



PLENARY MEETING

**Addendum 4 to
Document 6046-E
3 October 2023
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African Common Proposals

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 1.4

1.4 To consider, in accordance with Resolution 247 (WRC-19), the use of High-altitude platform stations as IMT Base Stations (HIBS) in the mobile service in certain frequency bands below 2.7 GHz already identified for IMT, on a global or regional level

1 Introduction

This Agenda item addresses possible regulatory provisions for the use of HIBS in the frequency bands already identified for terrestrial IMT while ensuring the protection of existing services to which the frequency band is allocated on a primary basis and services operating in adjacent bands as appropriate, from interference by HIBS.

HIBS have very large coverage area and therefore implementation of frequency coordination between neighbouring countries will be needed. The determination of the regulatory provisions (e.g., some technical and operational conditions) required for the coordination of HIBS operations with neighbouring countries is of paramount importance. Such provisions would also be used as guidance in the authorisation of HIBS within a country to ensure compatibility with existing services. Hence, appropriate frequency coordination procedures between concerned administrations, based on the result of ITU-R studies, should be developed.

Harmonized spectrum for implementation of HIBS is highly desirable. From the results of ITU-R studies on this agenda item, the ATU Member States are of the view that no major impediments are seen to enable the use of HIBS in bands below 2 700 MHz, already identified for IMT for the following reasons:

- In each of the bands, terrestrial fixed and mobile services, including ground based IMT systems, exist, and they can be coordinated through cross border coordination with any deployment of HIBS in a neighbouring country. Such coordination, for example, could be based on pre-established pfd (power flux-density) limits for HIBS at the border similar to

resolves 1.1 of Resolution **221 (Rev.WRC-07)** for the protection of IMT mobile stations in 2 GHz band.

- HIBS will use the same band plans as ground-based IMT. For the bands considered, these plans are given in Recommendation ITU-R M.1036. This approach avoids potential interference for existing services in those parts of the bands where HIBS will not transmit.
- There are existing regulatory provisions for HIBS in parts of the 2 GHz band (Nos. **5.388A**, **5.388B** and Resolution **221 (Rev.WRC-07)**) which can provide guidance for the development of regulatory provisions for the bands under WRC-23 agenda item (AI) 1.4. However, there is also an opportunity to update the provisions of Resolution **221 (Rev.WRC-07)** using the results of the studies submitted for AI 1.4, which would be based on the most recent technical and operational characteristics of HIBS and of the existing services.
- Some of the coexistence studies between HIBS and existing services/applications carried out ITU-R are not conclusive and other studies show divergent results and therefore it is necessary to consider relevant provisions in order to ensure the protection existing services with primary allocation.
- Mitigation of the possible second harmonics interference of HIBS base stations (694 – 960 MHz) on RAS in the frequency band 1 610.6 - 1 613 MHz would be feasible by applying some technical provisions; whether or not the studies between HIBS DL second harmonics and RAS are within the scope of WRC-23 agenda item 1.4, it is clear that administrations would need to act, if any HIBS would cause interference (via spurious emissions) at a RAS station.

Therefore, a set of appropriate technical and operational conditions ensuring optimal protection of the existing primary services and the future development of services to which bands are allocated on a primary basis and services operating in adjacent frequency bands are proposed. These include measures for the mitigation of the possible second harmonics interference of HIBS base stations (694 – 960 MHz) on RAS in the frequency band 1 610.6 - 1 613 MHz and a formal commitment from administrations authorizing such systems to coordinate with affected neighbouring countries and to notify the HIBS stations to ITU.

