UNITED STATES DEPARTMENT OF COMMERCE
National Telecommunications and Information Administration
INTERDEPARTMENT RADIO ADVISORY COMMITTEE
Washington, D.C. 20230

Ms. Mindel De La Torre
Chief of the International Bureau
Federal Communications Commission
445 12th Street SW
Washington, DC 20554

JUN 2 6 2015

Dear Ms. De La Torre:

The National Telecommunications and Information Administration (NTIA), on behalf of the Executive Branch agencies, approves the release of the draft Executive Branch proposals for the 2015 World Radiocommunication Conference (WRC-15) which address future conference agenda items for broadband over high altitude platform stations (HAPS) and International Mobile Telecommunications (IMT) above 6 GHz under WRC-15 agenda item 10. NTIA has crafted these as counter proposals to the FCC's WRC-15 Advisory Committee proposals for these same topics as found in documents WAC 117 and WAC 118.

NTIA considered the federal agencies' input toward the development of U.S. proposals for WRC-15. NTIA forwards this package for your consideration and review. Mr. Charles Glass is the primary contact from my staff.

Sincerely,

Paige R. Atkins
Associate Administrator
Office of Spectrum Management

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-15~~2~~)

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.

Studies to be carried out by: ITU-R Study Group 5, WP 5C	*with the participation of:* SG 4 and SG 7

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 ***Multicountry proposal:*** Yes/No

Number of countries:

Remarks

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: Since 2000, terrestrial IMT networks have served a crucial role in providing access to businesses and consumers worldwide. According to ITU statistics, "Mobile cellular subscriptions will reach almost 7 billion by end 2014, corresponding to a penetration rate of 96%," including a penetration rate of 90% in developing countries and 121% in developed countries.[1]

IMT networks contribute to global economic and social development. IMT systems provide a wide range of multimedia applications, including telemedicine, teleworking, distance learning, and public protection and disaster relief, with even more applications envisioned. IMT systems also help reduce the digital divide between urban and rural areas, including underserved communities.

The growth rate of mobile broadband has been phenomenal. According to ITU statistics, "Mobile broadband remains the fastest growing market segment, with continuous double-digit growth rates in 2014. By end 2014, the number of mobile-broadband subscriptions will reach 2.3 billion globally, almost 5 times as many as just six years earlier (in 2008)."[2]

In order to meet this growing demand as well as to provide increased capabilities to users, IMT systems have continually incorporated technological improvements, from the first IMT-2000 networks to IMT-Advanced. In early 2012, ITU-R began to develop "IMT for 2020 and beyond," setting the stage for research activities that are emerging around the world. ITU-R studies include Report ITU-R M.2320, which provides information on the technology trends of terrestrial IMT systems considering the time frame 2015-2020 and beyond, [PDN] Report ITU-R M.[IMT.ABOVE 6 GHz], which studies the technical feasibility of IMT in bands above 6 GHz, and [PDN] Recommendation ITU-R M.[IMT.VISION], which describes the framework and overall objectives of the future development of IMT for 2020 and beyond.

Within the scope of the wide ranging development for future mobile broadband, and in addition to the work on-going for IMT in the lower frequency bands, considerable research has been carried out by various organizations on a global scale on the feasibility of terrestrial IMT in spectrum above 6 GHz. The corresponding results presented at various workshops and conferences have been positive towards the feasibility of utilizing higher frequencies for terrestrial IMT and mobile broadband usage. It is expected that usage of higher frequencies will be one of the key enabling components of future IMT as the state of the art in technological developments unlocks the spectrum above 6 GHz. In the U.S., the FCC has already expressed interest in the use of higher frequency bands for mobile broadband services.

Given the growing demand for mobile broadband and the technological advances which will be able to support IMT networks in higher frequency bands, it is essential to ensure the timely availability of additional spectrum in bands above 6 GHz to support the future growth of IMT in the years 2020 and beyond. Therefore, the United States proposes a WRC-19 agenda item to

---

[1] https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2014-e.pdf, p 3.

[2] https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2014-e.pdf, p1.

consider the identification of frequency bands for the terrestrial component of IMT in bands above 6 GHz.

Proposal:

MOD USA/10/1

RESOLUTION 808 (WRC-~~12~~15)

Agenda for the 20~~15~~19 World Radiocommunication Conference

The World Radiocommunication Conference (Geneva, 20~~12~~15),

Reasons: To update Resolution 806 (WRC-12) to include proposals for WRC-19.

