of the ITU Convention, the general scope of the agenda for a world radiocommunication conference should be established four to six years in advance and that a final agenda shall be established by the Council two years before the conference;
- b)* Article 13 of the ITU Constitution relating to the competence and scheduling of world radiocommunication conferences and Article 7 of the Convention relating to their agendas;
- c)* the relevant resolutions and recommendations of previous world administrative radio conferences (WARCs) and world radiocommunication conferences (WRCs),

resolves

to recommend to the Council that a world radiocommunication conference be held in 2023 for a maximum period of four weeks, with the following agenda:

1 on the basis of proposals from administrations, taking account of the results of WRC-15 and the Report of the Conference Preparatory Meeting, and with due regard to the requirements of existing and future services in the bands under consideration, to consider and take appropriate action in respect of the following items:

1.[XXX] to consider, on the basis of ITU-R studies in accordance with Resolution [USA/10/XX] (WRC-19), appropriate regulatory actions, *Studies on additional frequency bands outside the 600 MHz and 700 MHz bands between 150 MHz to 2 000 MHz, and worldwide and/or regional harmonization for terrestrial electronic news gathering systems;*

1. ENG

resolves further

to activate the Conference Preparatory Meeting,

invites the Council

to finalize the agenda and arrange for the convening of WRC-23, and to initiate as soon as possible the necessary consultations with Member States,

instructs the Director of the Radiocommunication Bureau

to make the necessary arrangements to convene meetings of the Conference Preparatory Meeting and to prepare a report to WRC-23,

instructs the Secretary-General

to communicate this Resolution to international and regional organizations concerned.

Reasons: Demand for ENG content is robust and accelerating. Currently, nearly all ENG audio tools (i.e., wireless microphones) operate in the UHF TV band, including the 600 MHz and 700 MHz bands that many administrations are re-allocating. As UHF spectrum is re-purposed from traditional analog TV to digital TV and mobile broadband, alternative suitable frequency bands are being made available for ENG applications. It is in the interests of administrations and industry to chart a smooth transition from the 600 MHz and 700 MHz to standardized alternate frequency bands that are suitable for ENG, i.e. between 150 to 2 000 MHz.

ADD **USA/10(XXX)/3**

DRAFT NEW RESOLUTION [USA/10/XX] (WRC-19)

RESOLUTION [xxx]

Studies on additional frequency bands outside the 600 MHz and 700 MHz bands between 150 to 2 000 MHz, and worldwide and/or regional harmonization for terrestrial electronic news gathering³ systems

The World Radiocommunication Conference (Sharm El Sheikh, 2019),

Considering

- a)* A large portion of ENG production tools, such as radio microphones, operate in vacant channels (6 MHz or 8 MHz wide) within the 600 MHz and 700 MHz bands;
- b)* that parts of these bands are being repurposed by many administrations from terrestrial TV to mobile broadband, resulting in loss of availability of many channels for ENG operations, approximately 60 MHz at typical locations;
- c)* that the technical nature of most ENG tools results in a general incapability in co-channel spectrum sharing with mobile handsets;

³ For the purpose of this Resolution, ENG represents all audio applications ancillary to broadcasting and programme making (SAB/SAP), such as electronic news gathering, electronic field production, TV outside broadcast, Program Making and Special Events (PMSE), wireless radio microphones and radio outside production and broadcast.

- d) that administrations will have to transition a large portion of ENG operations to alternate suitable spectrum, outside the 600 and 700 MHz bands;
- e) that WRC-15 initiated studies concerned with spectrum usage and operational characteristics of portable and nomadic links for terrestrial ENG systems operation in spectrum already allocated for that purpose on a global basis, in accordance with Resolution 59-1;
- e) that modularization and miniaturization of terrestrial ENG systems has increased the portability for these systems and has thus increased the trend towards cross-border operation of ENG equipment;
- d) that the technical characteristics for television outside broadcast, ENG and electronic field production systems have been established in ITU-R Recommendations (e.g. ITU-R BT 1871),

noting

- a) that studies undertaken by ITU-R indicate that national spectrum management could benefit from globally harmonized band planning for ENG systems;
- b) that ENG-related studies in ITU-R are based on data for current and anticipated ENG spectrum requirements collected from many administrations in all regions;
- c) that the lower frequency spectrum, i.e. less than 2 000 MHz tends to provide better propagation characteristics over obstructed paths, thereby increasing the reliability of ENG links operating in these bands;
- d) that the demand for ENG content is robust and accelerating,

recognizing

- a) that the production of ENG content continues to become increasingly sophisticated, requiring more channel in higher audio and video resolution formats;
- b) that the dynamic nature of the use of ENG is driven in part by unscheduled and unpredictable events such as breaking news, emergencies and disasters;
- c) that news gathering and electronic production typically takes place in an environment where several television broadcasters/organizations/networks attempt to cover the same event, creating a demand for multiple ENG links and increased demand for access to spectrum in suitable frequency bands;
- d) that handheld and body pack transmitters as well as body worn receivers require compact size, battery operation, sufficient range and small, yet efficient antennas, frequency bands suitable for mobile audio ENG are primarily within the frequency bands of 150 MHz to 2 000 MHz;
- e) There is a general incompatibility in co-channel spectrum sharing between wireless ENG / PMSE tools and some services that operate in portions of the 150 MHz to 2 000 MHz range. These

include IMT; aviation radio services and aeronautical mobile telemetry (AMT)⁴; Radio Navigation Satellite Service (e.g., GPS); and other satellite downlink bands. Thus, for purposes of global harmonization, the identification of suitable bands will require careful consideration and detailed compatibility studies to ensure protection of these services.

f) some administrations have already identified such alternate, suitable spectrum between 150 MHz to 2 000 MHz for ENG (e.g. 941.5 - 960 MHz, 169 -172 MHz in the United States; 960 - 1 164 MHz in the United Kingdom; 1 350 – 1 400 MHz in portions of Region 1);

g) Mobile ENG audio tools (i.e. wireless microphones) are low power devices, typically operating with transmitter output power of 50 mW – 250 mW, and have proven to pose a negligible risk of interference to services operating in adjacent channels (e.g. broadcast services);

h) that access to globally harmonized spectrum is highly desirable to facilitate the rapid and less restricted deployment and operation of ENG systems from one country to another,

resolves

1 that, based on studies undertaken by ITU-R, WRC-23 should address the feasibility of achieving a coordinated transition for ENG operations from the 600 MHz and 700 MHz bands to suitable alternate spectrum between 150 – 2 000 MHz. The amount of alternate spectrum should total approximately 72 MHz, contiguous or separate multiple 6 MHz or 8 MHz channels, to compensate for the loss within the 600 MHz and 700 MHz bands and to accommodate the robust demand for content creation. A portion of this alternate spectrum should be identified in a manner that results in a satisfactory degree of worldwide/regional harmonization of spectrum for ENG use in terms of the frequency bands and tuning ranges⁵;

2 that methods should be identified for the possible harmonization of frequency bands and tuning ranges for ENG usage,

invites ITU-R

1 to carry out studies of ENG regarding possible solutions for global/regional harmonization in frequency bands and tuning ranges, taking into account:

- propagation characteristics at various frequencies;
- available technologies to maximize efficient and flexible use of frequency;
- system characteristics and operational practices which facilitate the implementation of these solutions;

2 to include in the studies referred to above, sharing and compatibility issues with services already having allocations in frequency bands and tuning ranges which have potential

⁴ Notwithstanding the “general incompatibility” of wireless microphone co-channel sharing with AMT, the United States administration has allocated spectrum from 1435 - 1525 MHz for AMT with a secondary allocation for wireless microphones. This is subject to stringent coordination requirements.

⁵ The term “tuning range” for ENG means a range of frequencies over which radio equipment is envisaged to be capable of operating; within this tuning range, the use in any one country of radio equipment from another country will be limited to the range of frequencies identified nationally in that one country for ENG, and will be operated in accordance with the related national conditions and requirements.

for ENG use;

3 to propose operational measures to facilitate operation of ENG equipment consistent with global circulation of radiocommunication equipment, taking into account Recommendation ITU-R M.1637;

4 to report the results of those studies to the World Radiocommunication Conference 2023 and identify ranges for regional and global harmonization,

invites administrations

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

ATTACHMENT

**PROPOSAL FOR ADDITIONAL AGENDA ITEM TO IDENTIFY AND HARMONIZE
FREQUENCY BANDS FOR ENG**

Subject: Proposed Future WRC Agenda Item for WRC-2023 studying harmonization

Origin: United States of America

Proposal: To review the frequency bands permitted for ENG, identify alternate bands outside of the 600 MHz and 700 MHz bands, and harmonize them among various administrations.

Background/reason:

Demand for ENG content is robust and accelerating. Currently, nearly all ENG audio tools (i.e., wireless microphones) operate in the UHF TV band, including the 600 MHz and 700 MHz bands that many administrations are re-allocating. As UHF spectrum is re-purposed from traditional analog TV to digital TV and mobile broadband, alternative suitable frequency bands are being made available for ENG applications. It is in the interests of administrations and industry to chart a smooth transition from the 600 MHz and 700 MHz to standardized alternate frequency bands suitable for ENG above 150 MHz and below 2 000 MHz.

Radiocommunication services concerned: Terrestrial Broadcast, Mobile Service

Indication of possible difficulties: None foreseen

Previous/ongoing studies on the issue: Resolution ITU-R 59-1, Report ITU-R BT 2069-7, Report ITU-R BT 2344-2, Recommendation ITU-R BT 1871-2

<i>Studies to be carried out by:</i> SG6	<i>with the participation of:</i> SG5
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ITU-R Study Groups concerned: SG6, SG5

ITU resource implications, including financial implications (refer to CVI26): **Minimal**

<i>Common regional proposal:</i> Yes/No	<i>Multicountry proposal:</i> Yes/No
<i>Number of countries:</i>	

Remarks

United States of America

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 9, Issue 9.1.9: Studies relating to spectrum needs and possible allocation of the frequency band 51.4-52.4 GHz to the fixed-satellite service (Earth-to-space)

BACKGROUND:

Resolution **162 (WRC-15)** resolves to invite ITU-R to conduct studies considering additional spectrum needs for development of the fixed-satellite service (FSS) and conduct sharing and compatibility studies with existing services to determine the suitability of new primary allocations to the FSS in the frequency band 51.4-52.4 GHz (Earth-to-space) limited to FSS gateway links for geostationary orbit use, and the possible associated regulatory actions.

ITU-R has conducted studies required by Resolution **162 (WRC-15)**. The results of analysis of additional spectrum needs are contained in DN Report ITU-R S.[SPECTRUM_NEEDS]. The results of sharing and compatibility studies with incumbent services including the fixed service (FS), mobile service (MS), Earth exploration-satellite service (EESS) (passive), radio astronomy service (RAS), and sharing with potential IMT-2020 applications are contained in PDN Report ITU-R S.[SPECTRUM_SHARING].

The spectrum needs were analyzed and it was concluded that the additional allocation to the FSS being considered is beneficial to make broadband connections accessible to communities as achieved by HTS (High Throughput Satellite) systems.