2 Proposal

To satisfy this Agenda item, which entails identification of the candidate bands for the use of high altitude platform stations as base stations for International Mobile Telecommunications (HIBS), taking into account that no additional regulatory or technical restrictions should be imposed on the existing IMT terrestrial systems and applications operating in the same bands or in adjacent bands and also to identify the necessary measures required for coordination with neighbouring countries regarding exceeded coverage, the ATU Member States are proposing the following regulatory provisions:

Frequency band 694-960 MHz

1. inclusion of a new footnote for the identification of the frequency band for the use of HIBS on the basis of not claiming protection from existing primary services and an associated new WRC Resolution specifying the conditions for the use of this band by HIBS;
2. for the protection of broadcasting in the GE06 agreement area: see **resolves 3 to 5** of the draft new Resolution;
3. for the protection of IMT mobile and base stations: see **resolves 6.1 and 6.2** of the draft new Resolution;

4. for protecting radio astronomy in the frequency band 1 610.3 – 1 613.6 MHz from second harmonics of HIBS in the frequency band 694 – 960 MHz: see **resolves 6.3 and 6.4** of the draft new Resolution;

Frequency bands 1710-1885 MHz, 1885-1980 MHz, 2010-2025 MHz and 2110-2170 MHz

1. modification of the footnote No. **5.388A** for updating the conditions with regards to the identification of this frequency band for the use of HIBS on the basis of not claiming protection from existing primary services and consequently revising the Resolution **221 (Rev.WRC-07)** specifying the conditions for the use of this band by HIBS;
2. for the protection of IMT mobile and base stations: see **resolves 1.1, 1.2 and 1.3** of the draft new Resolution;
3. for the protection of stations in the fixed service: see **resolves 1.6** of the draft new Resolution;
4. for the protection of aeronautical mobile service systems: see **1.7 and 1.8** of the draft new Resolution;

Frequency band 2500 - 2690 MHz

1. inclusion of a new footnote for the identification of this frequency band for the use of HIBS on the basis of not claiming protection from existing primary services and an associated new WRC Resolution specifying the conditions for the use of this band by HIBS;
2. for the protection of IMT mobile and base stations: see **resolves 1.1 and 1.2** of the draft new Resolution;
3. for the protection of stations in the fixed service: see **resolves 1.3** of the draft new Resolution;
4. for the protection of the broadcasting-satellite service: see **resolves 1.4** of the draft new Resolution;
5. for the protection of the radiolocation service: see **resolves 1.6** of the draft new Resolution;
6. for the protection of the mobile satellite service: see **resolves 1.9** of the draft new Resolution;
7. for the protection of radioastronomy service: see **resolves 1.7 and 1.8** of the draft new Resolution.

Regulatory proposals for the respective above frequency bands are presented below.

ARTICLE 5

Frequency allocations

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

MOD AFCP/6046A4/1

460-890 MHz

Allocation to services		
Region 1	Region 2	Region 3
470-694 BROADCASTING 5.149 5.291A 5.294 5.296 5.300 5.304 5.306 5.312	470-512 BROADCASTING Fixed Mobile 5.292 5.293 5.295	470-585 FIXED MOBILE 5.296A BROADCASTING 5.291 5.298
	512-608 BROADCASTING 5.295 5.297	
	608-614 RADIO ASTRONOMY Mobile-satellite except aeronautical mobile-satellite (Earth-to-space)	610-890 FIXED MOBILE 5.296A 5.313A 5.317A ADD 5.A14 ADD 5.B14 BROADCASTING
	614-698 BROADCASTING Fixed Mobile 5.293 5.308 5.308A 5.309	
694-790 MOBILE except aeronautical mobile 5.312A 5.317A ADD 5.A14 BROADCASTING 5.300 5.312	698-806 MOBILE 5.317A ADD 5.A14 BROADCASTING Fixed 5.293 5.309	
790-862 FIXED MOBILE except aeronautical mobile 5.316B 5.317A ADD 5.A14 BROADCASTING 5.312 5.319	806-890 FIXED MOBILE 5.317A ADD 5.A14 BROADCASTING	
862-890 FIXED MOBILE except aeronautical mobile 5.317A ADD 5.A14 BROADCASTING 5.322		

5.319 5.323	5.317 5.318	5.149 5.305 5.306 5.307 5.320
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Reasons: To include a new footnote for the identification of the frequency band 694 - 960 MHz or portions thereof, for the use of HIBS in all Regions on the basis of not claiming protection from existing primary services and an associated new WRC Resolution specifying the conditions for the use of this band by HIBS.