ADD USA/10/2

1.[IMT] to consider, in accordance with Resolution **[IMT] (WRC-2015)**, spectrum requirements and identification of frequency bands for the terrestrial component of International Mobile Telecommunications (IMT) in the frequency range 27.5-71 GHz taking into account the results of studies;

Reasons: To support the requirement for additional spectrum being identified for the terrestrial component of International Mobile Telecommunications (IMT) to enable nano- and pico-cell IMT operations in high demand, high density locations while ensuring compatibility with existing services.

ADD USA/10/3

RESOLUTION [IMT] (WRC-15)

Consideration of regionally or globally harmonized identification of frequency ranges for the terrestrial component of International Mobile Telecommunications (IMT) in the frequency range 27.5-71 GHz to facilitate the development of mobile broadband applications for nano- and pico-cell operations in high demand, high density locations.

The World Radiocommunication Conference (Geneva, 2015),

Considering

a) that International Mobile Telecommunications (IMT) systems have been the main method of delivering wide area mobile broadband applications;

b) that IMT and other mobile broadband systems contribute to global economic and social development by providing a wide range of multimedia applications, such as mobile telemedicine, teleworking, distance learning and other applications;

c) that in all countries where terrestrial IMT systems are deployed there is a continuing significant growth in the number of users of IMT systems and in the quantity and rate of data carried, the latter being driven to a large extent by audiovisual content;

d) that IMT and other mobile broadband systems have helped reduce the digital divide between urban and rural areas, including underserved communities;

e) that in many developing markets the main delivery mechanism for broadband access is expected to be through mobile devices;

f) that adequate and timely availability of spectrum and supporting regulatory provisions is essential to support the future growth of IMT and other mobile broadband systems;

g) that there is a need to continually take advantage of technological developments in order to increase the efficient use of spectrum and facilitate spectrum access;

h) that harmonized worldwide bands and harmonized frequency arrangements for IMT and other mobile broadband systems are highly desirable in order to achieve global roaming and the benefits of economies of scale;

i) that there is a need to protect the existing primary services in the frequency range 27.5-71 GHz; and

j) that there is a need to identify additional regional or global harmonized spectrum for IMT nano- and pico-cell operations to meet increasing demand in high demand, high density locations,

recognizing

a) that there is a fairly long lead time between the identification of frequency bands by world radiocommunication conferences and the deployment of systems in those bands, and timely availability of spectrum is therefore important to support the development of IMT and other terrestrial mobile broadband applications;

b) the use of relevant parts of the spectrum by other radiocommunication services, many of which involve significant investment in infrastructure or represent significant societal benefit, and the evolving needs of these services,

c) that Report ITU-R M.2320 provides information on the technology trends of terrestrial IMT systems considering the time frame 2015-2020 and beyond.

d) that [PDN] Report ITU-R M.[IMT.ABOVE 6 GHz] studies the technical feasibility of IMT in bands above 6 GHz

e) that [PDN] Recommendation ITU-R M.[IMT.VISION] describes the framework and overall objectives of the future development of IMT for 2020 and beyond.

f) that unwanted emissions in the bands 31.3-31.5 GHz, 48.94-49.04 GHz, 50.2-50.4 GHz and 52.6-54.25 GHz (see RR No. **5.340**) will need to be limited to ensure protection of systems of the EESS (passive), SRS (passive) and radio astronomy services,

resolves

1 that WRC-19 consider, based on the results of ITU-R studies in *invites ITU-R* 1, 3, and 4, the possible identification of frequency bands for the terrestrial component of International Mobile Telecommunications (IMT) to enable nano- and pico-cell operations in high demand, high density locations in bands already allocated for mobile service use on a primary basis in specific portions of the spectrum between 27.5-71 GHz, while ensuring compatibility with existing services.

2 to invite WRC-19 to consider the results of the above studies and take appropriate action

invites ITU-R

1) to conduct, and complete in time for WRC-19, the appropriate studies to determine the spectrum requirements for the terrestrial component of IMT in specific portions of the spectrum between 27.5-71 GHz already allocated to the mobile service, to support nano- and pico-cell operations of IMT;

2) to develop, prior to November 2016, the technical and operational characteristics needed for sharing and compatibility studies to ensure that studies can be completed in time for consideration at WRC-19;

3) to conduct sharing and compatibility studies, based on *resolves invite ITU-R* 1 and 2, with a focus on identification of regionally or globally harmonized frequency ranges necessary for IMT within the frequency ranges 27.5 – 29.5 GHz, 37.5 – 40.5 GHz, 47.2-50.2 GHz, 50.4 – 52.6 GHz, and 59.3 – 66 GHz which are already globally identified for mobile service use on a primary basis;

4) to take into account the protection of current and planned use by existing services in the ranges contained in *resolves to invite ITU-R* 3 and to take into account RR No. **5.340** and No. **5.149** when conducting studies in accordance with *resolves to invite ITU-R* 3.

invites administrations

to participate actively in these studies by submitting contributions to ITU-R.