Additionally, the outcome of the studies has demonstrated the possibility of sharing and compatibility with the appropriate protection measures. Studies included sharing and compatibility between FSS and other primary services in the band, such as fixed service and mobile service (including IMT-2020). Studies were also performed for the protection of Earth Exploration-Satellite Service (EESS) and Space Research Service (SRS) allocated in adjacent bands. Studies have considered FSS earth stations as small as 4.5 m but analysis of the various studies demonstrates the feasibility to use smaller FSS earth stations, as low as 2.4 m, with minimal impact.

Based on the results of the sharing and compatibility studies this proposal supports an allocation of the frequency band 51.4-52.4 GHz to the fixed-satellite service (Earth-to-space), limited to FSS gateway links for geostationary orbit use while protecting currently allocated services in the same frequency band and in adjacent bands as follows:

To protect FS stations, separation distances up to 33 km are required when assuming flat terrain and a 4.5 m earth station which means that the distance can be reduced when real terrain is taken into consideration. In the case of a 2.4 m earth station, the only impacting parameter is the change in FSS antenna peak gain and the resulting change in the transmitter power spectral density (assuming a fixed EIRP density) leading to a separation distance of 35 km.

Regarding the possible IMT-2020 applications of the MS in the same frequency band, the required separation distances between FSS earth stations and IMT base station and IMT user equipment are 260 and 330 meters, respectively.

The protection of non-GSO EESS (passive) sensors operating in the frequency band 52.6-54.25 GHz can be achieved by limiting the FSS earth station unwanted emissions falling in the passive band.

Regarding the protection of future GSO EESS (passive) sensors, a footnote in article 5 will require coordination between a FSS network and a notified GSO EESS network when the orbital separation between the GSO EESS space station and the FSS space station is less than 1.8 degrees.

Regarding protection of EESS (passive) sensors, studies have demonstrated that the FSS earth station antenna size has only a minimal impact on the results. It is then proposed to consider FSS earth station size as small as 2.4 m.

ARTICLE 5

Frequency allocations

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

MOD USA/9.1.9/1

51.4-55.78 GHz

Allocation to services		
Region 1	Region 2	Region 3
51.4-52.4	FIXED-SATELLITE (Earth-to-space) ADD 5.A919 ADD 5.B919 FIXED MOBILE 5.547 5.556 MOD 5.338A	
52.4-52.6	FIXED MOD 5.338A MOBILE 5.547 5.556	

Reasons: Creates an allocation to the FSS (Earth-to-space) in 51.4-52.4 GHz.

MOD USA/9.1.9/2

5.338A In the frequency 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-19)** applies. (WRC-19)

Reasons: Applies the limits for FSS ES unwanted emissions as contained in the proposed revision to Resolution 750 (Rev.WRC-15).

ADD USA/9.1.9/1

5.A919 The use of the band 51.4-52.4 GHz by the fixed-satellite service (Earth-to-space) is limited to feeder links for geostationary satellite networks.

Reasons: Limits the new allocation to feeder links operating in FSS GSO networks as prescribed in Resolution 162, *resolves* 2.

ADD USA/9.1.9/2

5.B919 An administration that has notified frequency assignments in the EESS on a GSO space station in the frequency band 52.6-54.25 GHz may seek the agreement of administrations who have submitted a notice under **No. 9.6** with frequency assignments in the fixed-satellite service on a GSO station that are within 1.8 degrees of the notified orbital position of GSO EESS space station. The administration responsible for the GSO fixed-satellite service satellite network shall cooperate with the administration responsible for the GSO EESS space station and both administrations should take reasonable steps to find a mutually agreed arrangement. In the absence of a mutually agreed arrangement, the administration responsible for the GSO FSS satellite network shall take all practicable actions to minimize its unwanted emission power in the 52.6-54.25 GHz band. The Bureau shall make no examination or finding under Articles 9 or 11 pursuant to this provision.

Reasons: To address possible stations at GSO in the EESS coexisting with new FSS GSO stations.

ARTICLE 21

Terrestrial and space services sharing frequency bands above 1 GHz

Section II – Power limits for terrestrial stations

MOD USA/9.1.9/3

TABLE 21-2 (Rev.WRC-19)

Frequency band	Service	Limit as specified in Nos.
...

10.7-11.7 GHz ⁵ (Region 1) 12.5-12.75 GHz ⁵ (Nos. 5.494 and 5.496) 12.7-12.75 GHz ⁵ (Region 2) 12.75-13.25 GHz 13.75-14 GHz (Nos. 5.499 and 5.500) 14.0-14.25 GHz (No. 5.505) 14.25-14.3 GHz (Nos. 5.505 and 5.508) 14.3-14.4 GHz ⁵ (Regions 1 and 3) 14.4-14.5 GHz 14.5-14.8 GHz 51.4-52.4 GHz	Fixed-satellite	21.2, 21.3 and 21.5
...

Reasons: Applies the limits in Nos. **21.2, 21.3** and **21.5** to the new allocation.

Section III – Power limits for earth stations

MOD USA/9.1.9/4

TABLE 21-3 (Rev.WRC-19)

Frequency band		Services
...
14.3-14.4 GHz ⁶ 14.4-14.8 GHz	(for Regions 1 and 3)	Fixed-satellite Earth exploration-satellite Mobile-satellite Space research
17.7-18.1 GHz		
22.55-23.15 GHz		
27.0-27.5 GHz ⁶ 27.5-29.5 GHz	(for Regions 2 and 3)	
31.0-31.3 GHz	(for the countries listed in No. 5.545)	
34.2-35.2 GHz	(for the countries listed in No. 5.550 with respect to the countries listed in No. 5.549)	
51.4-52.4 GHz		Fixed-satellite

Reasons: Applies the limits in No. 21.8 to the new FSS frequency band

MOD USA/9.1.9/5

{Editor's note: this Appendix 4 text is to mandate that the antenna size be provided – depending on formulation of 5.A919, this may not be needed.}

APPENDIX 4 (REV.WRC-15)

Consolidated list and tables of characteristics for use in the application of the procedures of Chapter III

ANNEX 2

Characteristics of satellite networks, earth stations or radio astronomy stations² (Rev.WRC-12)

Footnotes to Tables A, B, C and D

TABLE C
CHARACTERISTICS TO BE PROVIDED FOR EACH GROUP OF FREQUENCY ASSIGNMENTS
FOR A SATELLITE ANTENNA BEAM OR AN EARTH STATION OR
RADIO ASTRONOMY ANTENNA
(Rev.WRC-19)

Items in Appendix	Advance publication of a geostationary-satellite network	Advance publication of a non-geostationary-satellite network subject to coordination under Section II of Article 9	Advance publication of a non-geostationary-satellite network not subject to coordination under Section II of Article 9	Notification or coordination of a geostationary-satellite network (including space operation functions under Article 2A of Appendices 3B or 3BA)	Notification or coordination of a non-geostationary-satellite network	Notification or coordination of an earth station (including notification under Appendices 30A or 30B)	Notice for a satellite network in the broadcasting-satellite service under Appendix 30 (Articles 4 and 5)	Notice for a satellite network (feeder-link) under Appendix 30A (Articles 4 and 5)	Notice for a satellite network in the fixed-satellite service under Appendix 30B (Articles 6 and 8)	Items in Appendix	Radio astronomy
...
C.10.d.7	the antenna diameter, in metres In cases other than Appendix 30A, required for fixed-satellite service networks operating in the frequency bands 13.75-14 GHz, 14.5-14.75 GHz (in countries listed in Resolution 163 (WRC-15) not for feeder links for the broadcasting-satellite service), 14.5-14.8 GHz (in countries listed in Resolution 164 (WRC-15) not for feeder links for the broadcasting-satellite service), 24.65-25.25 GHz (Region 1) 24.65-24.75 GHz (Region 3) and 51.4-52.4 GHz and for maritime mobile-satellite service networks operating in the frequency band 14-14.5 GHz	+	+	X	...	C.10.d.7	...
...

Reasons: Limitations for antenna diameter for the frequency band 51.4-52.4 GHz is proposed in footnote RR No. 5.A919.

APPENDIX 7 (REV.WRC-15)

Methods for the determination of the coordination area around an earth station in frequency bands between 100 MHz and 105 GHz

ANNEX 7

System parameters and predetermined coordination distances for determination of the coordination area around an earth station

TABLE 7c (Rev.WRC-19)

Parameters required for the determination of coordination distance for a transmitting earth station

Transmitting space radiocommunication service designation	Fixed- satellite	Fixed- satellite ²	Fixed- satellite ³	Space research	Earth exploration-satellite, space research	Fixed-satellite, mobile-satellite, radionavigation-satellite	Fixed-satellite	Fixed- satellite ²
Frequency bands (GHz)	24.65-25.25 27.0-29.5	28.6-29.1	29.1-29.5	34.2-34.7	40.0-40.5	42.5-47 47.2-50.2 50.4-51.4	51.4-52.4	47.2-50.2
Receiving service designations	Fixed, mobile	Fixed, mobile	Fixed, mobile	Fixed, mobile, radiolocation	Fixed, mobile	Fixed, mobile, radionavigation	Fixed, mobile	Fixed, mobile
Method to be used	§ 2.1	§ 2.2	§ 2.2		§ 2.1, § 2.2	§ 2.1, § 2.2	§ 2.1	§ 2.2
Modulation at terrestrial station ¹	N	N	N		N	N	N	N
Terrestrial station interference parameters and criteria	p_0 (%)	0.005	0.005		0.005	0.005	0.005	0.001
	n	1	2		1	1	1	1
	p (%)	0.005	0.0025		0.005	0.005	0.005	0.001
	N_L (dB)	0	0		0	0	0	0
	M_s (dB)	25	25		25	25	25	25
	W (dB)	0	0		0	0	0	0
Terrestrial station parameters	G_A (dB) ⁴	50	50		42	42	42	46
	T_e (K)	2 000	2 000		2 600	2 600	2 600	2 000
	B (Hz)	10^6	10^6		10^6	10^6	10^6	10^6
Reference bandwidth								
Permissible interference power in B	$P_f(p)$ (dBW)	-111	-111		-110	-110	-110	-111

¹ A: analogue modulation; N: digital modulation.

² Non-geostationary satellites in the fixed-satellite service.

³ Feeder links to non-geostationary-satellite systems in the mobile-satellite service.

⁴ Feeder losses are not included.

MOD USA/9.1.9/7

RESOLUTION 750 (REV.WRC-19)

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

The World Radiocommunication Conference (Sharm el-Sheikh, 2019)

...

noting

- a) that the compatibility studies between relevant active and passive services operating in adjacent and nearby frequency bands are documented in Report ITU-R SM.2092 and in [PDN] Report ITU-R S.[SPECTRUM_SHARING];
- b) that the compatibility studies between IMT systems in the frequency bands 1 375-1 400 MHz and 1 427-1 452 MHz and EESS (passive) systems in the frequency band 1 400-1 427 MHz are documented in Report ITU-R RS.2336;
- c) that Report ITU-R F.2239 provides the results of studies covering various scenarios between the fixed service, operating in the frequency band 81-86 GHz and/or 92-94 GHz, and the Earth exploration-satellite service (passive), operating in the frequency band 86-92 GHz;
- d) that Recommendation ITU-R RS.2017 provides the interference criteria for satellite passive remote sensing,

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
...
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
52.6-54.25 GHz	52.1-52.4 GHz	Fixed-satellite (E-to-s)	For stations brought into use after the date of entry into force of the Final Acts of WRC-19: -37 dBW in any 100 MHz of the EESS (passive) band for earth stations with antenna elevation angles lower than 75° -52 dBW in any 100 MHz of the EESS (passive) band for earth stations with antenna elevation angles equal or higher than 75°

Reasons: Limit the unwanted emissions from the FSS Earth stations falling in the band 52.6-54.25 GHz to protect the EESS (passive) according to their elevation angle.

