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| **World Radiocommunication Conference (WRC-15) Geneva, 2–27 November 2015** |  |
| **INTERNATIONAL TELECOMMUNICATION UNION** |  |
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| PLENARY MEETING | **Addendum 3 to Document 25(Add.23)-E** |
|  | **15 September 2015** |
|  | **Original: English** |
|  | |
| Arab States Common Proposals | |
| Proposals for the work of the Conference | |
|  | |
| Agenda item 9.2 | |

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

9.2 on any difficulties or inconsistencies encountered in the application of the Radio Regulations; and

Introduction

WARC-92 adopted RR No. 5.526 and few other provisions (Nos. 5.527, 5.528 and 5.529) in which earth stations at specified or unspecified points or while in motion could operate with networks, which are both in the fixed-satellite service and in the mobile-satellite service.

However, these footnotes were not sufficiently clear to enable the use of earth stations in motion in a satisfactory manner.

The issue extensively discussed in ITU-R relevant Study Groups/Working Parties from technical, operational and regulatory aspects with respect to the use of these earth stations in motion communicating with geostationary space stations in the fixed-satellite service operating in the band 29.5-30.0 GHz.

While there seems to be no difficulties in technical aspects of earth stations in motion, there is some ambiguity in the operational and regulatory aspects. ITU-R Study Group 4 prepared two reports to address the various technical and operational aspects of earth stations in motion (Report ITU-R S.2223 and Report ITU-R S.2357). However, the regulatory aspects considered as a matter to be decided by a competent WRC.

The issue was reported to the Director of the Radiocommunication Bureau and was subject to a Circular Letter CR/358 clarifying some operational aspects of the matter, including the symbol (new class of earth station UC) to be used when submitting notices (of such type indicated in the Circular Letter) to the BR and in the coordination and notification process. The Director also included in his Report (Addendum 2 to Document 4), information on the use of the symbol of UC class of stations for the bands subject to RR No. 5.526 and for which consideration is invited at WRC-15.

Proposal

ASMG members are of the view to complement No. 5.526 by adding a new footnote to harmonize the FSS allocation in all three regions in the 29.5-30 GHz and 19.7-20.2 GHz bands. In order to make it clear in the Radio Regulations that, earth stations while in motion may communicate with GSO FSS networks on the same basis as conventional FSS earth stations, without causing, limiting, or constraining the deployment of other services share these frequency bands.

Under RR No. 5.542 there is an additional allocation to fixed and mobile services on a secondary basis in a number of countries. Therefore, in some geographical areas in Regions 1 and 3, there is a need to manage the potential interference from transmitting ESOMPs into terrestrial receivers operating under the additional secondary allocation in the frequency band 29.5-29.9 GHz. Administrations which notify GSO networks intended to be used by maritime and aeronautical ESOMPs in these frequency bands should ensure that such operations do not cause unacceptable interference to any terrestrial systems operating in the countries listed in RR No. 5.542. This may be accomplished through consultation between relevant administrations.

Furthermore, under the same RR No. 5.524 there is an additional allocation to the fixed and mobile service on a primary basis in a number of countries in the frequency band 19.7-21.2 GHz. Consequently, receiving ESOMPs cannot claim protection from potential interference caused by terrestrial transmitters operating in accordance with RR No. 5.524.

Moreover, ASMG members also propose an associated Resolution, cross-referenced in the proposed new footnote to the FSS allocation, for administrations when deploying earth stations that will operate while in motion.

The above course of action will facilitate the licensing process for ESOMPs in accordance with Article 18 of the RR, and while ensuring that transmission, are kept to an acceptable level or ceased completely, should any interference occurs, and shall not limit or constraint current or future deployment of other services share the same frequency bands.