Reasons: To support the requirement for additional spectrum being identified for the terrestrial component of International Mobile Telecommunications (IMT) to enable nano- and pico-cell IMT operations in high demand, high density locations while ensuring compatibility with existing services.

ATTACHMENT

PROPOSAL FOR ADDITIONAL AGENDA ITEM FOR CONSIDERATION OF IDENTIFICATION OF REGIONALLY OR GLOBALLY HARMONIZED FREQUENCY RANGES FOR IMT, IN THE FREQUENCY RANGE 27.5 – 71 GHZ, TAKING INTO ACCOUNT THE RESULTS OF STUDIES

Subject: Proposed Future WRC Agenda Item for WRC-2019 for consideration of identification of frequency bands for the terrestrial component of International Mobile Telecommunications (IMT) in the frequency range 27.5 – 71 GHz to facilitate the development of mobile broadband applications for nano- and pico-cell operations in high density applications

Origin: United States of America

Proposal: *To consider the identification of frequency bands for the terrestrial component of International Mobile Telecommunications (IMT) in the frequency range 27.5-71 GHz* to facilitate the development of mobile broadband applications for nano- and pico-cell operations in high density applications

---

Background/reason:

ITU statistics show that "Mobile broadband remains the fastest growing market segment, with continuous double-digit growth rates in 2014. By end 2014, the number of mobile-broadband subscriptions will reach 2.3 billion globally, almost 5 times as many as just six years earlier (in 2008)."[3] In order to meet this growing demand as well as support new user capabilities, terrestrial IMT networks continue to incorporate technological advances.

In early 2012, ITU-R began to develop "IMT for 2020 and beyond", setting the stage for research activities that are emerging around the world, including support for networks in bands above 6 GHz. Technological advances described in PDN Report [IMT.ABOVE 6 GHz] can facilitate the development and deployment of IMT networks to help meet this growing capacity demands for mobile broadband. Given the growing demand for mobile broadband and the technological advances which will be able to support IMT networks in higher frequency bands, it is essential to ensure the timely availability of spectrum in bands above 6 GHz to support the future growth of IMT in the years 2020 and beyond. There are currently no bands above 6 GHz identified for IMT.

Given the increased demand for IMT in urban areas, there is a need to expand coverage in high demand, high density locations using nano- and pico- cell arrangements to meet the explosive growth of cellular and data use in these areas. This agenda item would consider IMT identification for nano- and pico- cell applications on a regional or global basis in already allocated primary mobile service spectrum in the **27.5 – 29.5 GHz, 37.5 – 40.5 GHz, 47.2 – 50.2 GHz, 50.4 – 52.6 GHz, and 59.3 – 66 GHz** frequency ranges, based on the results sharing and compatibility studies.

Radiocommunication services concerned:

Fixed, Fixed Satellite, Inter-Satellite, Mobile, Mobile-Satellite, Earth Exploration Satellite, Space Research, Earth Exploration Satellite (passive), Space Research (passive), Radio Astronomy and Radiolocation

---

[3] https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2014-e.pdf

Indication of possible difficulties: IMT technical and operational characteristics must be developed in time to complete sharing and compatibility studies. If these studies cannot be completed due to the delay in IMT characteristics, WRC-19 consideration of regulatory action may be deferred to the following conference.

Previous/ongoing studies on the issue: Report ITU-R M.2320 provides information on the technology trends of terrestrial IMT systems in 2015-2020 and beyond. ITU-R Working Party 5D is finalizing studies on [PDN] Report ITU-R M.[IMT.ABOVE 6 GHz], which studies the technical feasibility of IMT in bands above 6 GHz and [PDN] Recommendation ITU-R M.[IMT.VISION], which describes the framework and overall objectives of the future development of IMT for 2020 and beyond.

Studies to be carried out by: SG 5	***with the participation of:*** SG 3, SG 4 and SG 7

ITU-R Study Groups concerned: SG 4, SG 5 and SG 7

ITU resource implications, including financial implications (refer to CV126): This proposed agenda item will be studied within the normal ITU-R procedures and planned budget. As the responsible group on IMT studies, ITU-R WP 5D usually has meetings three times a year, which last 6 days each. Meetings should be held in conjunction with other SG 5 Working Party meetings to the extent practicable.

Common regional proposal: Yes/No ***Multicountry proposal:*** Yes/No
Number of countries:

Remarks