DOCUMENT WAC/089 (11.03.19)

UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

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;*

BACKGROUND INFORMATION:

Article 1.22 of the Radio Regulations defines *fixed-satellite service* (FSS) as follows:

A radiocommunication service between earth stations at given positions, when one or more satellites are used; the given position may be a specified fixed point or any fixed point within specified areas; in some cases this service includes satellite-to-satellite links, which may also be operated in the inter-satellite service; the fixed-satellite service may also include feeder links for other space radiocommunication services.

The “some cases” in which satellite-to-satellite links are included in the FSS are not elaborated in either the Radio Regulations or associated ITU publications. Nevertheless, the possibility for satellite-to-satellite links within the FSS exists. This possibility seems particularly reasonable in cases where a link from a space station in non-geostationary satellite orbit (non-GSO) is being transmitted in the same general direction (e.g., Earth-to-space) within the receive beam of a higher-altitude geostationary-orbit (GSO) space station using technical parameters identical or substantially similar to transmitting FSS ground stations within that GSO space station receive beam.

As reported by the Director of the Radiocommunication Bureau to the final CPM for WRC-19, since 2014, there have been 27 submissions of advance publication information for non-GSO satellite systems under No. 4.4 of the Radio Regulations specifying use by a non-allocated space service of frequency bands allocated to another space service. See Document CPM19-2/017, at Section 3.1.3.2 (Preliminary Draft Report of the Director to WRC-19 on Activities of the Radiocommunication Sector). Notification information was subsequently filed for frequency assignments to 3 of these systems. The Director’s draft report states that “[n]one of these frequency assignments was reported to the BR as causing harmful interference to any service of another administration.” Document CPM19-2/017, at Section 3.1.3.2

The challenge comes, as the Director of the Radiocommunication Bureau has acknowledged, in finding a path to recognition in the Radio Regulations for such uses, where possible, based on the technical conditions derived from ITU-R studies. Because frequency bands allocated to the fixed-satellite service are used for links between space stations and earth stations, it is necessary to analyze the use of the same bands for satellite-to-satellite links to ensure compatibility and avoid harmful interference. The sharing scenario is likely to differ as the orbital characteristics of the linked satellites vary.

Preliminary ITU-R studies have identified factors to be considered in assessing the compatibility of non-GSO satellite-to-GSO satellite links, in the Earth-to-space direction, with other FSS operations and other services in the 27.5 – 30 GHz frequency band. Continued development and completion of

these studies will permit the development of appropriate ITU-R regulatory text to define the cases in which such transmissions may be provided within the fixed-satellite service and/or the inter-satellite service, and allow for a determination of whether the recognition of compatible links can be made via appropriate modifications to the studied FSS allocations in Article 5.

Proposals:

MOD USA/10/[SAT-TO-SAT-1]

RESOLUTION 810 (WRC-19)

Agenda for the 2023 World Radiocommunication Conference

The World Radiocommunication Conference (Sharm-el-Sheikh, 2019),

* * *

resolves to give the view

that the following items should be included in the agenda for WRC-23:

* * *

2 on the basis of proposals from administrations and the Report of the Conference Preparatory Meeting, and taking account of the results of WRC-19, to consider and take appropriate action in respect of the following items:

* * *

2.6 to identify the cases and conditions under which transmissions in the Earth-to-space direction from non-geostationary orbit space stations to geostationary-orbit space stations may be accommodated on a basis other than under No. 4.4 of the Radio Regulations in the 27.5 – 30 GHz, 47.2 – 50.2 GHz, and 50.4 – 51.4 GHz frequency bands, taking into account the necessary protection of existing services, in accordance with Resolution **[A10-SAT-TO-SAT] (WRC-19)**;

* * *

ADD USA/10/[SAT-TO-SAT-2]

DRAFT NEW RESOLUTION [A10-SAT-TO-SAT] (WRC-19)

Study of technical, operational issues, and regulatory provisions for transmissions in the Earth-to-space direction from non-geostationary satellites in the Earth-to-space direction to geostationary satellites in the fixed-satellite service in the 27.5 – 30 GHz, 47.2 – 50.2 GHz, and 50.4 – 51.4 GHz frequency bands

The World Radiocommunication Conference (Sharm-el-Sheikh, 2019),

considering

- a)* that the definition of fixed-satellite service (FSS) in No. **1.22** of the Radio Regulations includes the possibility, in some cases, of satellite-to-satellite links, which may also be operated in the inter-satellite service;
- b)* that there have been expressions of interest by some administrations of using the FSS (Earth-to-space) band at 27.5-30 GHz, 47.2 – 50.2 GHz, and 50.4 – 51.4 GHz frequency bands for transmissions in the Earth-to-space direction from non-geostationary orbit (non-GSO) satellites toward FSS satellites operating in geostationary orbit (GSO);
- c)* that frequency bands allocated to the fixed-satellite service are used for links between earth stations and space stations, and that such links may not be operated in the inter-satellite service;
- d)* that the ITU-R has begun preliminary studies on the technical and operational issues associated with the use of non-GSO satellites transmitting toward the GSO in the 27.5-30 GHz FSS band, and that such studies are expected to continue in this band and other bands after WRC-19;
- e)* that all allocations to the fixed-satellite service include a direction indicator,

recognizing

- a)* that it is necessary to analyse the use of the FSS (Earth-to-space) band at 27.5-30 GHz, 47.2 – 50.2 GHz, and 50.4 – 51.4 GHz frequency bands for transmissions in the Earth-to-space direction from non-GSO satellites toward GSO FSS satellites to ensure compatibility with all allocated services in this band and avoid harmful interference;
- b)* that the sharing scenario is likely to differ as the orbital characteristics of the non-GSO satellites vary;
- c)* that the use by a non-allocated space service of frequency bands allocated to another space service under No. **4.4** of the Radio Regulations, without recognition and on a non-harmful interference/non-protected basis, is being made today,

noting

- a) that preliminary ITU-R studies have identified factors to be considered in assessing the compatibility of non-geostationary satellite to-geostationary FSS satellite links in the Earth-to-space direction with existing services in the 27.5 – 30 GHz frequency band;
- b) that further development of these studies, may identify and define the cases in which transmissions in the Earth-to-space direction from non-GSO satellites to GSO FSS satellites in the 27.5-30 GHz, 47.2 – 50.2 GHz, and 50.4 – 51.4 GHz frequency bands, band can be made without causing unacceptable or harmful interference to existing services,

recognizing further

- a) that the use of the frequency bands 27.5-28.6 GHz and 29.5-30 GHz by non-geostationary fixed-satellite service systems is subject to the application of the provisions of Nos. **5.484A**, **22.5C** and **22.5I**;
- b) that use of the frequency band 28.6-29.1 GHz 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 (No. **5.523A**);
- c) that use of the frequency band 29.1-29.5 GHz (Earth-to-space) by the fixed-satellite service is limited to geostationary-satellite systems and feeder links to non-geostationary satellite systems in the mobile-satellite service, and that such use is subject to the application of the provisions of No. **9.11A**, but not subject to the provisions of No. 22.2, except as indicated in Nos. **5.523C** and **5.523E**, where such use is not subject to the provisions of No. **9.11A** and shall continue to be subject to Articles **9** (except No. **9.11A**) and **11** procedures, and to the provisions of No. **22.2** (No. **5.535A**);
- d) that the frequency band 27.5-30 GHz may be used by the fixed-satellite service (Earth-to-space) for the provision of feeder links for the broadcasting-satellite service (No. **5.539**);
- e) that feeder links of non-geostationary networks in the mobile-satellite service and geostationary networks in the fixed-satellite service operating in the frequency band 29.1-29.5 GHz (Earth-to-space) shall employ uplink adaptive power control or other methods of fade compensation, such that the earth station transmissions shall be conducted at the power level required to meet the desired link performance while reducing the level of mutual interference between both networks (No. **5.541A**);
- f) that the fixed and mobile services are allocated on a primary basis in the frequency bands 27.5-30 GHz, 47.2 – 50.2 GHz, and 50.4 – 51.4 GHz frequency bands on a global basis;
- g) that the frequency band 28.5-29.5 GHz (Earth-to-space) is also allocated to the Earth exploration-satellite service on a secondary basis, and no additional constraints should be imposed on the EESS, and that the frequency band 50.2-50.4 GHz is allocated to the Earth exploration-satellite service (passive), and the conditions of fixed-satellite service operation are described in Resolution **750** (Rev. WRC-15);
- h) that the frequency band 29.5-30 GHz (Earth-to-space) is also allocated to the mobile-satellite service on a primary basis in 29.5-30 GHz in Region 2, on a primary basis in 29.9-30 GHz in Regions 1 and 3, and on a secondary basis in Regions 1 and 3 in 29.5-29.9 GHz,

resolves to invite ITU-R

- 1 to study the technical and operational characteristics and user requirements of different types of non-GSO space stations that plan transmissions in the general Earth-to-space direction to GSO FSS space stations in the frequency band 27.5-30 GHz, 47.2-50.2 GHz, and 50.4-51.4 GHz frequency bands;

2 to study sharing and compatibility between non-GSO space stations transmitting in the general Earth-to-space direction to GSO FSS space stations in the 27.5-30 GHz, 47.2-50.2 GHz, and 50.4-51.4 GHz frequency bands, and current and planned stations of the FSS and other existing services allocated in same frequency bands, to ensure protection of, and not impose undue constraints on, other FSS operations and other services allocated in those frequency bands, and taking into account *recognizings further a) to h)*;

3 to develop, for different types of non-GSO space stations and different portions of the frequency bands studied, technical conditions and regulatory provisions for their operation, including new or revised allocations as appropriate, taking into account the results of the studies above;

4 to complete these studies by the 2023 World Radiocommunication Conference,

invites administrations

to participate in the studies and to provide input contributions,

resolves to invite the 2023 World Radiocommunication Conference

to consider the results of the above studies and take necessary regulatory actions, as appropriate.

ATTACHMENT

PROPOSAL FOR FUTURE AGENDA ITEM FOR WRC-23

Subject: Proposed Future WRC Agenda Item for WRC-2023 to consider the results of studies on the compatibility of non-GSO satellite-to-GSO satellite links, in the Earth-to-space direction, with other FSS operations and other services in the 27.5 – 30 GHz, 47.2 – 50.2 GHz, and 50.4 – 51.4 GHz frequency bands.

Origin: United States of America

Proposal: to identify the cases and conditions under which transmissions in the Earth-to-space direction from non-geostationary orbit space stations to geostationary-orbit space stations may be accommodated on a basis other than under No. 4.4 of the Radio Regulations in the 27.5 – 30 GHz, 47.2 – 50.2 GHz, and 50.4 – 51.4 GHz frequency bands, taking into account the necessary protection of existing services, in accordance with Resolution [A10-SAT-TO-SAT] (WRC-19);

Background/reason:

To provide a means for recognizing in the Radio Regulations transmissions in the Earth-to-space direction from non-GSO to GSO space stations in the 27.5-30 GHz, 47.2 – 50.2 GHz, and 50.4 – 51.4 GHz frequency bands where conditions of avoiding interference with existing systems are met.