ARTICLE 5

Frequency allocations

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

MOD ARB/25A23A3/1

18.4-22 GHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 19.7-20.1  FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B ADD 5.XXX  Mobile-satellite (space-to-Earth) | 19.7-20.1  FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B ADD 5.XXX  MOBILE-SATELLITE  (space-to-Earth) | 19.7-20.1  FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B ADD 5.XXX  Mobile-satellite (space-to-Earth) |
| 5.524 | 5.524 5.525 5.526 5.527 5.528 5.529 | 5.524 |
| 20.1-20.2FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B ADD 5.XXX  MOBILE-SATELLITE (space-to-Earth)  5.524 5.525 5.526 5.527 5.528 | | |

MOD ARB/25A23A3/2

24.75-29.9 GHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 29.5-29.9  FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.539 ADD 5.XXX  Earth exploration-satellite (Earth-to-space) 5.541  Mobile-satellite (Earth-to-space) | 29.5-29.9  FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.539 ADD 5.XXX  MOBILE-SATELLITE (Earth-to-space)  Earth exploration-satellite (Earth-to-space) 5.541 | 29.5-29.9  FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.539 ADD 5.XXX  Earth exploration-satellite (Earth-to-space) 5.541  Mobile-satellite (Earth-to-space) |
| 5.540 5.542 | 5.525 5.526 5.527 5.529 5.540 | 5.540 5.542 |

MOD ARB/25A23A3/3

29.9-34.2 GHz

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

ADD ARB/25A23A3/4

5.XXX In the bands 19.7-20.2 GHz and 29.5-30 GHz, earth stations that are in motion may communicate with geostationary space stations of the fixed-satellite service. Operation of earth stations while in motion shall not constrain or limit the operation of current or future deployment of other services share this band nor claim protection from potential interference caused by systems of other services, and shall operate in accordance with Resolution **[ARB-XXX] (WRC‑15)**.

**Reasons:** Adoption of this proposal would provide the availability of 500 MHz in both the uplink and downlink to support important and growing global broadband communication requirements for users on ships, airplanes, and land vehicles, on an equal basis in all three Regions. Furthermore, it will facilitate the licensing process for ESOMPs in accordance with Article 18 of the RR, and while ensure that transmission, are kept to an acceptable level or ceased completely, should any interference occur. Additionally, deployment of earth stations while in motion, shall not limit or constrain current or future deployment of other services share the same frequency bands.

ADD ARB/25A23A3/5

Draft New Resolution [arb-XXX] (WRC-15)

Use of the frequency bands 19.7-20.2 GHz and 29.5-30.0 GHz by earth stations in motion communicating with geostationary space stations  
 in the fixed-satellite service

The World Radiocommunication Conference (Geneva, 2015),

considering

*a)* that the bands 19.7-20.2 GHz and 29.5-30.0 GHz are globally allocated on a primary basis to the FSS and that there are a large number of geostationary FSS satellite networks operating in these frequency bands;

*b)* that, in the band 29.5-30.0 GHz there is an allocation to fixed and mobile services on a secondary basis in a number of countries (see No. **5.542**) and in the band 19.7-21.2 GHz there is an allocation to the fixed and mobile service on a primary basis in a number of countries (see No. **5.524**);

*c)* that there is an increasing need for mobile communications, including global broadband satellite services, and that some of this need can be met by allowing earth stations in motion on platforms (such as ships, aircraft and land vehicles) to communicate with space stations of the FSS operating in the frequency bands 19.7-20.2 GHz and 29.5-30.0 GHz;

*d)* that administrations seeking to authorize earth stations in motion need to implement appropriate technical, regulatory and operational procedures with which such earth stations need to comply;

*e)* that GSO FSS networks in the bands 19.7-20.2 GHz and 29.5-30.0 GHz, are required to be coordinated and notified in accordance with the provisions of Articles **9** and **11** of the Radio Regulations, so as to address potential interference between networks and other services allocated in the band;

*f)* that some administrations have already deployed, and plan to expand their use of such earth stations with operational and future GSO FSS networks;

*g)* that ITU‑R has studied the technical and operational use of these earth stations in motion communicating with geostationary space stations in the fixed-satellite service operating in the band 29.5-30.0 GHz;

*h)* that the operation of earth stations in motion communicating with space stations of the FSS may result in the circulation of these stations within other countries that will require appropriate administrative and procedural arrangements to ensure that unacceptable interference is not caused to any terrestrial stations operating in accordance with the Radio Regulations,

recognizing

*a)* that currently there is no definition in Article **1** of the Radio Regulations providing a description of the operation of earth station in motion within the FSS;

*b)* that successful coordination does not in any way imply licensing authorization to provide a service within the territory of a Member State;

