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| **World Radiocommunication Conference (WRC-19) Sharm el-Sheikh, Egypt, 28 October – 22 November 2019** |  |
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| COMMITTEE 4 | **Document 407-E** |
|  | **17 November 2019** |
|  | **Original: English** |
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| Working Group 4B Ad-hoc Group on Agenda item 1.14 | |
| PROPOSALS RELATING TO AGENDA ITEM 1.14 | |
|  | |
| Agenda item 1.14 | |

1.14 to consider, on the basis of ITU-R studies in accordance with Resolution **160 (WRC‑15)**, appropriate regulatory actions for high-altitude platform stations (HAPS), within existing fixed-service allocations;

For the frequency band 27.9-28.2 GHz, the Ad-hoc Group agreed to the changes to the Radio Regulations as indicated in the Annex. The proposals on modifications to Article **11**, Appendix **4**, Appendix **7** and Resolution **160 (WRC‑15)** for the band above will be available separately.

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Alternative 1 (NOC)

ARTICLE 5

Frequency allocations

NOC WG4B/407/1

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

Alternative 2

(Worldwide identification HAPS to ground)

MOD WG4B/407/2#72729

24.75-29.9 GHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 27.5-28.5 FIXED ADD 5.E114  FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.539  MOBILE  5.538 5.540 | | |

ADD WG4B/407/3#72730

5.E114The allocation to the fixed service in the band 27.9-28.2 GHz is identified for worldwide use by high-altitude platform stations (HAPS). Such use of the fixed-service allocation by HAPS is limited to operation in the HAPS-to-ground direction and shall be in accordance with the provisions of Resolution **[TBD] (WRC‑19)**.     (WRC‑19)

Alternative 3

(Worldwide identification HAPS to ground)

MOD WG4B/407/4#72729

24.75-29.9 GHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 27.5-28.5 FIXED ADD 5.E114  FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.539  MOBILE  5.538 5.540 | | |

ADD WG4B/407/5#72612

5.E114 The allocation to the fixed service in the band 27.9-28.2 GHz is identified for worldwide use by high-altitude platform stations (HAPS), limited to operation in the HAPS-to-ground direction. The HAPS ground stations using the fixed-service allocation shall not claim protection from fixed-satellite service earth stations and stations in the fixed and mobile services. The development of fixed-satellite service shall not be constrained by HAPS. This identification does not preclude the use of this frequency band by other fixed service applications or by other services to which this band is allocated on a co-primary basis and does not establish priority in the Radio Regulations. Such use of the fixed-service allocation by HAPS shall be in accordance with the provisions of Resolution **[TBD] (WRC‑19)**.     (WRC‑19)

Alternative 4

(Worldwide identification HAPS to ground)

MOD WG4B/407/6#72729

24.75-29.9 GHz

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 27.5-28.5 FIXED ADD 5.E114  FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.539  MOBILE  5.538 5.540 | | |

ADD WG4B/407/7#72612

5.E114 The allocation to the fixed service in the 27.9-28.2 GHz band is identified for worldwide use by administrations wishing to implement high-altitude platform stations (HAPS). Such use of the fixed-service allocation by HAPS shall not cause harmful interference to, nor claim protection from, other types of fixed-service systems or other co-primary services. Furthermore, the development of these other services shall not be constrained by HAPS. The use of the fixed service allocation by HAPS is limited to operation in the HAPS-to-ground direction and is subject to the provisions of Resolution **[TBD] (WRC‑19)**.     (WRC‑19)

SUP WG4B/407/8#71512

5.537A

SUP WG4B/407/9#72735

RESOLUTION 145 (Rev.WRC‑12)

Use of the bands 27.9-28.2 GHz and 31-31.3 GHz by   
high altitude platform stations in the fixed service

ADD WG4B/407/10#72736

draFt new RESOLUTION [TBD] (WRC‑19)

Use of the band 27.9-28.2 GHz by high altitude platform stations in the fixed service

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

considering

*a)* that there is a need for greater broadband connectivity in underserved communities and in rural and remote areas;

*b)* that HAPS deployment in the frequency band 27.9-28.2 GHz is intended to provide connectivity from the HAPS to a limited number of HAPS ground stations per beam;

*b)* that WRC-15 invited ITU-R to study additional spectrum needs for fixed HAPS links to provide broadband connectivity and to facilitate the use of HAPS linkson a global or regional basis, recognizing that the existing HAPS identifications were established without reference to today’s broadband capabilities;

*d)* that HAPS ground stations need to accept the interference created by fixed-satellite service (FSS) earth stations in the frequency band 27.9-28.2 GHz;