MOD AFCP/6046A4/2

890-1 300 MHz

Allocation to services		
Region 1	Region 2	Region 3
890-942 FIXED MOBILE except aeronautical mobile 5.317A ADD 5.A14 BROADCASTING 5.322 Radiolocation 5.323	890-902 FIXED MOBILE except aeronautical mobile 5.317A ADD 5.A14 Radiolocation 5.318 5.325	890-942 FIXED MOBILE 5.317A ADD 5.A14 BROADCASTING Radiolocation 5.327
	902-928 FIXED Amateur Mobile except aeronautical mobile 5.325A ADD 5.A14 Radiolocation 5.150 5.325 5.326	
	928-942 FIXED MOBILE except aeronautical mobile 5.317A ADD 5.A14 Radiolocation 5.325	
942-960 FIXED MOBILE except aeronautical mobile 5.317A ADD 5.A14 BROADCASTING 5.322 5.323	942-960 FIXED MOBILE 5.317A ADD 5.A14	942-960 FIXED MOBILE 5.317A ADD 5.A14 BROADCASTING 5.320

Reasons: To include a new footnote for the identification of the frequency band 694 - 960 MHz, or portions thereof, for the use of HIBS in all Regions on the basis of not claiming protection from existing primary services and an associated new WRC Resolution specifying the conditions for the use of this band by HIBS.

ADD AFCP/6046A4/3

5.A14 The frequency band 698-960 MHz, or portions thereof, in Region 2, the frequency band 694-790 MHz, or portions thereof, in Region 1, and the frequency band 790-960 MHz, or portions thereof, in Regions 1 and 3, are identified for use by high-altitude platform stations as International

Mobile Telecommunications (IMT) base stations (HIBS). This identification does not preclude the use of these frequency bands by any application of the services to which it is allocated and does not establish priority in the Radio Regulations. HIBS shall not claim protection from existing primary services. No. 5.43A does not apply. The notifying administration of HIBS at the time of submission of the Appendix 4 information shall send an objective, measurable and enforceable commitment undertaking that in case of unacceptable interference is caused shall immediately reduce the interference to the acceptable level or cease the emission. Resolution [A14-HIBS 694-960 MHz] (WRC-23) shall apply. Such use of HIBS in the frequency bands 694-728 MHz and 830-835 MHz is limited to reception by HIBS. (WRC-23)

Reasons: To include a new footnote for the identification of the frequency band 694 - 960 MHz or portions thereof, for the use of HIBS on the basis of not claiming protection from existing primary services, a formal commitment from administrations authorizing such systems to coordinate with affected neighbouring countries and to notify the HIBS stations to ITU and an associated new WRC Resolution specifying the conditions for the use of this band by HIBS.

ADD AFCP/6046A4/4

5.B14 The frequency band 698-790 MHz, or portions thereof, in the countries listed in No. 5.313A, which are allocated to the mobile service on a primary basis, is identified for use by high-altitude platform stations as International Mobile Telecommunications (IMT) base stations (HIBS). This identification does not preclude the use of this frequency band by any application of the services to which it is allocated and does not establish priority in the Radio Regulations. HIBS shall not claim protection from existing primary services. No. 5.43A does not apply. The notifying administration of HIBS at the time of submission of the Appendix 4 information shall send an objective, measurable and enforceable commitment undertaking that in case of unacceptable interference is caused shall immediately reduce the interference to the acceptable level or cease the emission. Resolution [A14-HIBS 694-960 MHz] (WRC-23) shall apply. Such use of HIBS in the frequency band 698-728 MHz is limited to reception by HIBS. (WRC-23)

Reasons: To include a new footnote for the identification of the frequency band 694 - 960 MHz for the use of HIBS on the basis of not claiming protection from existing primary services, a formal commitment from administrations authorizing such systems to coordinate with affected neighbouring countries and to notify the HIBS stations to ITU and an associated new WRC Resolution specifying the conditions for the use of this band by HIBS.

