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| **33 MEETING OF PERMANENT****CONSULTATIVE COMMITTEE II:****RADIOCOMMUNICATIONS****April 8 to 12, 2019****Monterrey, Nuevo Leon, Mexico** | **OEA/Ser.L/XVII.4.2.33****CCP.II-RADIO/doc.** **XX March****Original: english** |
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|  | **U.S. PROPOSAL ON WRC-19 AGENDA ITEM 1.14 (28/31 GHz)** |  |
|  | **(Item on the Agenda: 3.1)** |  |
|  | **(Document submitted by the delegation of the United States of America)** |  |

Introduction

This document contains an attachment including the USA proposal on WRC-19 Agenda Item 1.14 (28/31 GHz) for consideration in CITEL’s preparation to WRC-19 Agenda Item 1.14.

**ATTACHMENT**

**Agenda Item 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.*

**BACKGROUND**

No. 1.66A of the ITU Radio Regulations define a high-altitude platform station (HAPS) as "a station on an object at an altitude of 20 to 50 km and at a specified, nominal, fixed point relative to the Earth". Agenda Item 1.14 was adopted by WRC-15 to consider, in accordance with Resolution 160 (WRC-15), regulatory actions that can facilitate deployment of HAPS for broadband applications. Resolution 160 resolves to invite ITU-R to study additional spectrum needs of HAPS, examining the suitability of existing HAPS designations and conducting sharing and compatibility studies for additional designations in existing fixed allocations in the 38-39.5 GHz band on a global basis and in 21.4-22 GHz and 24.25-27.5 GHz bands in Region 2 exclusively.

Advances in aeronautics and transmission technologies have significantly improved the capabilities of HAPS to provide effective connectivity solutions and meet the growing demand for high capacity broadband networks, particularly in currently underserved areas. Recently conducted full-scale test flights have shown that solar-powered platforms in the upper-atmosphere can now be used to carry payloads that offer reliable and cost-effective connectivity, and a growing number of applications for the new generation of HAPS are being developed. The technology appears particularly well suited to complementing terrestrial networks by providing backhaul. A number of advantages of the new generation of HAPS are foreseen:

* **Reach:** HAPS platforms may operate at around 20 km above ground, which reduces their vulnerability to weather conditions that may affect service, provides large coverage areas and helps mitigate interference caused by physical obstacles.
* **Geographical reach:** HAPS that use the architecture of solar platforms can also provide connectivity where it is impossible to deploy terrestrial infrastructure: remote sites on land or sea.
* **Wide-area coverage:** Depending on the operational scenario, a single platform is capable of providing footprints on the order of up to100 km in diameter, and recent technological advances in the development of optical inter-HAPS links now support the deployment of multiple linked HAPS, in fleets that can provide greater coverage within a country as needed.
* **Low cost and Environmental aspects:** The cost of operating stratospheric platforms is projected to be lower than other connectivity solutions depending on geographical area, while mass production of the aircraft will significantly lower upfront capital expenditure for deployment. HAPS can run exclusively on solar power for long periods, connecting people with almost no environmental impact.
* **Rapid deployment and flexibility:** It may be possible to deploy HAPS services without long lead times and it is relatively simple to return solar platforms to the ground for maintenance or payload reconfiguration.

The ITU-R is conducting compatibility studies to assess coexistence between HAPS and incumbent and proposed systems and services (including issues of overlap with WRC-19 Agenda Items 1.6 and 1.13).  Associated regulatory provisions are proposed below based on the results of sharing studies.

**PROPOSAL**

*NOTE: If the bands 27.9-28.2 GHz and 31-31.3 GHz are modified as proposed, there would need to be consequential modifications and/or suppression of Nos.* ***5.537A*** *and* ***5.543A*** *and to Resolution* ***145 (Rev.WRC-12)****.*

ARTICLE 5

Frequency allocations

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

MOD USA/1.14/1

24.75-29.9 GHz

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| --- |
| Allocation to services |
| Region 1 | Region 2 | Region 3 |
| 27.5-28.5 FIXED 5.537A ADD 5.A114 FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.539 MOBILE 5.538 5.540 |

MOD USA/1.14/2

29.9-34.2 GHz

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| --- |
| Allocation to services |
| Region 1 | Region 2 | Region 3 |
| 31-31.3 FIXED 5.338A 5.543A ADD 5.B114 MOBILE Standard frequency and time signal-satellite (space-to-Earth) Space research 5.544 5.545 5.149 |

ADD USA/1.14/3

**5.A114** 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 **XXX (WRC‑19)**.     (WRC‑19)

ADD USA/1.14/4

**5.B114** The allocation to the fixed service in the 31-31.3 GHz band is identified for worldwide use by administrations wishing to implement high-altitude platform stations (HAPS) in the HAPS-to-ground direction. 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. Use of the band is subject to the provisions of Resolution **XXX (WRC‑19)**.     (WRC‑19)

ADD USA/1.14/5

DRAFT NEW RESOLUTION XXX (WRC‑19)