Radiocommunication services concerned:

Broadcasting-Satellite, Earth Exploration Satellite, Fixed, Fixed-Satellite, Mobile, Mobile Satellite.

Indication of possible difficulties: None foreseen

Previous/ongoing studies on the issue: Studies have been initiated in Working Party 4A during the 2016-2019 ITU-R Study Cycle

Studies to be carried out by: ITU-R Study Group 4	with the participation of: SGs 5 and 7
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ITU-R Study Groups concerned: SG 5 and SG 7

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

Common regional proposal: Yes/No
Number of countries:

Multicountry proposal: Yes/No

Remarks

DOCUMENT WAC/090 (11.03.19)

UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

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;*

BACKGROUND INFORMATION:

Today satellite operators provide a wide range of broadband services to a rapidly growing customer base, with more systems to come before 2023. 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. The fixed-satellite service 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 the mobile-satellite service 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-satellite service outpaces the spectrum available for this service today.

Nonetheless, there is growing demand for fixed-satellite service, 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 the 37.5-39.5 GHz frequency band for reverse direction operations for gateway earth stations. 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/[38 GHZ FSS-1]**

RESOLUTION 810 (WRC-19)

Agenda for the 2023 World Radiocommunication Conference

The World Radiocommunication Conference (Sharm-el-Sheikh, 2019),

* * *

resolves to give the view

that the following items should be included in the agenda for WRC-23:

* * *

2 on the basis of proposals from administrations and the Report of the Conference Preparatory Meeting, and taking account of the results of WRC-19, to consider and take appropriate action in respect of the following items:

* * *

2.6 study of spectrum needs and possible new allocations to the fixed-satellite service in the frequency band 37.5-39.5 GHz (Earth-to-space), in accordance with Resolution **161 (WRC-15)**;

* * *

NOC **USA/10/[38 GHZ FSS-2]**

RESOLUTION 161 (WRC-15)

**Studies relating to spectrum needs and possible allocation of the
frequency band 37.5-39.5 GHz to the fixed-satellite service**

ATTACHMENT

PROPOSAL FOR FOR FUTURE AGENDA ITEM FOR WRC-23

Subject: Proposes the adoption of an Agenda item for WRC-19 aiming at the consideration of spectrum requirements for the development of the fixed-satellite service, and possible regulatory actions, including additional allocations to the fixed-satellite service for reverse direction operations for gateway earth stations in the 37.5-39.5 GHz frequency band.

Origin: Member States of the Inter-American Telecommunication Commission (CITEL); WRC-19 Preliminary Agenda item 2.4

Proposal: To develop an Agenda item aiming at the consideration of spectrum requirements for the development of the fixed-satellite service and possible regulatory actions, including additional allocations for reverse direction operations for gateway earth stations in the 37.5-39.5 GHz frequency band.

Background/reason: Today satellite operators provide a wide range of broadband services to a rapidly growing customer base, with more systems to come before 2023. 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. The fixed-satellite service 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-satellite service outpaces the spectrum available for this service today.

Nonetheless, there is growing demand for fixed-satellite service, 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: SG7
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ITU-R Study Groups concerned: SG4, SG7

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

Common regional proposal: Yes/No
Number of countries:

Multicountry proposal: Yes/No

Remarks

DOCUMENT WAC/091 (11.03.19)

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:

The need for broadband services to passengers on aircraft and ships continues to grow with the increasing demand for internet-based applications for the aviation and shipping industry and their passengers. This need can be provided by aeronautical and maritime earth stations in motion (ESIM), communicating with GSO space stations in the Fixed Satellite Service (FSS). The availability of the bands 10.7-10.95 GHz, 11.2-11.45 GHz, and 12.75-13.25 GHz, allocated to the FSS, for the use by aeronautical and maritime ESIM would allow satellite network operators to provide additional capacity for the growing needs in this sector.

The frequency band 12.75-13.25 GHz is allocated on a primary basis to the fixed, fixed-satellite (Earth-to-space)⁶, and mobile services, and on a secondary basis to the Space research (deep space) (space-to-Earth) services. The frequency bands 10.7-10.95 GHz (space-to-Earth) and 11.2-11.45 GHz (space-to-Earth) are allocated on a primary basis to the fixed, fixed-satellite (space-to-Earth)⁷, and mobile services except aeronautical mobile.

Currently, satellite networks operating in this frequency band can provide services with aeronautical and maritime ESIM 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 in accordance with the Radio Regulations.

Given the growing need for connectivity for aviation and maritime, it is proposed to study the viability of allowing the operation of aeronautical and maritime ESIM communicating with GSO space stations in the FSS in the 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth), and 12.75-13.25 GHz (Earth-to-space), frequency bands, with the aim of developing regulatory means and associated conditions for this type of application.

⁶ 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.

⁷ The use of the bands 10.7-10.95 GHz (space-to-Earth) and 11.2-11.45 GHz (space-to-Earth) by geostationary-satellite systems in the fixed-satellite service is in accordance with the provisions of Appendix 30B according to No. 5.441.

Proposals

SUP USA/10/1

RESOLUTION 810 (WRC-15)

Preliminary agenda for the 2023 World Radiocommunication Conference

The World Radiocommunication Conference (Geneva, 2015),

Reasons: This Resolution must be suppressed, as WRC-19 will create a new Resolution that will include the agenda for WRC-23.

ADD USA/10(XXX)/2

DRAFT NEW RESOLUTION [USA-2023]

Agenda for the 2023 World Radiocommunication Conference

The World Radiocommunication Conference (Geneva, 2015),

considering

- a) that, in accordance with No. 118 of the ITU Convention, the general scope of the agenda for a world radiocommunication conference should be established four to six years in advance and that a final agenda shall be established by the Council two years before the conference;
- b) Article 13 of the ITU Constitution relating to the competence and scheduling of world radiocommunication conferences and Article 7 of the Convention relating to their agendas;
- c) the relevant resolutions and recommendations of previous world administrative radio conferences (WARCs) and world radiocommunication conferences (WRCs),

resolves

to recommend to the Council that a world radiocommunication conference be held in 2023 for a maximum period of four weeks, with the following agenda:

1 on the basis of proposals from administrations, taking account of the results of WRC-15 and the Report of the Conference Preparatory Meeting, and with due regard to the requirements of existing and future services in the bands under consideration, to consider and take appropriate action in respect of the following items:

1.[FSS-12.75-13.25 GHz] to consider, on the basis of ITU-R studies in accordance with Resolution [USA/10/FSS 12.75-13.25 GHz] (WRC-19), appropriate regulatory and technical provisions for the use of the frequency bands 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth), and 12.75-13.25 GHz (Earth-to-space), by aeronautical and maritime ESIM communicating with geostationary space stations in the fixed-satellite service;

resolves further

to activate the Conference Preparatory Meeting,

invites the Council

to finalize the agenda and arrange for the convening of WRC-23, and to initiate as soon as possible the necessary consultations with Member States,

instructs the Director of the Radiocommunication Bureau
to make the necessary arrangements to convene meetings of the Conference Preparatory Meeting
and to prepare a report to WRC-23,

instructs the Secretary-General
to communicate this Resolution to international and regional organizations concerned.

Reasons: To allow additional uses of the FSS frequency bands 10.7-10.95 GHz, 11.2-11.45 GHz,
and 12.75-13.25 GHz to meet growing demand for spectrum for aeronautical and maritime ESIM.

ADD USA/10/3

DRAFT RESOLUTION [USA/10/FSS 12.75-13.25 GHZ] (WRC-19)

**Operation of aeronautical and maritime ESIM communicating with
geostationary space stations in the fixed-satellite service in the frequency bands
10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth), and 12.75-
13.25 GHz (Earth-to-space)**

The World Radiocommunication Conference (Sharm el-Sheik Egypt, 2019),

considering

- a)* that the frequency band 12.75-13.25 GHz is 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 globally;
- b)* that the frequency bands 10.7-10.95 GHz and 11.2-11.45 GHz are allocated on a primary basis to the fixed, fixed-satellite (space-to-Earth), and mobile services except aeronautical mobile services globally;
- c)* that the use of the fixed-satellite service (FSS) in this band is subject to Appendix **30B** and that any actions under this agenda item should not impact the integrity of the Appendix **30B** Plan;
- d)* that in order to meet the growing demand for connectivity on aircraft and vessels, networks operating in this frequency band may already be providing services to earth stations on aircraft and vessels under No. **4.4**;
- e)* that the advances in earth station technology, including the use of tracking techniques, allow aeronautical and maritime earth stations to operate within the characteristics of fixed earth stations in the FSS;
- f)* that the availability of the band 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth) and 12.75-13.25 GHz (Earth-to-space) for aeronautical and maritime ESIM will provide administrations with more flexibility to use their allotments in the Appendix **30B** Plan;
- g)* that operations of aeronautical and maritime ESIM should protect stations of allocated services and not constrain their future development;
- h)* that a consistent approach to the use of the 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth) and 12.75-13.25 GHz (Earth-to-space) by aeronautical and maritime ESIM will

provide regulatory certainty and support the growing need for inflight and maritime connectivity globally;

i) that aeronautical and maritime ESIM must comply and operate within the envelope of the emission characteristics of the associated earth stations in the GSO satellite network,

recognizing

a) that the use of the bands 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth), and 12.75-13.25 GHz (Earth-to-space) by geostationary-satellite networks in the fixed-satellite service is in accordance with the provisions of Appendix **30B** according to No. **5.441**;

b) that aeronautical and maritime ESIM in the 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth) frequency bands will be receiving and not transmitting and thus will not cause interference to other allocated services or claim protection from allocated service operating in accordance with the Radio Regulations;

c) that previous World Radiocommunication Conferences have adopted measures to allow aeronautical and maritime ESIM to communicate with GSO space stations in the FSS in certain frequency allocations provided they meet the technical requirements of fixed-satellite earth stations;

d) that these earth stations will not be used or relied upon for safety-of-life applications;

e) that the use of the band 12.75-13.25 GHz (Earth-to-space) by non-geostationary-satellite systems in the fixed-satellite service shall not claim protection from geostationary-satellite networks operating in accordance with the Radio Regulations,

resolves to invite ITU-R

1 to carry out studies on technical and operational characteristics of aeronautical and maritime ESIM that communicate or plan to communicate with GSO space stations within the existing FSS allocation in the frequency bands 10.7-10.95 GHz, 11.2-11.45 GHz, and 12.75-13.25 GHz;

2 to study sharing and compatibility between aeronautical and maritime ESIM communicating with GSO space stations in the FSS and current and planned stations of existing services allocated in the 12.75-13.25 GHz bands to ensure protection of those services;

3 to develop technical conditions and regulatory provisions for the operation of aeronautical and maritime ESIM communicating with GSO space stations in the FSS in the frequency bands 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth), and 12.75-13.25 GHz (Earth-to-space) taking into account the result of studies as called for in resolves 1) and 2) above and in particular without affecting any provisions of Appendix **30B**;

4 to complete studies in time for WRC-23,

Further resolves to invite WRC-23

to review the results of these studies in order to adopt technical conditions and regulatory provisions that allow for the operation of aeronautical and maritime ESIM communicating with GSO space stations in the FSS in the frequency bands 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth), and 12.75-13.25 GHz (Earth-to-space),

invites administrations

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

ATTACHMENT

ANNEX 2 TO RESOLUTION 804 (REV.WRC-12)
Template for the submission of proposals for agenda items

Subject: Developing technical conditions and regulatory provisions and associated conditions that allow for the operation of aeronautical and maritime ESIM communicating with geostationary space stations in the FSS in the frequency bands 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth), and 12.75-13.25 GHz (Earth-to-space)

Origin: United States of America

Proposal: *To consider the use of the frequency bands 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth), and 12.75-13.25 GHz (Earth-to-space) by aeronautical and maritime ESIM communicating with geostationary space stations in the fixed-satellite service in accordance with Resolution [USA/10/FSS 12.75-13.25 GHZ] (WRC-19).*

Background/reason: According to the provisions of the Radio Regulations, FSS satellite networks operating in the 12.75-13.25 GHz frequency band can only provide services to aeronautical and maritime ESIM 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. Previous WRCs have adopted provisions to allow aeronautical and maritime ESIM to communicate with GSO space stations in the FSS in certain FSS frequency allocations provided they meet the technical requirements of fixed-satellite earth stations and other associated provisions.