MOD AFCP/6046A4/5

1 710-2 170 MHz

Allocation to services		
Region 1	Region 2	Region 3
1 710-1 930	FIXED MOBILE 5.384A <u>MOD</u> 5.388A 5.388B 5.149 5.341 5.385 5.386 5.387 5.388	
1 930-1 970 FIXED MOBILE <u>MOD</u> 5.388A 5.388B 5.388	1 930-1 970 FIXED MOBILE <u>MOD</u> 5.388A 5.388B Mobile-satellite (Earth-to-space) 5.388	1 930-1 970 FIXED MOBILE <u>MOD</u> 5.388A 5.388B 5.388

1 970-1 980	FIXED MOBILE <u>MOD</u> 5.388A 5.388B 5.388	
1 980-2 010	FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) 5.351A 5.388 5.389A 5.389B 5.389F	
2 010-2 025 FIXED MOBILE <u>MOD</u> 5.388A 5.388B 5.388	2 010-2 025 FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) 5.388 5.389C 5.389E	2 010-2 025 FIXED MOBILE <u>MOD</u> 5.388A 5.388B 5.388
2 025-2 110	SPACE OPERATION (Earth-to-space) (space-to-space) EARTH EXPLORATION-SATELLITE (Earth-to-space) (space-to-space) FIXED MOBILE 5.391 SPACE RESEARCH (Earth-to-space) (space-to-space) 5.392	
2 110-2 120	FIXED MOBILE <u>MOD</u> 5.388A 5.388B SPACE RESEARCH (deep space) (Earth-to-space) 5.388	
2 120-2 160 FIXED MOBILE <u>MOD</u> 5.388A 5.388B 5.388	2 120-2 160 FIXED MOBILE <u>MOD</u> 5.388A 5.388B Mobile-satellite (space-to-Earth) 5.388	2 120-2 160 FIXED MOBILE <u>MOD</u> 5.388A 5.388B 5.388
2 160-2 170 FIXED MOBILE <u>MOD</u> 5.388A 5.388B 5.388	2 160-2 170 FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) 5.388 5.389C 5.389E	2 160-2 170 FIXED MOBILE <u>MOD</u> 5.388A 5.388B 5.388

Reasons: To modify the footnote No. **5.388A** in view of updating the conditions with regards to the identification of the frequency bands 1710 - 1885 MHz, 1885 - 1980 MHz, 2010 - 2025 MHz and 2110 - 2170 MHz in all Regions for the use of HIBS on the basis of not claiming protection from existing primary services and a revision of Resolution **221 (Rev.WRC-07)** specifying the conditions for the use of these bands by HIBS.

MOD AFCP/6046A4/6

5.388A In Regions 1 and 3, the frequency bands 1 885 1 710-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz in Regions 1 and 3, and, in Region 2, the frequency bands 1 885 1 710-1 980 MHz and 2 110-2 160 MHz in Region 2 may be identified for use by high-altitude

platform stations ~~as base stations to provide as~~ International Mobile Telecommunications (IMT) ~~base stations (HIBS), in accordance with Resolution 221 (Rev.WRC-07). Their use by IMT applications using high altitude platform stations as base stations~~ This identification does not preclude the use of these frequency bands by any station in application of the services to which they are allocated and does not establish priority in the Radio Regulations. Resolution 221 (Rev.WRC-23) shall apply. Such use of HIBS in the frequency bands 1 710-1 785 MHz in Regions 1 and 2, and 1 710-1 815 MHz in Region 3 is limited to reception by HIBS, and in the frequency band 2 110-2 170 MHz is limited to transmission from HIBS. HIBS shall not claim protection from existing primary services. No. 5.43A does not apply. The notifying administration of HIBS at the time of submission of the Appendix 4 information shall send an objective, measurable and enforceable commitment undertaking that in case of unacceptable interference is caused shall immediately reduce the interference to the acceptable level or cease the emission. (WRC-~~423~~)

Reasons: To modify the footnote 5.388A in view of updating the conditions with regards to the identification of the frequency band 1710 - 1885 MHz, 1885 - 1980 MHz, 2010 - 2025 MHz and 2110 - 2170 MHz for the use of HIBS on the basis of not claiming protection from existing primary services, a formal commitment from administrations authorizing such systems to coordinate with affected neighbouring countries and to notify the HIBS stations to ITU and a revision of Resolution 221 (Rev.WRC-07) specifying the conditions for the use of this band by HIBS.

