

PLENARY MEETING

**Addendum 1 to
Document 6169(Add.14)-
E
29 August 2019
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Member States of the Inter-American Telecommunication Commission (CITEL)

PROPOSALS FOR THE WORK OF THE CONFERENCE

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;

Part 1 – Frequency band 21.4-22 GHz

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".

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 provide backhaul for terrestrial networks and facilitate emergency response in case of natural disaster.

Agenda Item 1.14 was adopted by WRC-15 to consider, in accordance with Resolution 160 (WRC-15), regulatory actions to facilitate deployment of HAPS for broadband applications. Resolution 160 resolves to invite ITU-R to study additional spectrum needs of HAPS, considering changes of regulatory provisions in existing HAPS identifications and potential new identifications 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.

ARTICLE 5

Frequency allocations

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

MOD IAP/6169A14A1/1

18.4-22 GHz

Allocation to services		
Region 1	Region 2	Region 3
21.4-22 FIXED MOBILE BROADCASTING-SATELLITE 5.208B 5.530A 5.530B 5.530D	21.4-22 FIXED <u>ADD 5.B114</u> MOBILE 5.530A	21.4-22 FIXED MOBILE BROADCASTING-SATELLITE 5.208B 5.530A 5.530B 5.530D 5.531

Reasons: To add the text of the footnote allowing HAPS to operate in the fixed service allocation in the 21.4-22 GHz band.

ADD IAP/6169A14A1/2

5. B114 The allocation to the fixed service in the band 21.4-22 GHz is identified for use in Region 2 by high-altitude platform stations (HAPS). This identification does not preclude the use of this frequency band by any application of the services to which it 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 is limited to the HAPS-to-ground direction and shall be in accordance with the provisions of Resolution **[IAP/B114] (WRC 19)**. (WRC-19)

Reasons: To add the text of the footnote allowing HAPS to operate in the fixed service allocation in the 21.4-22 GHz band.

ADD IAP/6169A14A1/3

RESOLUTION [IAP/B114] (WRC-19)

Use of the band 21.4-22 GHz by high altitude platform stations in the fixed service for Region 2

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

considering

a) that WRC-15 considered that there is a need for greater broadband connectivity in underserved communities and in rural and remote areas, that current technologies can be used to deliver broadband applications by high-altitude platform stations (HAPS), which can provide broadband connectivity and disaster recovery communications with minimal ground network infrastructure;

b) that WRC-15 decided to study additional spectrum needs for fixed HAPS links to provide broadband connectivity, including within the band 21.4-22 GHz, recognizing that the existing HAPS identifications were established without reference to today's broadband capabilities;

c) that HAPS can provide broadband connectivity with minimal ground network infrastructure;

d) that ITU-R has conducted studies dealing with compatibility between systems using HAPS and existing services in the band 21.4-22 GHz in Region 2 leading to Report ITU-R F.[HAPS-21GHz],

recognizing

a) that HAPS is defined in No. **1.66A** of the Radio Regulations as a station located on an object at an altitude of 20-50 km and at a specified, nominal, fixed point relative to the Earth, and is subject to No. **4.23**;

b) that the aeronautical mobile service (AMS) within the mobile service operates in the 21.2-21.5 GHz frequency range on a primary basis within Region 2,

resolves

1 that for the purpose of protecting fixed service systems in territory of other administrations in the band 21.4-22 GHz, the power flux density level per HAPS 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;

0.7 θ – 135 dB(W/(m ² · MHz))	for	0° ≤ θ < 10°
2.4 θ – 152 dB(W/(m ² · MHz))	for	10° ≤ θ < 20°
0.45 θ – 113 dB(W/(m ² · MHz))	for	20° ≤ θ < 60°
–86 dB(W/(m ² · MHz))	for	60° ≤ θ ≤ 90°

where θ is the angles of arrival of the incident wave above the horizontal plane, in degrees. These limits relate to the power flux density which would be obtained under clear-sky conditions with assumed free-space propagation. These limits were derived by taking into account the impact of gaseous attenuation and polarization loss.

2 that in order to ensure the protection of EESS (passive), the e.i.r.p. density, in the bands 21.2-21.4 GHz and 22.21-22.5 GHz, per HAPS operating in the band 21.4-22 GHz, shall not exceed:

–0.76 θ – 9.5	dB(W/100 MHz)	for	–4.53° ≤ θ < 35.5°
–36.5	dB(W/100 MHz)	for	35.5° ≤ θ ≤ 90°

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

3 that in order to ensure the protection of the radio astronomy service, the power flux density produced by unwanted emissions from HAPS downlink transmissions in the band 21.4-22 GHz, shall not exceed -176 dB(W/m².290 MHz) for continuum observations, and -192 dB(W/m².250 kHz) for spectral line observations in the band 22.21-22.5 GHz at an RAS station location at a height of 50m. This limit relates to the power flux density which would be obtained using a time percentage of 2% in the relevant propagation model;

4 that *resolves* 3 shall apply at any radio astronomy station that was in operation prior to 22 November 2019; and that has been notified to the Bureau in the band 22.21-22.5 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* 3 applies. Radio astronomy stations notified after this date may seek an agreement with administrations that have notified HAPS;

5 that for the purpose of protecting the aeronautical mobile service (AMS) operating in the band 21.2-21.5 GHz, the e.i.r.p. per HAPS shall not exceed 17.5 dB(W/100 MHz) in the 21.4-21.5 GHz frequency range;

6 that administrations planning to implement a HAPS system in the 21.4-22 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 the Radio Regulations 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.

Reasons: To add the text of a resolution specifying the operating requirements for HAPS to protect other incumbent services.