It may therefore be feasible to allow aeronautical and maritime ESIM to communicate with geostationary space stations in the FSS operating in the frequency bands 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth), and 12.75-13.25 GHz (Earth-to-space), which would allow the provision of such services with additional regulatory certainty.

This additional use will not impact the Appendix 30B allotments/assignments. The earth stations on aircraft, similar to any other earth station operating in Appendix 30B frequency assignments, are to be operated within the service area and with the characteristics notified for earth stations of the GSO FSS system (i.e. within the interference envelope established for earth stations of the GSO FSS system). Such operation therefore should not cause interference to other allotments/assignments of Appendix 30B.

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

Indication of possible difficulties: None foreseen

Previous/ongoing studies on the issue:

Previous WRCs have adopted technical and regulatory provisions that allow earth stations on aircraft to communicate with GSO space stations in the FSS. These decisions were based on studies carried out by the ITU-R.

One of the regional organizations of ITU-R Region 1 has conducted technical studies on introducing earth stations on aircraft in the 12.75-13.25 GHz band concluding with the derivation of

a pfd mask to ensure the protection (long term and short-term criteria) of terrestrial FS stations from the aggregated interference from earth stations on aircraft communicating with GSO and non-GSO space stations in the FSS.

The above can be taken into account as proof of concept regarding the potential use of the band under consideration by aeronautical ESIM.

<i>Studies to be carried out by:</i> SG4	<i>with the participation of:</i>
<i>ITU-R Study Groups concerned:</i> SG5 and SG7	
<i>ITU resource implications, including financial implications (refer to CVI26):</i> Minimal	
<i>Common regional proposal:</i> Yes/No <i>Number of countries:</i>	<i>Multicountry proposal:</i> Yes/No
<i>Remarks</i>	

DOCUMENT WAC/092 (11.03.19)

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:

At WRC-97, the Earth exploration-satellite (passive) service was upgraded from secondary to primary status in Region 2.

In the 1997-2000 study period leading up to WRC-2000, SG-4 and SG-7 examined the technical and regulatory issues associated with considering the possible worldwide allocation for the earth exploration-satellite (passive) and space research (passive) services in the band 18.6 - 18.8 GHz. At the time, the allocation for the Earth exploration-satellite (passive) service was on a primary basis in Region 2, but on a secondary basis in Regions 1 and 3. These studies, performed under agenda item 1.17 (WRC-2000) which led to the establishment of the current footnote No. 5.522B, did not provide consideration for all types of non-geostationary (non-GSO) satellite systems that could operate in this band.

During the studies, only one non-GSO satellite system was planning to use this band above an altitude of 20,000 km. Accordingly, the constraint was imposed without appropriate consideration of non-GSO systems operating with an apogee below 20,000 km. Since there is a growing demand for Low Earth Orbit (LEO) and Medium Earth Orbit (MEO) global satellite broadband services, revisiting the studies performed in the band 18.6-18.8 GHz while taking into account the latest technology developments, could help facilitate the deployment of non-GSO systems operating with an apogee below 20,000 km.

Proposals

SUP **USA/10(XXX)/1**

RESOLUTION 810 (WRC-15)

Preliminary agenda for the 2023 World Radiocommunication Conference

The World Radiocommunication Conference (Geneva, 2015),

Reasons: This Resolution must be suppressed, as WRC-19 will create a new Resolution that will include the agenda for WRC-23.

ADD **USA/10(XXX)/2**

DRAFT NEW RESOLUTION [USA-2023]

Agenda for the 2023 World Radiocommunication Conference

The World Radiocommunication Conference (Geneva, 2015),

considering

a) that, in accordance with No. 118 of the ITU Convention, the general scope of the agenda for a world radiocommunication conference should be established four to six years in advance and that a final agenda shall be established by the Council two years before the conference;

- b) Article 13 of the ITU Constitution relating to the competence and scheduling of world radiocommunication conferences and Article 7 of the Convention relating to their agendas;
- c) the relevant resolutions and recommendations of previous world administrative radio conferences (WARCs) and world radiocommunication conferences (WRCs),

resolves

to recommend to the Council that a world radiocommunication conference be held in 2023 for a maximum period of four weeks, with the following agenda:

1 on the basis of proposals from administrations, taking account of the results of WRC-15 and the Report of the Conference Preparatory Meeting, and with due regard to the requirements of existing and future services in the bands under consideration, to consider and take appropriate action in respect of the following items:

1.[XXX] to consider, on the basis of ITU-R studies in accordance with Resolution [USA/10/FSS NGSO 18GHZ] (WRC-19), appropriate regulatory actions regarding non-geostationary fixed-satellite service systems with an apogee below 20 000 km that operate in the 18.6-18.8 GHz (space-to-Earth) band;

...

resolves further

to activate the Conference Preparatory Meeting,

invites the Council

to finalize the agenda and arrange for the convening of WRC-23, and to initiate as soon as possible the necessary consultations with Member States,

instructs the Director of the Radiocommunication Bureau

to make the necessary arrangements to convene meetings of the Conference Preparatory Meeting and to prepare a report to WRC-23,

instructs the Secretary-General

to communicate this Resolution to international and regional organizations concerned.

Reasons: To update footnote No. **5.522B** to revise the altitude restriction and introduce, as appropriate, a new power flux density limit in Article **21**, Table **21-4**, considering the latest technological advancements and growing demand for spectrum for non-geostationary Fixed-Satellite Service systems operating below 20,000 km.

ADD USA/10(XXX)/3

DRAFT NEW RESOLUTION [USA/10/ FSS NGSO 18GHZ] (WRC-19)

Non-geostationary fixed-satellite service systems with an apogee below 20 000 km that operate in the 18.6-18.8 GHz (space-to-Earth) band

The World Radiocommunication Conference (Sharm el-Sheik Egypt, 2019),

considering

- a) that high-density applications by the fixed-satellite service is identified for the 18.3-19.3 GHz (space-to-Earth) band in Region 2;
- b) that geostationary and certain non-geostationary fixed-satellite service networks and systems operating in the 18.6-18.8 GHz (space-to-Earth) band must comply with the current regulatory provisions in Article **21**, Table **21-4** for power flux-density from space stations;
- c) that previous studies establishing the power flux-density limits on the surface of the Earth, found in Article **21**, Table **21-4** for 18.6-18.8 GHz involved just one non-geostationary fixed-satellite service system, operating above 20,000 km,

recognizing

- a) that the frequency band 18.6-18.8 GHz is currently allocated on a primary basis to the earth exploration-satellite (passive), fixed, mobile, fixed-satellite (space-to-Earth) services globally, as well as space research service (passive) on a primary basis in Region 2 and secondary basis in Regions 1 and 3;
- b) that the emissions of the fixed, mobile and fixed-satellite services in the band 18.6-18.8 GHz are limited to the values given in **Nos. 21.5** and, in accordance with footnote **No. 5.522A**, **21.5A** and **21.16.2**;
- c) that non-geostationary-satellite systems shall not cause unacceptable interference to and shall not claim protection from geostationary-satellite networks in the fixed-satellite service and the broadcasting-satellite service in accordance with **No. 22.2**;
- d) that the modification of the limits referenced in *recognizing b* for the fixed and mobile services and stations operating in the fixed-satellite service above an apogee of 20 000 km to protect EESS (passive) and SRS (passive) stations are outside the scope of this Resolution;
- e) that the use of the band 18.6-18.8 GHz by geostationary networks and non-geostationary systems in the fixed-satellite service (space-to-Earth) operate in accordance with Footnote **5.522B** in the Radio Regulations;
- f) that **No. 21.16** contains power flux-density limits applicable to fixed-satellite service to protect fixed and mobile services with allocations in the frequency band 18.6-18.8 GHz;
- g) that the power flux-density specified in **No. 21.16.2** across the 200 MHz band 18.6-18.8 GHz produced at the surface of the Earth by emissions from a space station operating in the fixed-satellite service under assumed free-space propagation conditions shall not exceed -95 dB(W/m²), except for less than 5% of time, when the limit may be exceeded by up to 3 dB;
- h) that the provisions of **No. 21.17** do not apply in this band,

resolves to invite ITU-R

- 1 to conduct and complete in time for WRC-23 sharing and compatibility studies between non-geostationary fixed-satellite service (space-to-Earth) systems operating with an apogee below 20,000 km and the earth exploration-satellite (passive) service in 18.6-18.8 GHz;

2 to develop technical conditions and regulatory provisions for non-geostationary stations operating in the fixed-satellite service (space-to-Earth) with an apogee below 20,000 km in 18.6-18.8 GHz, with the constraint that the power flux-density limits in Table **21-4** of Article **21** associated with the protection of the fixed and mobile service in this band remain unchanged,

further resolves

1 that the technical conditions and regulatory provisions developed under *resolves to invite ITU-R* 2 includes the constraint that of the limits referenced in *recognizing b* applicable to the fixed and mobile services and to stations operating in the fixed-satellite service with an apogee greater than 20 000 km remain unchanged;

2 to invite WRC-23 to review the results of these studies and take appropriate action,

invites administrations

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

ATTACHMENT

PROPOSAL FOR FUTURE AGENDA ITEM FOR [XXX]

Subject: Proposed Future WRC Agenda Item for WRC-2023 to consider the results of studies on the ... **Revision to footnote No. 5.522A and 5.522B and Radio Regulations Article 21 power flux density limits regarding non-geostationary Fixed-Satellite Service systems with an apogee below 20 000 km that operate in the 18.6-18.8 GHz (space-to-Earth) band**

Origin: United States of America

Proposal: Examine revision of Radio Regulation footnote 5.522A and 5.522B and Article 21, Table 21-4 regarding expansion of regarding non-geostationary Fixed-Satellite Service systems with an apogee below 20 000 km that operate in the 18.6-18.8 GHz (space-to-Earth) band.

Background/reason:

At WRC-97, the Earth exploration-satellite (passive) service was upgraded from secondary to primary status in Region 2.