MOD AFCP/6046A4/7

2 170-2 520 MHz

Allocation to services		
Region 1	Region 2	Region 3
2 500-2 520 FIXED 5.410 MOBILE except aeronautical mobile 5.384A <u>ADD 5.C14</u> 5.412	2 500-2 520 FIXED 5.410 FIXED-SATELLITE (space-to-Earth) 5.415 MOBILE except aeronautical mobile 5.384A <u>ADD 5.C14</u>	2 500-2 520 FIXED 5.410 FIXED-SATELLITE (space-to-Earth) 5.415 MOBILE except aeronautical mobile 5.384A <u>ADD 5.C14</u> MOBILE-SATELLITE (space-to-Earth) 5.351A 5.407 5.414 5.414A 5.404 5.415A

MOD AFCP/6046A4/8

2 520-2 700 MHz

Allocation to services		
Region 1	Region 2	Region 3
<p>2 520-2 655 FIXED 5.410 MOBILE except aeronautical mobile 5.384A ADD 5.C14 BROADCASTING-SATELLITE 5.413 5.416</p>	<p>2 520-2 655 FIXED 5.410 FIXED-SATELLITE (space-to-Earth) 5.415 MOBILE except aeronautical mobile 5.384A ADD 5.C14 BROADCASTING-SATELLITE 5.413 5.416</p>	<p>2 520-2 535 FIXED 5.410 FIXED-SATELLITE (space-to-Earth) 5.415 MOBILE except aeronautical mobile 5.384A ADD 5.C14 BROADCASTING-SATELLITE 5.413 5.416 5.403 5.414A 5.415A</p>
<p>5.339 5.412 5.418B 5.418C</p>	<p>5.339 5.418B 5.418C</p>	<p>2 535-2 655 FIXED 5.410 MOBILE except aeronautical mobile 5.384A ADD 5.C14 BROADCASTING-SATELLITE 5.413 5.416 5.339 5.418 5.418A 5.418B 5.418C</p>
<p>2 655-2 670 FIXED 5.410 MOBILE except aeronautical mobile 5.384A ADD 5.C14 BROADCASTING-SATELLITE 5.208B 5.413 5.416 Earth exploration-satellite (passive) Radio astronomy Space research (passive)</p>	<p>2 655-2 670 FIXED 5.410 FIXED-SATELLITE (Earth-to-space) (space-to-Earth) 5.415 MOBILE except aeronautical mobile 5.384A ADD 5.C14 BROADCASTING-SATELLITE 5.413 5.416 Earth exploration-satellite (passive) Radio astronomy Space research (passive)</p>	<p>2 655-2 670 FIXED 5.410 FIXED-SATELLITE (Earth-to-space) 5.415 MOBILE except aeronautical mobile 5.384A BROADCASTING-SATELLITE 5.208B 5.413 5.416 Earth exploration-satellite (passive) Radio astronomy Space research (passive)</p>
<p>5.149 5.412</p>	<p>5.149 5.208B</p>	<p>5.149 5.420</p>
<p>2 670-2 690 FIXED 5.410 MOBILE except aeronautical mobile 5.384A ADD 5.C14 Earth exploration-satellite (passive) Radio astronomy Space research (passive)</p>	<p>2 670-2 690 FIXED 5.410 FIXED-SATELLITE (Earth-to-space) (space-to-Earth) 5.208B 5.415 MOBILE except aeronautical mobile 5.384A ADD 5.C14 Earth exploration-satellite (passive) Radio astronomy Space research (passive)</p>	<p>2 670-2 690 FIXED 5.410 FIXED-SATELLITE (Earth-to-space) 5.415 MOBILE except aeronautical mobile 5.384A MOBILE-SATELLITE (Earth-to-space) 5.351A 5.419 Earth exploration-satellite (passive) Radio astronomy Space research (passive)</p>
<p>5.149 5.412</p>	<p>5.149</p>	<p>5.149</p>

