# 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:

\* \* \*

* 1. 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*

1. that there is a need for greater broadband connectivity and telecommunication services;
2. that satellite systems are increasingly being used to deliver broadband services and are part of the solutions to enable universal broadband access;
3. 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;
4. 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;
5. 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;
6. 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;
7. that current FSS technologies can be adapted for broadband applications in the mm-waves;
8. the need to encourage the development and implementation of new technologies in the fixed-satellite service (FSS) at mm-wave;
9. 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;
10. that system trials of high mm-wave bands are progressing, and technology prototypes are maturing;
11. that GSO networks and non-GSO systems are at early conceptual phases, thus providing an opportunity to investigate equitable sharing conditions;
12. 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;
13. 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;
14. 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;
15. 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;
16. 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*

1. 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;
2. 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*

1. 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;
2. that the frequency band 71-76 GHz is also allocated to the fixed and mobile services on a primary basis;
3. 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;
4. 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**;
5. 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;
6. that Resolution **750 ([Rev. WRC-19])** appliesin the frequency band 81-86 GHz in accordance to provision **5.338A**;
7. 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;
8. that in the frequency band 81-81.5 GHz is also allocated to the amateur and amateur-satellite services on a secondary basis;
9. 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*

1. 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;
2. 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;
3. 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;
4. 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;
5. 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;
6. 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:***

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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

|  |  |
| --- | --- |
| ***Studies to be carried out by:*** ITU-R Study Group 4 | *with the participation of:* |

***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***