*e)* that Report ITU-R F.2439 provides deployment and technical characteristics of broadband HAPS systems;

*f)* that Report ITU-R F.2438 contains worldwide spectrum needs of HAPS systems;

*g)* that ITU-R has conducted sharing studies between systems using HAPS in the fixed service and other services in the frequency band 27.9‑28.2 GHz leading to Report ITU‑R F.2473,

considering further

that current technologies, such as high-altitude platform stations (HAPS), can be used to deliver broadband applications for broadband connectivity and disaster recovery communications with minimal ground network infrastructure,

noting

*a)* thatWRC‑2000 adopted No. **5.537A** , which were modified at WRC‑03 and then again at WRC‑07 to permit the use of HAPS in the fixed service in the band 27.9-28.2 GHz in certain Region 1 and 3 countries on a non-harmful interference, non‑protection basis;

*b)* that the band 27.9-28.2 GHz is heavily used or planned to be used by a number of different services and a number of other types of applications in the fixed service;

*c)* that while the decision to deploy HAPS can be taken on a national basis, such deployment may affect neighbouring administrations;

*d)* that results of some ITU‑R studies indicate that, in the band 27.9-28.2 GHz, sharing between fixed-service systems using HAPS and mobile service and other conventional fixed-service systems in the same area is subject to appropriate interference mitigation techniques to be developed and implemented,

recognizing

[*a)* that in the frequency band 27.9-28.2 GHz with respect to transmitting earth stations in the fixed-satellite service (Earth-to-space) and HAPS ground station receivers which operate in the fixed service, No. **9.17** applies;][Editorial Note: this recognizing is only relevant to alternative 2 and should be deleted otherwise;]

*b)* that during periods of rain, the e.i.r.p. of the HAPS’ beam suffering rain fade may be increased by a level commensurate with the level of rain fade, by up to 20 dB above the e.i.r.p. under clear sky conditions declared in the Appendix 4,

resolves

1 that, for the purpose of protecting the fixed service systems in territory of other administrations in the frequency band 27.9-28.2 GHz, the power flux-density level (pfd) per HAPS produced at the surface of the Earth in territory of other administrations shall not exceed the following limits, developed for clear-sky conditions, unless the explicit agreement of the affected administration is provided at the time of notification of HAPS:

3 θ − 140 dB(W/(m² · MHz)) for 0° ≤ θ < 10°

0.57 θ − 115.7 dB(W/(m² · MHz)) for 10° ≤ θ < 45°

−90 dB(W/(m² · MHz)) for 45° ≤ θ < 90°

where θ is the angles of arrival of the incident wave above the horizontal plane, in degrees;

2 that, with regard to the protection of fixed service stations with pointing elevation beyond 5°, an administration believing that unacceptable interference may still be caused shall, within four months of the date of publication of the relevant BR IFIC, provide its comments with relevant justification to the notifying administration;

3 that, for the purpose of protecting the mobile service systems in territory of other administrations in the frequency band 27.9-28.2 GHz, the power flux-density level (pfd) per HAPS produced at the surface of the Earth in territory of other administrations shall not exceed the following limits, developed for clear-sky conditions, unless the explicit agreement of the affected administration is provided at the time of notification of HAPS:

−119.7 dB(W/(m² · MHz)) for 0° ≤ θ < 2°

−119.7 + 2 (θ − 2) dB(W/(m² · MHz)) for 2° ≤ θ < 2.3°

−119.6 + 1.5 (θ − 2) dB(W/(m² · MHz)) for 2.3° ≤ θ < 7.9°

−110.9 dB(W/(m² · MHz)) for 7.9° ≤ θ ≤ 90°

where θ is the angles of arrival of the incident wave above the horizontal plane, in degrees.

The limits above do take into account 3 dB aggregate loss due to polarization mismatch and body loss was not taken into account;

4 that, for the purpose of protecting the fixed-satellite service (Earth-to-space) in the frequency band 27.9‑28.2 GHz, the maximum e.i.r.p. density per HAPS downlink shall be less than −8 dB(W/MHz) in any direction for off-nadir angle higher than 82°, even when increasing the HAPS e.i.r.p. density to compensate for rain fade;

5 that administrations planning to implement a HAPS system in the frequency band 27.9-28.2 GHz shall notify the frequency assignments by submitting all mandatory elements of Appendix **4** to the Bureau for the examination of compliance with respect to this resolution with a view to their registration in the Master International Frequency Register,

instructs the Director of the Radiocommunication Bureau

to take all necessary measures to implement this Resolution.

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