Reasons: To include a new footnote for the identification of the frequency band 2500 - 2690 MHz, in Regions 1 and 2 and the frequency band 2 500-2 655 MHz in Region 3 for the use of HIBS

in all Regions on the basis of not claiming protection from existing primary services and an associated new WRC Resolution specifying the conditions for the use of this band by HIBS.

ADD AFCP/6046A4/9

5.C14 The frequency band 2 500-2 690 MHz in Regions 1 and 2, and the frequency band 2 500-2 655 MHz in Region 3 are identified for use by high-altitude platform stations as International Mobile Telecommunications (IMT) base stations (HIBS). This identification does not preclude the use of these frequency bands by any application of the services to which it is allocated and does not establish priority in the Radio Regulations. Resolution [B14-HIBS 2 500-2 690 MHz] (WRC-23) shall apply. Such use of HIBS in the frequency bands 2 500-2 510 MHz in Regions 1 and 2, and 2 500-2 535 MHz in Region 3 is limited to reception by HIBS. HIBS shall not claim protection from existing primary services. No. 5.43A does not apply. The notifying administration of HIBS at the time of submission of the Appendix 4 information shall send an objective, measurable and enforceable commitment undertaking that in case of unacceptable interference is caused shall immediately reduce the interference to the acceptable level or cease the emission. (WRC-23)

Reasons: To include a new footnote for the identification of the frequency band 2500 - 2690 MHz, in Regions 1 and 2 and the frequency band 2 500-2 655 MHz in Region 3 for the use of HIBS on the basis of not claiming protection from existing primary services, a formal commitment from administrations authorizing such systems to coordinate with affected neighbouring countries and to notify the HIBS stations to ITU and an associated new WRC Resolution specifying the conditions for the use of this band by HIBS.

ARTICLE 11

Notification and recording of frequency assignments^{1, 2, 3, 4, 5, 6, 7} (WRC-19)

Section I – Notification

MOD AFCP/6046A4/10

11.26A Notices relating to assignments for high-altitude platform stations ~~operating as IMT base stations to provide IMT~~ in the frequency bands identified in Nos. 5.A14, 5.C14, 5.D14 and 5.388A shall reach the Bureau not earlier than three years before the assignments are brought into use. (WRC-0323)

Reasons: To include reference to new or revised footnote for the identification of the frequency bands 694--960 MHz, 1710--1885 MHz, 1885--1980 MHz, 2010--2025 MHz, 2110--2170 MHz and 2500--2690 MHz for the use of HIBS where notification of the HIBS stations to ITU is needed.

MOD AFCP/6046A4/11

APPENDIX 4 (REV.WRC-1923)

Consolidated list and tables of characteristics for use in the application of the procedures of Chapter III

Reasons: To include consequential changes to provisions in Article No. **11.26A**.

MOD AFCP/6046A4/12

RESOLUTION 221 (REV.WRC-~~0723~~)

Use of high-altitude platform stations as International Mobile Telecommunications base stations (HIBS) providing IMT in the frequency bands 1 885-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz in Regions 1 and 3 and 1 885-1 980 MHz and 2 110-2 160 MHz in Region 2

