

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: Recent test deployments of broadband provided from stations on lightweight, solar-powered aircraft operating at approximately 20 km above ground in the stratosphere have demonstrated the potential of providing connectivity to underserved communities with minimal ground-level infrastructure and maintenance. Stations operating at 20 km are high enough to provide service to a large footprint but low enough to provide dense coverage at low latency. Thus, they could potentially provide a high quality of service to underserved communities. These stations are also highly resilient in the face of natural disasters and therefore could potentially be an effective tool for disaster recovery.

While tests of unmanned aircraft at high altitudes for Internet service are recent, high altitude platform stations (HAPS) have been studied by the ITU-R for about two decades, beginning for WRC-1997. High Altitude Platform Stations (HAPS) are defined in Article 1.66A of the Radio Regulations as “[a] station located on an object at an altitude of 20 to 50 km and at a specified, nominal, fixed point relative to the Earth.” Some entities are developing unmanned aircraft that will circle for several months at approximately 20 km in the stratosphere to maintain coverage of a constant service area on the ground. Such nominally fixed aircraft, which could be considered HAPS, are one promising model for delivery of broadband from a high altitude, and could be used by broadband providers to offer service to underserved communities.

The initial HAPS identification provided for HAPS use in the fixed service at 47.2-47.5 GHz and 47.9-48.2 GHz. Because of concern with rain fade in that range, WRC-2000 agreed on HAPS identification for 27.9 – 28.2 GHz (fixed downlink), paired with 31.0 – 31.3 GHz (fixed uplink) outside Region 2. Also at WRC-2000, the bands 1 885 – 1 980 MHz, 2 010 – 2 025 MHz and 2 110 – 2 170 MHz were identified for HAPS operating as IMT base stations. In WRC-12, five countries joined a footnote for a HAPS designation in the fixed service for 6 440 – 6 520 MHz (HAPS-ground) and 6 560-6 640 MHz (ground-HAPS). Despite these designations, few HAPS systems have been deployed.

Since 1997, demand for broadband has increased markedly. The designations for HAPS, now geographically limited, may need to be expanded, geographically and spectrally, in order to allow newer technologies to deliver broadband consistent with user demand. Global identifications facilitating the delivery of broadband from HAPS could provide the economies of scale necessary to make this technology affordable in underserved areas, especially those with terrain features that make it challenging to deploy conventional terrestrial networks and those that have suffered natural or other disasters.

In addition to expanded geographic reach, additional spectrum may be required to support modern broadband technologies. Therefore, the frequency bands currently allocated to the Fixed Service should be studied for additional identifications for HAPS. The following proposal puts forth a new agenda item for WRC-19 to consider the results of studies on the delivery of broadband applications by HAPS, and related ITU-R Recommendations and Resolutions, and take appropriate action.

Proposals:

MOD **USA/10/1**

RESOLUTION 808 (WRC-1~~52~~)

Agenda for the 201~~9~~⁸ World Radiocommunication Conference

The World Radiocommunication Conference (Geneva, 201~~5~~²),

Reasons: To modify the agenda for WRC-19 to add a new item.

ADD **USA/10/2**

2.x to consider, on the basis of ITU-R studies in accordance with Resolution [USA/10/XX], appropriate regulatory actions, potentially including expansion of the frequency ranges of existing identifications for HAPS within existing fixed service allocations, identifying additional frequency ranges for use by HAPS, within existing fixed service allocations, in accordance with Resolution [USA/10/XX], and revising geographic, technical, and regulatory restrictions associated with existing HAPS identifications.

Reasons: To facilitate access by underserved communities, as well as residents in rural and remote areas, to affordable and reliable broadband services.

ADD **USA/10/3**

RESOLUTION [USA/10/XX] (WRC-15)

Facilitating access to broadband applications delivered from HAPS

The World Radiocommunication Conference (Geneva, 2015),

considering

- a) that existing identifications for high altitude platform stations (HAPS) are in a limited number of countries;
- b) there is an urgent need for greater broadband connectivity and telecommunications services in underserved communities and in rural and remote areas;
- c) that some entities are currently testing the delivery of broadband over lightweight, solar-powered aircraft that are designed to circle at approximately 20 kilometers for several months at a nominal fixed point relative to the ground below;
- d) that current technologies can be used to deliver broadband services from base stations operating at high altitudes;

- e) that high altitude platform stations could provide broadband connectivity in remote areas, including mountainous, coast, and sandy desert areas;
- f) that high altitude platform stations can provide broadband connectivity with minimal ground network infrastructure, and therefore could be effective for disaster recovery;
- g) that HAPS, which operate at a fixed point relative to the earth as defined in the radio regulations, are one possible model for delivering mobile broadband;