In the 1997-2000 study period leading up to WRC-2000, SG-4 and SG-7 examined the technical and regulatory issues associated with considering the possible worldwide allocation for the earth exploration-satellite (passive) and space research (passive) services in the band 18.6 - 18.8 GHz. At the time, the allocation for the Earth exploration-satellite (passive) service was on a primary basis in Region 2, but on a secondary basis in Regions 1 and 3. These studies, performed under agenda item 1.17 (WRC-2000) which led to the establishment of the current footnote No. 5.522B, did not provide consideration for all types of non-geostationary (non-GSO) satellite systems that could operate in this band.

During the studies, only one non-GSO satellite system was planning to use this band above an altitude of 20,000 km. Accordingly, the constraint was imposed without appropriate consideration of non-GSO systems operating with an apogee below 20,000 km. Since there is a growing demand for Low Earth Orbit (LEO) and Medium Earth Orbit (MEO) global satellite broadband services, revisiting the studies performed in the band 18.6-18.8 GHz while taking into account the latest technology developments, could help facilitate the deployment of non-GSO systems operating with an apogee below 20,000 km.

Radiocommunication services concerned:

Earth Exploration Satellite, Fixed, Mobile, Fixed-Satellite, Space research

Indication of possible difficulties: None foreseen

Previous/ongoing studies on the issue: Studied in the 1997-2000 preparatory cycle leading up to WRC-2000 considering an allocation to EESS (passive) and SRS (passive).

Studies to be carried out by: ITU-R Study Group 4	with the participation of:
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ITU-R Study Groups concerned: SG 5 and SG 7

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

Common regional proposal: No **Multicountry proposal:** No

Number of countries:

One

Remarks

DOCUMENT WAC/093 (11.03.19)

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:

Non-geostationary (“NGSO”) satellite constellations in frequency bands 17.7-20.2 GHz (space-to-Earth) and 27.5-30 GHz (Earth-to-space) enable the provision of Internet connectivity and more of such NGSO systems offering broadband solutions are planned to be deployed in the near future in the same bands and in the 37.5-39.5 GHz (space-to-Earth), 39.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space). These constellations are designed to meet the consumer demand for access to broadband connectivity, regardless of location. One area of noticeable growth for NGSO connectivity is for earth stations in motion (“ESIM”). This market segment is particularly well served by satellites and in instances where lower latency matters, NGSO connectivity is there to deliver. For example, there is growing demand for high performance connectivity for users on maritime vessels and aircraft, as well as for other applications at both fixed locations and while in motion. New and next generation NGSO systems will be designed to serve smaller ESIM terminals and as such NGSO systems offer the potential to expand connectivity to new market segments rapidly. In order to facilitate the further deployment of ubiquitous broadband connectivity to ESIM services in the above mentioned frequency bands, there should be consideration on how to develop internationally harmonized spectrum technical and regulatory measures or frameworks that will enable and facilitate deployment of this critical and valuable service using NGSO satellites.

It is proposed to carry out technical sharing studies between all types of ESIM communicating with NGSO FSS systems with other primary services in the frequency bands 17.7-20.2 GHz (space-to-Earth), 27.5-30.0 GHz (Earth-to-space), 37.5-39.5 GHz (space-to-Earth), 39.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space), in order to develop appropriate technical and regulatory requirements (which may include, but not limited to, off-axis EIRP density limits, minimum antenna elevation angles and power-flux densities) to facilitate the operations of such earth stations, while ensuring harmful interference is not caused to other primary services.

This proposal does not call for the revision of the efd limits in Article 22 of the Radio Regulations for the frequency bands of 17.8-18.6 GHz, 19.7-20.2 GHz (space-to-Earth) / 27.5-28.6 GHz, 29.5-30 GHz (Earth-to-space) and 17.8-18.4 GHz (inter-satellite) nor any provisions established by WRC-19 in consideration of Resolution 159 (WRC-15).

In studying the frequencies 29.1-29.5 GHz for use by FSS NGSO ESIMs, it is necessary to first study the technical and regulatory measures necessary to allow other uses by FSS NGSO satellite systems not limited to MSS feeder links, subject to provision No. 22.2.

Proposals

SUP USA/10(XXX)/1

RESOLUTION 810 (WRC-15)

Preliminary agenda for the 2023 World Radiocommunication Conference

The World Radiocommunication Conference (Geneva, 2015),

Reasons: This Resolution must be suppressed, as WRC-19 will create a new Resolution that will include the agenda for WRC-23.

ADD USA/10(XXX)/2

DRAFT NEW RESOLUTION [USA-2023]

Agenda for the 2023 World Radiocommunication Conference

The World Radiocommunication Conference (Geneva, 2015),

considering

- a) that, in accordance with No. 118 of the ITU Convention, the general scope of the agenda for a world radiocommunication conference should be established four to six years in advance and that a final agenda shall be established by the Council two years before the conference;
- b) Article 13 of the ITU Constitution relating to the competence and scheduling of world radiocommunication conferences and Article 7 of the Convention relating to their agendas;
- c) the relevant resolutions and recommendations of previous world administrative radio conferences (WARCs) and world radiocommunication conferences (WRCs),

resolves

to recommend to the Council that a world radiocommunication conference be held in 2023 for a maximum period of four weeks, with the following agenda:

1 on the basis of proposals from administrations, taking account of the results of WRC-15 and the Report of the Conference Preparatory Meeting, and with due regard to the requirements of existing and future services in the bands under consideration, to consider and take appropriate action in respect of the following items:

1.[NGSO-ESIM] to consider, on the basis of ITU-R studies in accordance with Resolution [USA/10/NGSO ESIM] (WRC-19), appropriate regulatory actions, for the use of the frequency bands 17.7-20.2 GHz (space-to-Earth), 27.5-30.0 GHz (Earth-to-space), 37.5-39.5 GHz (space-to-Earth), 39.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) by earth stations in motion communicating with non-geostationary space stations in the fixed-satellite service;

resolves further

to activate the Conference Preparatory Meeting,

invites the Council

to finalize the agenda and arrange for the convening of WRC-23, and to initiate as soon as possible the necessary consultations with Member States,

instructs the Director of the Radiocommunication Bureau

to make the necessary arrangements to convene meetings of the Conference Preparatory Meeting and to prepare a report to WRC-23,

instructs the Secretary-General

to communicate this Resolution to international and regional organizations concerned.

Reasons: To fulfil the growing need for connectivity ‘in motion’ by allowing operation of ESIM with NGSO in additional frequency bands while preventing harmful interference to other services.

ADD USA/10(XXX)/3

DRAFT NEW RESOLUTION [USA/10/NGSO ESIM] (WRC-19)

Use of the frequency bands 17.7-20.2 GHz (space-to-Earth), 27.5-30.0 GHz (Earth-to-space), 37.5-39.5 GHz (space-to-Earth), 39.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) by earth stations in motion communicating with non-geostationary space stations in the fixed-satellite service

The World Radiocommunication Conference (Sharm el-Sheik Egypt, 2019),

considering

- a)* that the frequency bands 17.7-20.2 GHz (space-to-Earth), 27.5-30.0 GHz (Earth-to-space), 37.5-39.5 GHz (space-to-Earth), 39.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) are currently allocated on a primary basis to the fixed-satellite service;
- b)* that there are existing non-geostationary orbit (NGSO) satellite constellations in the frequency bands listed in *considering a)* and that these constellations are designed to serve the growing need for access to broadband connectivity, regardless of location;
- c)* that the frequency bands listed in *considering a)* are also allocated to several other services on a primary basis, the allocated services are used by a variety of different systems in many administrations and these existing services and their future development should be protected without undue constraints,

recognizing

- a)* that technical and operational requirements for ESIM (which were referred to as earth stations on mobile platforms (“ESOMPs”) prior to WRC-15) operating with NGSO in the fixed-satellite service systems in the frequency bands 17.3-20.2 GHz, 27.5-29.1 GHz and 29.5-30.0 GHz have been discussed in the ITU-R and are reflected in the Report ITU-R S.2261;
- b)* that Article 22 of the Radio Regulations contains efd limits for non-geostationary-satellite systems in the fixed-satellite service in the 17.8-18.6 GHz, 19.7-20.2 GHz (space-to-Earth) / 27.5-28.6 GHz, 29.5-30 GHz (Earth-to-space) and 17.8-18.4 GHz (inter-satellite) frequency bands;
- c)* the provisions established by WRC-19 in consideration of Resolution **159 (WRC-15)** for NGSO FSS satellite systems in the frequency bands 37.5-39.5 GHz (space-to-Earth), 39.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space);
- d)* that use of the frequency band 29.1-29.5 GHz (Earth-to-space) by the fixed-satellite service is limited to geostationary-satellite systems and feeder links to non-geostationary satellite systems in the mobile-satellite service, and that such use is subject to the application of the provisions of No. **9.11A**, but not subject to the provisions of No. **22.2**, except as indicated in Nos. **5.523C** and **5.523E**, where such use is not subject to the provisions of No. **9.11A** and shall continue to be subject to Articles **9** (except No. **9.11A**) and **11** procedures, and to the provisions of No. **22.2** (No. **5.535A**),

resolves to invite ITU-R

- 1** to study the technical sharing between all types of earth stations in motion communicating with NGSO FSS systems with other primary services in the frequency bands 17.7-20.2 GHz (space-to-Earth),

27.5-30.0 GHz (space-to-Earth), 37.5-39.5 GHz (space-to-Earth), 39.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space);

2 to study sharing and compatibility between earth stations in motion operating with NGSO FSS systems and current and planned stations of existing services allocated in the frequency bands listed in *considering a*) to ensure protection of, and not impose undue constraints on, services allocated in those frequency bands;

3 to develop technical conditions and regulatory provisions for earth stations in motion operation with NGSO FSS systems taking into account the results of studies under *resolves* 1;

4 to complete studies in time for WRC-23,

resolves

that these earth stations not be used or relied upon for safety-of-life applications,

further resolves to invite WRC-23

to review the results of these studies and take appropriate action.

ATTACHMENT

ANNEX 2 TO RESOLUTION 804 (REV.WRC-12)

Template for the submission of proposals for agenda items

PROPOSAL FOR FUTURE AGENDA ITEM FOR [XXX]

Subject: Proposed Future WRC Agenda Item for WRC-2023 to consider the results of studies on NGSO ESIM in the frequency bands 17.7-20.2 GHz (space-to-Earth), 27.5-30.0 GHz (Earth-to-space), 37.5-39.5 GHz (space-to-Earth), 39.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space)

Origin: United States of America

Proposal: Study and develop technical and regulatory measures or frameworks, as appropriate, to facilitate the use of the frequency bands 17.7-20.2 GHz (space-to-Earth), 27.5-30.0 GHz (Earth-to-space), 37.5-39.5 GHz (space-to-Earth), 39.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) by NGSO ESIM. In studying the use of the frequency band 29.1-29.5 GHz by fixed-satellite service (FSS), it is necessary to study the technical and regulatory measures to allow other uses of these frequencies by NGSO satellite systems.