*c)* that in some geographical areas, there is a need to manage the potential interference from transmitting earth stations to terrestrial receivers operating under the additional secondary allocation of footnote No. **5.542** in the band 29.5-29.9 GHz in Regions 1 and 3;

*d)* that in some geographical areas, taking into account that in the 19.7-20.2 GHz band only specific earth stations can be notified, earth stations in motion will have to accept the potential interference caused by terrestrial transmitters operating under the additional primary allocation of footnote No. **5.524**;

*e)* that earth stations in motion as considered in this Resolution are not intended to be used to provide safety services/applications,

considering further

notifying Member States for FSS networks intending to provide services to earth stations in motion should be guaranteed that they will be operated in accordance with the Constitution, the Convention and the Administrative Regulations,

noting

*a)* that the Constitution recognizes the sovereign right of each State to regulate its telecommunications;

*b)* that the International Telecommunication Regulations “recognize the right of any Member, subject to national law and should it decide to do so, to require that administrations and private operating agencies, which operate in its territory and provide an international telecommunication service to the public, be authorized by that Member”, and specifies that “within the framework of the present Regulations, the provision and operation of international telecommunication services in each relation is pursuant to mutual agreement between administrations”;

*c)* that Article **18** specifies the authorities for licensing the operation of stations within any given territory;

*d)* the right of each Member State to decide on deployment of earth stations in motion, and the obligations for entities and organizations providing international or national telecommunication services by means of these type of stations to comply with the legal, financial and regulatory requirements of the administrations in whose territory these services are authorized;

*e)* that some administrations have addressed this matter nationally or regionally by adopting technical and operational criteria for the operation of these earth stations;

*f)* that a consistent approach to deployment of these earth stations will support these important and growing global communication requirements on an equal basis in all three Regions;

*g)* that these earth stations will have to operate consistently with the coordination agreements to the GSO FSS networks with which they communicate,

further noting

that there are no technical parameters or regulatory procedures to protect terrestrial systems allocated on a secondary basis in some countries in the band 29.5-30.0 GHz from unacceptable interference from the operation such earth stations,

taking into account

the requirement to protect existing and future services sharing the frequency bands 19.7-20.2 GHz and 29.5-30 GHz, when deploying earth stations in motion,

resolves

1 that administrations authorizing earth stations in motion communicating with FSS networks in the band 29.5-30.0 GHz shall require such earth stations to:

a) comply with the off-axis e.i.r.p. density levels given in Annex 1 or other levels mutually agreed with other satellite network operators and their administrations;

b) employ techniques that allow the tracking of the wanted satellite and that are resistant to capturing and tracking adjacent satellites;

c) immediately reduce or cease transmission when their antenna mispointing would result in exceeding the levels referred to in *resolves* 1 a);

d) be subject to permanent monitoring and control by a Network Control and Monitoring Centre (NCMC) or equivalent facility and that these earth stations be capable to receive and act upon at least “enable transmission” and “disable transmission” commands from the NCMC. In addition, it should be possible for the NCMC to monitor the operation of an earth station in motion to determine if it is malfunctioning;

2 that administrations authorizing earth stations in motion may require the operators to provide a point of contact for the purpose of tracing any suspected cases of interference from earth stations in motion;

3 that administrations licensing satellite systems and stations intended to provide communication services to earth stations in motion by means of fixed, mobile or transportable terminals shall ensure, when licensing these systems and stations, that they have the capability to limit operations to the territory or territories of administrations having authorized such service and stations in compliance with Articles **17** and **18**;

4 that administrations considering to authorize the operation of earth stations in motion to communicate with geostationary space stations of the FSS operating in the bands 29.5-30.0 GHz and 19.7-20.2 GHz ensure the protection of all services operating in these bands in accordance with the Radio Regulations;

5 that administrations which notify FSS networks used by maritime earth stations in motion operating in international waters and by aeronautical earth stations in motion operating in international airspace should ensure that such operations do not cause unacceptable interference to any terrestrial systems operating in the countries listed in No. **5.542**;

6 that neither this Resolution nor the operation of earth stations in motion communicating with geostationary space stations of the FSS operating in the bands 19.7-20.2 GHz and 29.5-30.0 GHz change the regulatory status of earth stations in motion as referred to in *recognizing* above*.*

Annex 1

Off-axis e.i.r.p. density levels for earth stations in motion communicating with geostationary space stations in the fixed-satellite service  
 operating in the band 29.5-30.0 GHz

This Annex provides a set of off-axis e.i.r.p. levels for earth stations in motion operating in the band 29.5-30.0 GHz. However, as stated in *resolves* 1 a), other levels may be mutually agreed between satellite operators and administrations.