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

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

*considering*

*a)* thatWRC‑2000 adopted Nos. **5.537A** and **5.543A**, 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 and in the band 31-31.3 GHz in certain Region 1 and 3 countries on a non-harmful interference, non‑protection basis;

*b)* that some countries in Region 2 have also expressed an interest in using these frequency bands for HAPS in the fixed service;

*c)* that the bands 27.9-28.2 GHz and 31-31.3 GHz are already 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;

*d)* that results of some ITU‑R studies indicate that, in the bands 27.9-28.2 GHz and 31‑31.3 GHz, sharing between fixed-service systems using HAPS and mobile service and other conventional fixed-service systems in the same area will require appropriate interference mitigation techniques to be developed and implemented;

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

f) that WRC‑15 decided to study additional spectrum needs for fixed HAPS links to provide broadband connectivity;

*g)* that HAPS can provide broadband connectivity with minimal ground network infrastructure,

*resolves*

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

 −122.7 dB(W/(m² · MHz)) for 0° ≤ θ < 2°

 −122.7 + 2 (θ − 2) dB(W/(m² · MHz)) for 2° ≤ θ < 2.3°

 −122.6 + 1.5 (θ − 2) dB(W/(m² · MHz)) for 2.3° ≤ θ < 7.9°

 −113.9 dB(W/(m² · MHz)) for 7.9° ≤ θ ≤ 90°

where θis the elevation angle in degrees (angles of arrival above the horizontal plane);

2 that for the purpose of protecting the fixed-satellite service (Earth-to-space) in the band 27.9-28.2 GHz, the maximum e.i.r.p. density per HAPS downlink shall be less than −8dB(W/MHz) in any direction for off-nadir angle higher than 85°;

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

 2 θ − 135 dB(W/(m² · MHz)) for 0° ≤ θ < 10°

 0.66 θ − 119.6 dB(W/(m² · MHz)) for 10° ≤ θ < 45°

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

where θis the elevation angle in degrees (angle of arrival above the horizontal plane). This pfd mask already takes into account the impact of attenuation due to atmospheric gases;

4 that for the purpose of protecting fixed service systems in territory of other administrations in the band 31-31.3 GHz, the power flux-density level per HAPS produced at the surface of the Earth in territory of other administrations shall not exceed the following limits, under clear-sky conditions, unless the explicit agreement of the affected administration is provided at the time of notification of HAPS:

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

 3.1 θ − 167 dB(W/(m² · MHz)) for 10° ≤ θ < 20°

 0.375 θ − 112.5 dB(W/(m² · MHz)) for 20° ≤ θ < 60°

 −90 dB(W/(m² · MHz)) for 60° ≤ θ ≤ 90°

where θ is the elevation angle in degrees (angle of arrival above the horizontal plane). This pfd mask already takes into account the impact of attenuation due to atmospheric gases;

5 that in order to ensure the protection of the Earth exploration-satellite service (passive), the level of unwanted emission e.i.r.p. density per HAPS transmitter operating in the 31-31.3 GHz band shall be limited into the 31.3-31.8 GHz band to:

 −θ−13.1 dB(W/200 MHz) −4.53° ≤ θ < 22°

 −35.1 dB(W/200 MHz) 22° ≤ θ < 90°

where *El* is the elevation angle in degrees (angles of arrival above the horizontal plane);

6 that in order to ensure the protection of the radio astronomy service the pfd produced by unwanted emissions from HAPS downlink transmissions shall not exceed −171 dB(W/(m² · 500 MHz)) for continuum observations in the band 31.3-31.8 GHz at an RAS station location at a height of 50 m; and that this pfd value shall be verified considering a percentage of time of 2% in the relevant propagation model;

7 that *resolves* 6 shall apply at any radio astronomy station that was in operation prior to 22 November 2019 and has been notified to the Bureau in the band 31.3-31.8 GHz before 22 May 2020, or at any radio astronomy station that was notified before the date of receipt of the complete Appendix **4** information for notification for the HAPS system to which *resolves* 8 applies. Radio astronomy stations notified after this date may seek an agreement with administrations that have authorized HAPS;

8 that the administrations which intend to implement systems using HAPS in the fixed service in the bands 27.9-28.2 GHz and 31-31.3 GHz shall seek explicit agreement of concerned administrations with regard to their stations of primary services to ensure that the conditions in this Resolution are met, and those administrations which intend to implement systems using HAPS in the fixed service in these bands shall seek explicit agreement of concerned administrations with regard to their stations of services operating in accordance with the Table of Frequency Allocations of Article **5** to ensure that the conditions in *resolves*1through 7 are met;

9 that administrations planning to implement a HAPS system pursuant this Resolution shall notify the frequency assignment(s) by submitting all mandatory elements of Appendix 4 to the Radiocommunication Bureau for the examination of compliance with resolves 1 through 8 above,

*instructs the Director of the Radiocommunication Bureau*

to take all necessary measures to implement this Resolution.

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