Background/reason:

Non-geostationary (“NGSO”) satellite constellations in frequency bands 17.7-20.2 GHz (space-to-Earth) and 27.5-30 GHz (Earth-to-space) enable the provision of Internet connectivity and more of such NGSO systems offering broadband solutions are planned to be deployed in the near future in the same bands and in the 37.5-39.5 GHz (space-to-Earth), 39.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space). These constellations are designed to meet the consumer demand for access to broadband connectivity, regardless of location. One area of noticeable growth for NGSO connectivity is for earth stations in motion (“ESIM”). This market segment is particularly well served by satellites and in instances where lower latency matters, NGSO connectivity is there to deliver. For example, there is growing demand for high performance connectivity for users on maritime vessels and aircraft, as well as on for other applications at both fixed locations and while in motion. New and next generation NGSO systems will be designed to serve smaller ESIM terminals and as such NGSO systems offer the potential to expand connectivity to new market segments rapidly. In order to facilitate the further deployment of ubiquitous broadband connectivity to ESIM services in the above mentioned frequency bands, there should be consideration on how to develop internationally harmonized spectrum technical and regulatory measures or frameworks that will enable and facilitate deployment of this critical and valuable service using NGSO satellites.

It is proposed to carry out technical sharing studies between all types of ESIM communicating with NGSO FSS systems with other primary services in the frequency bands 17.7-20.2 GHz (space-to-Earth), 27.5-30.0 GHz (Earth-to-space), 37.5-39.5 GHz (space-to-Earth), 39.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space), in order to develop appropriate technical and regulatory requirements (which may include, but not limited to, off-axis EIRP density limits, minimum

antenna elevation angles and power-flux densities) to facilitate the operations of such earth stations, while ensuring harmful interference is not caused to other primary services.

This proposal does not call for the revision of the epfd limits in Article 22 of the Radio Regulations for the frequency bands of 17.8-18.6 GHz, 19.7-20.2 GHz (space-to-Earth) / 27.5-28.6 GHz, 29.5-30 GHz (Earth-to-space) and 17.8-18.4 GHz (inter-satellite) nor any provisions established by WRC-19 in consideration of Resolution 159 (WRC-15).

In studying the frequencies 29.1-29.5 GHz for use by FSS NGSO ESIMs, it is necessary to first study the technical and regulatory measures necessary to allow other uses by FSS NGSO satellite systems not limited to MSS feeder links, subject to provision No. 22.2.

Radiocommunication services concerned:

Fixed, Mobile, Inter-Satellite, Broadcasting-satellite, MSS, FSS, Space Research (passive) and EESS (passive)

Indication of possible difficulties:

Technical and regulatory requirements too stringent to allow an efficient deployment of ESIM services.

Previous/ongoing studies on the issue: Technical and operational requirements for ESIM (which were referred to as earth stations on mobile platforms (“ESOMPs”) prior to WRC-15) operating with NGSO FSS systems in the frequency bands 17.3-20.2 GHz, 27.5-29.1 GHz and 29.5-30.0 GHz have been discussed in the ITU-R and are reflected in the Report ITU-R S.2261. The Report identified the technical and operational requirements to be considered with the deployment of ESOMPs operating with NGSO FSS systems in the frequency bands 17.3-19.3 GHz, 19.7-20.2 GHz, 27.0-29.1 GHz and 29.5-30.0 GHz. The Report describes how ESOMPs operating in these frequency bands must be designed and operated to meet the existing technical and/or operational requirements applicable to FSS earth stations.

<i>Studies to be carried out by:</i> ITU-R Study Group 4	<i>with the participation of:</i>
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ITU-R Study Groups concerned: SG-5 and SG 7

ITU resource implications, including financial implications (refer to CVI26): minimal

Common regional proposal: Yes/No

Multicountry proposal: Yes/No

Number of countries:

Remarks

WAC/097 (11.03.19)
IWG-4/059 (04 March 2019)

DOCUMENT WAC/094 (11.03.19)

UNITED STATES OF AMERICA

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

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;*

BACKGROUND INFORMATION:

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 non-GSO 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.

WRC-19 will review the results of the studies and will consider taking appropriate regulatory actions for non-GSO satellite systems in the 37-51.4 GHz frequency range by adopting aggregate criteria not to be exceeded by non-GSO FSS systems in order to protect GSO FSS and GSO BSS networks against interference.

High mm-wave bands are particularly suitable for use as ultra-high capacity gateway links for large constellation non-GSO FSS systems using broadband service links. In addition, these frequency bands are potentially suitable for broadband links for consumer and enterprise customers. As a result, system trials of high mm-wave bands are progressing and technology prototypes are maturing.

However, there are currently no mechanisms in the RR establishing coordination procedures applicable between NGSO systems, nor methods of ensuring satisfactory co-existence with GSO networks, operating in the frequency bands currently allocated to the FSS in the range from 71-76 GHz (space-to-Earth) and 81-86 GHz (Earth-to-space).

This contributes to uncertainty with adopting high mm-wave gateway technology among potential operators of non-GSO satellite systems in these bands, which should be addressed by a competent WRC.

RESOLUTION 810 (WRC-19)

Agenda for the 2023 World Radiocommunication Conference

The World Radiocommunication Conference (Sharm-el-Sheikh, 2019),

* * *

resolves to give the view

that the following items should be included in the agenda for WRC-23:

* * *

2 on the basis of proposals from administrations and the Report of the Conference Preparatory Meeting, and taking account of the results of WRC-19, to consider and take appropriate action in respect of the following items:

* * *

2.7 to define the cases and conditions to develop regulatory provision for non-geostationary fixed-satellite services satellite systems in the frequency bands 71-76 GHz (space-to-Earth) and 81-86 GHz (Earth-to-space) based on studies of technical and operational issues in accordance with Resolution **[A10-E-band-NGSO-SAT] (WRC-19)**;

* * *

ADD USA/10/[A10-E-band-NGSO-SAT]

DRAFT NEW RESOLUTION [A10-E-BAND-NGSO-SAT] (WRC-19)

Studies of technical, operational issues and regulatory provisions for non-geostationary fixed-satellite services satellite systems in the frequency bands 71-76GHz (space-to-Earth) and 81-86 GHz (Earth-to-space)

The World Radiocommunication Conference (Sharm-el-Sheikh, 2019),

considering

- a) that there is a need for greater broadband connectivity and telecommunication services;
- b) that satellite systems are increasingly being used to deliver broadband services and are part of the solutions to enable universal broadband access;
- c) that next-generation fixed-satellite service technologies are required to deliver multi-terabit speeds to support real-time demanding applications, which can be delivered by large constellation non-GSO FSS systems;
- d) that technological developments such as advances in spot-beam technologies and frequency reuse are used by the fixed-satellite service in the 12 to 30 GHz range to increase the efficient use of spectrum to achieve the targets in the considering above;
- e) that the high mm-wave bands are particularly suitable for use as ultra-high capacity gateway links for large constellation non-GSO FSS systems using broadband service links already allocated in lower frequency bands;
- f) that the particular characteristics of such ultra-high capacity gateway links for large constellation non-GSO FSS systems involve highly directional antennas on both the satellites and the earth stations and, as such, may be conducive to novel frequency sharing arrangements including, but not limited to, consideration of reverse band operation in certain situations;
- g) that current FSS technologies can be adapted for broadband applications in the mm-waves;
- h) the need to encourage the development and implementation of new technologies in the fixed-satellite service (FSS) at mm-wave;
- i) that FSS systems based on the use of new technologies in the higher bands and 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;
- j) that system trials of high mm-wave bands are progressing, and technology prototypes are maturing;
- k) that GSO networks and non-GSO systems are at early conceptual phases, thus providing an opportunity to investigate equitable sharing conditions;
- l) that the Radio Regulations should enable the introduction of new applications of radiocommunication technology to ensure the operation

of as many systems as possible in order to ensure efficient use of the spectrum;

- m) that, unacceptable interference as per No. 22.2 is subject to interpretation and the performance and interference criteria of GSO and non-GSO links have not been established in these bands;
- n) that technical studies are required in order to ascertain the feasibility of, and conditions for, non-GSO FSS satellite systems sharing the frequency bands 71-76 GHz and 81-86 GHz as appropriate to the band), and 2) with other non-GSO FSS satellite systems;
- o) that due to early development phase of GSO and non-GSO systems the above studies can be conducted to establish mutually equitable regulations for both types of systems, as well as with other services;
- p) that fixed-satellite applications in spectrum above 60 GHz, such as feeder links, should be easier to share with other radiocommunication services than high-density fixed-satellite service (HDFSS) applications,

considering further

- a) that Recommendations ITU-R S.1323, ITU-R S.1325, ITU-R S.1328, ITU-R S.1526, ITU-R S.1529 and provide information on non-GSO and GSO FSS system characteristics, operational requirements and protection criteria that may be used in sharing studies;
- b) that Report ITU-R S.[E-band FSS characteristics] currently being developed provide additional system characteristics of planned high mm-wave FSS network and systems,

noting

- a) that filing information for GSO and NGSO FSS satellite networks in the frequency bands 71-76 GHz (space-to-Earth) and 81-86 GHz (Earth-to-space) have recently been communicated to the Radiocommunication Bureau;
- b) that the frequency band 71-76 GHz is also allocated to the fixed and mobile services on a primary basis;
- c) that the frequency band 74-76 GHz is also allocated to the broadcasting and broadcasting satellite services on a primary basis, as well as the space research service in the space-to-earth direction on the secondary basis;
- d) that in the band 74-76 GHz the fixed, mobile and broadcasting services shall not cause harmful interference to stations of the fixed-satellite service in accordance with provision **5.561**;
- e) that the frequency band 81-86 GHz is also allocated to the fixed, mobile and radio-astronomy services on a primary basis, as well as the space research service in the space to earth direction on a secondary basis;
- f) that Resolution **750 ([Rev. WRC-19])** applies in the frequency band 81-86 GHz in accordance to provision **5.338A**;
- g) that the frequency band 81-84 GHz is also allocated to the mobile-satellite service in the earth-to-space direction on a primary basis;
- h) that in the frequency band 81-81.5 GHz is also allocated to the amateur and amateur-satellite services on a secondary basis;
- i) that the adjacent frequency band 86-92 GHz is allocated to the earth exploration satellite (passive) and space research (passive) services, as well as the radio astronomy service;

recognizing

- a) that WRC-19 adopted provisions to quantify No. **22.2**, in order to establish protection of GSO FSS and BSS satellite networks from non-GSO FSS satellite systems in the 37-51.4 GHz frequency range;
- b) that Resolution **[TBD] (WRC-19)** contains aggregate criteria not to be exceeded by non-GSO FSS systems in order to protect GSO FSS and GSO BSS networks against interference in the 37-51.4 GHz frequency range;
- c) that WRC-19 incorporated by reference Recommendation ITU-R. S.[50/40 GHZ SHARING METHODOLOGY] to define methodology and sharing criteria between non-GSO FSS and GSO FSS in the 37-51.4 GHz frequency range;
- d) that **No. 21.16** does not contain power flux-density limits applicable to FSS satellites to protect fixed and mobile services with allocations in the frequency band 71- 76 GHz;
- e) that the frequency band 86-92 GHz is allocated on a primary basis to the EESS (passive) and space research (passive) services, which must be adequately protected;
- f) that **No. 5.149** indicates that radio astronomy observations are carried out in the frequency band 76-86 GHz and that mitigation measures may have to be defined in this regard;