Earth stations in motion communicating with geostationary space stations in the fixed‑satellite service transmitting in the band 29.5-30.0 GHz should be designed in such a manner that at any angle[[1]](#footnote-1)1, θ, which is 2° or more from the vector from the earth station antenna to the wanted satellite (see Fig. 1 below for the reference geometry of an earth station in motion compared to an earth station at a fixed location), the e.i.r.p. density in any direction within 3° of the GSO, should not exceed the following values:

|  |  |
| --- | --- |
| Angle θ | Maximum e.i.r.p. per 40 kHz |
| 2° ≤ θ ≤ 7° | (19 − 25 log θ) dB(W/40 kHz) |
| 7° θ ≤ 9.2° | −2 dB(W/40 kHz) |
| 9.2° θ ≤ 48° | (22 − 25 log θ) dB(W/40 kHz) |
| 48° θ ≤ 180° | −10 dB(W/40 kHz) |

NOTE 1 – The values above should be maximal values under clear-sky conditions. In case of networks employing uplink power control, these levels should include any additional margins above the minimum clear-sky level necessary for the implementation of uplink power control. When uplink power control is used and rain fades makes it necessary, the levels stated above may be exceeded for the duration of that period. When uplink power control is not used and the e.i.r.p. density levels given above are not met, different values could be used in compliance with the values agreed to through bilateral coordination of GSO FSS satellite networks.

NOTE 2 – The e.i.r.p. density levels for angles of θ less than 2° may be determined from GSO FSS coordination agreements taking into account the specific parameters of the two GSO FSS satellite networks.

NOTE 3 – For geostationary space stations in the fixed-satellite service with which the earth stations in motion are expected to transmit simultaneously in the same 40 kHz band, e.g. employing code division multiple access (CDMA), the maximum e.i.r.p. density values should be decreased by 10 log(*N*) dB, where *N* is the number of earth stations in motion that are in the receive satellite beam of the satellite with which these earth stations are communicating and that are expected to transmit simultaneously on the same frequency.

NOTE 4 – potential aggregate interference from earth stations in motion operating with satellites using multi-spot frequency reuse technologies should be taken into account in agreements between the GSO FSS satellite operators and their administrations.

NOTE 5 – Earth stations in motion operating in the band 29.5-30.0 GHz that have lower elevation angles to the GSO will require higher e.i.r.p. levels relative to the same terminals at higher elevation angles to achieve the same power flux-densities (pfd) at the GSO due to the combined effect of increased distance and atmospheric absorption. Earth stations with low elevation angles may exceed the above levels by the following amount:

|  |  |
| --- | --- |
| Elevation angle to GSO (ε) | Increase in e.i.r.p. spectral density (dB) |
| ε < 5° | 2.5 |
| 5° ε ≤ 30° | 3 – 0.1 ε |

Figure 1 below illustrates the definition of angle θ[[2]](#footnote-2)2.

FIGURE 1

Definition of angle θ



where:

a represents the earth station in motion;

b represents the boresight of the antenna;

c represents the geostationary orbit (GSO);

d represents the vector from the earth station in motion to the wanted satellite;

φ represents the angle between the boresight of the antenna and a point P on the GSO arc;

θ represents the angle between the vector d and point P on the GSO arc;

P represents a generic point on the GSO arc which angles θ and φ are referred to.

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1. 1 It should be noted that the definition of angle θ is different to that of angle φ contained in Recommendation ITU‑R S.524‑9. The angle θ is introduced to address possible mispointing from earth stations in motion, which is not a consideration in Recommendation ITU‑R S.524‑9. [↑](#footnote-ref-1)
2. 2 In Figure 1 proportions are illustrative and not to scale. [↑](#footnote-ref-2)