recognizing

- a) the importance of protecting existing services and users;
- b) that HAPS is not a service but a type of station from which either mobile or fixed services may be provided;
- c) that certain bands are presently identified for use by HAPS in limited areas of the world, including the 1 885 – 1 980 MHz, 2 010 – 2 025 MHz, and 2 110 – 2 170 MHz mobile allocations as well as the fixed allocations in the 6 440 – 6 520 MHz paired with 6 560 – 6 640 MHz; and 27.9 – 28.2 GHz, paired with 31.0 – 31.3 GHz bands;
- d) that the existing HAPS identifications were established without reference to today's broadband capabilities;
- e) that Recommendation ITU-R M.1456 noted that links between two High Altitude Platform Stations (HAPS) and links between HAPS and HAPS system ground stations will need to be studied and coordinated;
- f) that Resolution 233 (WRC-12) noted that mobile broadband systems can help reduce the digital divide between urban and rural areas, including underserved communities;
- g) that Resolution 233 (WRC-12) also noted the need to continually take advantage of technological developments to increase the efficient use of spectrum and facilitate spectrum access;
- h) that Resolution 233 (WRC-12) further noted that harmonized worldwide bands and harmonized frequency arrangements for mobile broadband systems are highly desirable in order to achieve the benefits of economies of scale;

resolves to invite ITU-R

- 1 to study additional spectrum requirements, taking into account:
 - technical and operational characteristics of HAPS systems, including the evolution of HAPS through advances in technology and spectrally-efficient techniques, and their deployment;
 - the possibility of modifying the geographic, technical, and regulatory restrictions associated with existing HAPS footnote identifications listed in *recognizing c)* to facilitate access to broadband, taking into account the technical characteristics of newer configurations of stratospheric broadband systems and the evolving user needs, particularly in underserved, rural, and remote areas and areas suffering from disasters;

2 to study the feasibility of identifying portions of the following existing fixed service frequency ranges not subject to Appendices 30, 30A, and 30B for the use of HAPS: 10.7-13.25 GHz, 21.4 GHz – 22.0 GHz, and 24.25 - 29.1 GHz;

3 to conduct sharing and compatibility studies with incumbent services operating in the frequency ranges identified in *resolves to invite ITU-R 1* and 2 and, if appropriate, adjacent band studies, taking into account studies already performed in the ITU-R;

4 to develop ITU-R Recommendations and Reports, as appropriate, taking into account *resolves to invite ITU-R 1, 2, and 3* above.

further resolves to invite WRC-19

to consider, on the basis of the studies conducted under the *resolves to invite ITU-R* above, appropriate regulatory actions, including the possible expansion of existing HAPS identification within existing fixed service allocations, possible identification of additional frequency ranges within existing fixed service allocations for HAPS in accordance with *resolves to invite ITU-R 2* and revising geographic, technical, and regulatory restrictions associated with existing HAPS identifications.

Reasons: To facilitate the delivery of current generation of broadband services to underserved communities over affordable and reliable infrastructure.

ATTACHMENT

PROPOSAL FOR FUTURE AGENDA ITEM FOR BROADBAND FROM HIGH ALTITUDE PLATFORM STATIONS

Subject: Proposed Future WRC Agenda Item for WRC-2019 to consider the results of studies on the delivery of broadband applications by HAPS, and whether changes are needed to the set of existing bands identified for use by HAPS and ITU-R Recommendations and Resolutions to facilitate the delivery of broadband to underserved communities, taking actions as appropriate.

Origin: United States of America

Proposal: To study high altitude platform station operations for broadband.

Background/reason:

Test deployments of broadband provided from stations operating at approximately 20 km above ground in the stratosphere have demonstrated the potential of providing connectivity to underserved communities with minimal ground-level infrastructure and maintenance. Stations operating at 20 km are high enough to provide service to a large footprint but low enough to provide dense coverage at low latency. Thus, they could potentially provide a high quality of service to underserved communities at reasonable cost. These stations are also highly resilient in the face of natural disasters and therefore could potentially be an effective tool for disaster recovery. Since 1997, demand for broadband has increased markedly. Studies are required to ensure that existing ITU-R HAPS identifications are sufficient to enable the current generation of broadband technologies to be delivered over HAPS and to possibly identify additional ranges for identifications.

Radiocommunication services concerned: Amateur, Amateur-satellite, Broadcasting-Satellite, Earth Exploration Satellite, Fixed, Fixed-Satellite, Inter-Satellite, Meteorological Satellite, Mobile, Mobile Satellite, Radio Astronomy, Radiolocation, Radiolocation-satellite, Radionavigation, Radionavigation-Satellite, Space research, Standard frequency and time signal-satellite.

Indication of possible difficulties: None foreseen.

Previous/ongoing studies on the issue: Recs. ITU-R F.1569, F.1570, F.1607, F.1609, F.1612, F.1764, F.1891, and F.2011, provide requirements and studies on the provision of HAPS operating in the fixed service. Recs. ITU-R M.1456 and M.1641 provide requirements and studies on the provision of mobile services from HAPS using certain bands around 1.9/2.1 GHz. Recs. ITU-R SF.1601 and SM.1633 provide propagation, interference mitigation, compatibility, and other technical analyses regarding the operation of HAPS.

<i>Studies to be carried out by:</i> ITU-R Study Group 5, WP 5C	<i>with the participation of:</i> SG 4 and SG 7
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ITU-R Study Groups concerned: SG 4, 5, 6, and 7

ITU resource implications, including financial implications (refer to CV126): Minimal

Common regional proposal: Yes/No
Number of countries:

Multicountry proposal: Yes/No

Remarks