resolves to invite ITU-R

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

- 1. studies of technical and operational issues and regulatory provisions for the operation of non-GSO FSS satellite systems in the frequency bands 71-76 GHz (space-to-Earth, and possible reverse-band operation in the Earth-to-space direction) and 81-86 GHz (Earth-to-space) (limited to gateway links only) while establishing equitable co-existence between non-GSO FSS and GSO satellite networks in the FSS, MSS and BSS
- 2. studies of technical and operational issues and regulatory provisions for the operation of non-GSO FSS satellite systems in the frequency bands 71-76 GHz (space-to-Earth, and possible reverse-band operation in the Earth-to-space direction) and 81-86 GHz (Earth-to-space) (limited to gateway links only) with fixed and mobile systems in those bands and adjacent bands as necessary
- 3. studies carried out under resolves *1* above will focus on the methodologies adopted by WRC-19 in the frequency band 37.5-51.4 GHz;
- 4. studies and development of sharing conditions between multiple non-GSO FSS systems operating in the frequency bands listed in resolves *1* above;
- 5. studies of possible necessary revisions to Resolution **750 (Rev.WRC-[19])** to ensure protection of the EESS (passive) and space research (passive) in the frequency bands 86-92 GHz from non-GSO FSS transmission, taking into account recognizing d) above, including study of aggregate FSS interference effects from networks and systems operating or planned to operate in the frequency bands described in resolves to invite ITU-R *1* above;
- 6. studies towards ensuring protection of the radio astronomy frequency bands 76-86 GHz from non-GSO FSS transmissions, taking into account recognizing e) above, including study of aggregate FSS interference effects from networks and systems operating or planned to operate in the frequency bands described in resolves to invite ITU-R *1* above,

further resolves

to invite WRC-23 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 FUTURE AGENDA ITEM FOR [XXX]

Subject: Proposed Future WRC Agenda Item for WRC-2023 to consider the results of studies on the **technical, operational issues and regulatory provisions for non-geostationary fixed-satellite services satellite systems in the frequency bands 71-76GHz (space-to-Earth) and 81-86 GHz (Earth-to-space), and proposed new allocation to FSS in the 71-76GHz (Earth-to-space)**

Origin: United States of America

Proposal: Examine revision of Radio Regulation regarding non-geostationary Fixed-Satellite Service systems in the 71-76 GHz and 81-86GHz bands.

Background/reason:

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 non-GSO 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.

WRC-19 will review the results of the studies and will consider taking appropriate regulatory actions for non-GSO satellite systems in the 37-51.4 GHz frequency range by adopting aggregate criteria not to be exceeded by non-GSO FSS systems in order to protect GSO FSS and GSO BSS networks against interference.

High mm-wave bands are particularly suitable for use as ultra-high capacity gateway links for large constellation non-GSO FSS systems using broadband service links. In addition, these frequency bands are potentially suitable for broadband links for consumer and enterprise customers. As a result, system trials of high mm-wave bands are progressing and technology prototypes are maturing.

However, there are currently no mechanisms in the RR establishing coordination procedures applicable between NGSO systems, nor methods of ensuring satisfactory co-existence with GSO networks, operating in the frequency bands currently allocated to the FSS in the range from 71-76 GHz (space-to-Earth) and 81-86 GHz (Earth-to-space).

Radiocommunication services concerned:

Earth Exploration Satellite, Space research, Radio Astronomy, Fixed, Mobile, Fixed-Satellite

Indication of possible difficulties: None foreseen

Previous/ongoing studies on the issue:

a) Studied in the 2015-2019 preparatory cycle leading up to WRC-2019 considering to adopt

provisions to quantify No. **22.2**, in order to establish protection of GSO FSS and BSS satellite networks from non-GSO FSS satellite systems in the 37-51.4 GHz frequency range;
b) Studied in the 2015-2019 preparatory cycle leading to a Report ITU-R S.[E-band FSS characteristics] currently being developed to provide additional system characteristics of planned high mm-wave FSS network and systems

<i>Studies to be carried out by:</i> ITU-R Study Group 4	<i>with the participation of:</i>
<i>ITU-R Study Groups concerned:</i> SG 5 and SG 7	
<i>ITU resource implications, including financial implications (refer to CVI26):</i> Minimal	
<i>Common regional proposal:</i> No <i>Number of countries:</i> One	<i>Multicountry proposal:</i> No
<i>Remarks</i>	

DOCUMENT WAC/097 (11.03.19)

Comments of IWG-4 on NTIA Agenda Item 10 Proposal in Doc. IWG-4/056

United States

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 10

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.

Background

The 2007 World Radiocommunication Conference (WRC-07) modified Appendix 4 Annex 2 of the Radio Regulations to allow the characteristics of active and passive sensors to be filed in the ITU-R under the provisions of Articles 9 and 11 so they may be recorded in the Master International Frequency Register.

Any frequency assignment recorded in the Master Register with a favourable finding under No. 11.31 shall have the right to international recognition. For such an assignment, this right means that other administrations shall take it into account when making their own assignments, in order to avoid harmful interference. (RR No. 8.3) Nevertheless, Nos. 5.28 to 5.31 place the conditions imposed on secondary services with regard to causing or claiming protection from harmful interference from other services.

It is noted that passive remote sensors are detecting an increasing number of instances of interference events and the interference is distributed worldwide.

Procedures are contained in Section VI of Article 15 to address the actions to be taken when harmful interference occurs between networks authorized by different Administrations. In particular, No. 15.27 states full particulars relating to harmful interference shall, whenever possible, be given in the form indicated in Appendix 10. As Appendix 10 was designed with terrestrial radiocommunication services in mind, its applicability related to harmful interference detected by EESS (passive) sensors is very limited. Passive sensors have unique characteristics to detect the particulars of the interference using different parameters from those of stations used for radiocommunication. Administrations have approved Recommendation ITU-R RS.2106-0 which provides data fields which should be used for reporting, detection and resolution of radio frequency interference to Earth exploration-satellite service (passive) sensors.

Proposals

ADD TBD/XXX/1

DRAFT NEW RESOLUTION [XXX] (WRC-19)

Agenda for the 2023 World Radiocommunication Conference

The World Radiocommunication Conference (Sharm el-Sheikh, 2019),

...

X.X1 to consider modifying RR Appendix **10** to improve the reporting and resolution of interference to Earth exploration-satellite service passive sensors in accordance with Resolution **YYY (WRC-19)**, and without modification to the procedure for cases of harmful interference in Section VI of Article **15** of the Radio Regulations;

Reasons: To establish a form suitable for the reporting of cases of harmful interference to Earth exploration-satellite service passive sensors which is not currently available through the existing provisions of the Radio Regulations

ADD TBD/XXX/2

DRAFT NEW RESOLUTION [YYY] (WRC-19)

Reporting of harmful interference to passive sensors in the Earth exploration-satellite service

The World Radiocommunication Conference (Sharm el-Sheikh, 2019),

considering

a) that passive sensors provide information critical to maintaining and improving the accuracy of weather forecasts and climate models, which contribute to the protection of life and preservation of property throughout the world;

b) that, in many cases, the frequencies used by Earth exploration-satellite service (passive) sensors are chosen to study natural phenomena producing radio emissions at frequencies determined by the laws of nature, and therefore shifting frequency to avoid or mitigate interference problems is not possible;

c) that some passive remote sensor operations in some frequency bands are impaired by an increasing number of cases of interference,

recognizing

a) that Section VI of Article **15** of the Radio Regulations describes the procedure for the resolution of cases of harmful interference;

b) that under No. **15.27**, full particulars relating to harmful interference shall, whenever possible, be given in the form indicated in Appendix **10** to the Radio Regulations;

c) that the applicability of the form in Appendix **10** to harmful interference detected by EESS (passive) sensors is very limited,

further recognizing

that Recommendation ITU-R RS.2106-0 “Detection and resolution of radio frequency interference to Earth exploration-satellite service (passive) sensors” provides a reporting form for recording and reporting the radio frequency interference to Earth exploration-satellite service (passive) sensors,

noting

a) that under RR No. **4.7** for the purpose of resolving cases of harmful interference, the earth exploration-satellite (passive) service shall be afforded protection from different services in other bands only to the extent that these different services are protected from each other;

b) that RR Nos. **5.28** to **5.31** define the conditions imposed on secondary services with regard to causing or claiming protection from harmful interference from other services,

resolves to invite the ITU-R

to conduct and complete, in time for WRC-23, ITU-R technical and regulatory studies appropriate to developing a form suitable for reporting cases of harmful interference to passive sensors that can be used in the procedure for the resolution of cases of harmful interference in Section VI of Article **15** of the Radio Regulations, without modification to Article **15**,

invites the 2023 World Radiocommunication Conference

to take into account the results of ITU-R studies in *resolves to invite the ITU-R*, and consider the possibility of including within Appendix **10** a form or forms suitable for reporting cases of harmful interference to passive sensors

invites administrations

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

instructs the Secretary-General

to bring this Resolution to the attention of the World Meteorological Organization (WMO) and other international and regional organizations concerned.

Reasons: A resolution will support the ITU-R studies needed under the relevant WRC-23 agenda item.

SUP TBD/XXX/3

RESOLUTION 810 (WRC-15)

Preliminary agenda for the 2023 World Radiocommunication Conference

Reasons: This Resolution must be suppressed, as WRC-19 will create a new Resolution that will include the agenda for WRC-23.

ATTACHMENT

PROPOSAL FOR ADDITIONAL AGENDA ITEM TO CONSIDER IMPLEMENTING A MECHANISM IN RR APPENDIX 10 TO IMPROVE THE REPORTING AND RESOLUTION OF INTERFERENCE TO EARTH EXPLORATION-SATELLITE SERVICE PASSIVE SENSORS

Subject: Proposed future WRC agenda item for WRC-23 to consider the processes for reporting and resolving harmful interference to passive sensors

Origin: [TBD]

Proposal: To consider implementing a mechanism in RR Appendix 10 to improve the reporting and resolution of interference to Earth exploration-satellite service passive sensors in accordance with Resolution YYY (WRC-19).

Background/reason:

Procedures are contained in Section VI of Article 15 to address the actions to be taken when harmful interference occurs between networks authorized by different Administrations. In particular, RR No. 15.27 states full particulars relating to harmful interference shall, whenever possible, be given in the form indicated in Appendix 10. As Appendix 10 was designed with terrestrial radiocommunication services in mind, its applicability related to harmful interference detected by EESS (passive) sensors is very limited. Passive sensors have unique characteristics to detect the particulars of the interference using different parameters from those of stations used for radiocommunication. The ITU-R has approved Recommendation ITU-R RS.2106 which provides data fields which should be used for the detection and resolution of radio frequency interference to Earth exploration-satellite service (passive) sensors.

Radiocommunication services concerned: Earth exploration-satellite service, fixed service, mobile service

Indication of possible difficulties: None foreseen

Previous/ongoing studies on the issue: ITU-R WP 7C has already developed Recommendation ITU-R RS.2106-0, Detection and resolution of radio frequency interference to Earth exploration-satellite service (passive) sensors

Studies to be carried out by: WP 7C

with the participation of:

ITU-R Study Groups concerned: SG 1, SG 5

ITU resource implications, including financial implications (refer to CVI26): Minimal

Common regional proposal: Yes/No

Multicountry proposal: Yes/No

Number of countries:

Remarks