The World Radiocommunication Conference (~~Geneva, 2007~~Dubai, 2023),

considering

- a)* ~~that the bands 1 885-2 025 MHz and 2 110-2 200 MHz are identified in No. 5.388 as intended for use on a worldwide basis for IMT, including the bands 1 980-2 010 MHz and 2 170-2 200 MHz for the terrestrial and satellite components of IMT;~~
- b)* ~~that a high altitude platform station (HAPS) is defined in No. 1.66A 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”;~~
- a)* that there is growing demand for access to mobile broadband, requiring more flexibility in the approaches to expand the capacity and coverage provided by International Mobile Telecommunications (IMT) systems;
- b)* that high-altitude platform stations as IMT base stations (HIBS) would be used as part of terrestrial IMT networks, and may use the same frequency bands as ground-based IMT base stations in order to provide mobile-broadband connectivity to underserved communities, and in rural and remote areas;
- c)* that HAPS may HIBS would offer a new means of providing IMT services with minimal network infrastructure as they are capable of providing service to a large footprint together with a dense coverage;
- d)* that the use of HIBS HAPS as base stations within the terrestrial component of IMT is optional for administrations, and that such use should not have any priority over other terrestrial IMT use;
- e)* that the mobile station to be served, whether by HIBS or ground-based IMT base stations, is the same, and currently supports a variety of the frequency bands identified for IMT;
- f)* that under certain deployment scenarios HIBS could operate at an altitude down to 18 km;
- g)* that some sensitivity studies have shown that the difference of interference from HIBS at altitudes between 18 km and 20 km would be negligible;

- ~~e) — that, in accordance with No. 5.388 and Resolution 212 (Rev.WRC-07)*, administrations may use the bands identified for IMT, including the bands referred to in this Resolution, for stations of other primary services to which they are allocated;~~
- ~~f) — that these bands are allocated to the fixed and mobile services on a co-primary basis;~~
- ~~g) — that, in accordance with No. 5.388A, HAPS may be used as base stations within the terrestrial component of IMT in the bands 1 885-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz in Regions 1 and 3 and 1 885-1 980 MHz and 2 110-2 160 MHz in Region 2. Their use by IMT applications using HAPS as base stations does not preclude the use of these bands by any station in the services to which they are allocated and does not establish priority in the Radio Regulations;~~
- ~~h) — that ITU-R has studied sharing and coordination between HAPS and other stations within IMT, has considered compatibility of HAPS within IMT with some services having allocations in the adjacent bands, and has approved Recommendation ITU-R M.1456;~~
- ~~i) — that radio interfaces of IMT-HAPS are compliant with Recommendation ITU-R M.1457;~~
- ~~j) — that the ITU Radiocommunication Sector (ITU-R) has addressed sharing and compatibility between systems using HAPSHIBS and some existing systems, of primary allocated services, and adjacent services particularly PCS (personal communications system), MMDS (multichannel multipoint distribution system) and systems in the fixed service, which are currently operating in some countries in the frequency bands 1 885-2 025 MHz and 2 110-2 200 MHz;~~
- ~~k) — that HAPS stations are intended to transmit in the band 2 110-2 170 MHz in Regions 1 and 3 and in the band 2 110-2 160 MHz in Region 2;~~
- ~~l) — that administrations planning to implement a HAPS as an IMT base station may need to exchange information, on a bilateral basis, with other concerned administrations, including data items describing the HAPS characteristics in a more detailed manner than the data items currently included in Annex 1 of Appendix 4, as indicated in the Annex to this Resolution;~~
- ~~i) — that spectrum needs, usage and deployment scenarios, and typical technical and operational characteristics for HIBS are provided in the WDPDN Report ITU-R M.[HIBS-CHARACTERISTICS];~~
- ~~j) — that the conclusion of the compatibility studies between HIBS operating above 2 110 MHz and SRS/SOS/EESS operations in the adjacent frequency band 2 025-2 110 MHz and the conclusion of the sharing studies between HIBS and SRS in the frequency band 2 110-2 120 MHz have both been assuming that the use of HIBS in the frequency band 2 110-2 170 MHz is limited to transmission from HIBS,~~
- ~~*recognizing*~~
- ~~a) — that a high-altitude platform station (HAPS) is defined in No. 1.66A 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;~~
- ~~b) — that in Regions 1 and 3, the frequency bands 1 885-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz and, in Region 2, the frequency bands 1 885-1 980 MHz and 2 110-2 160 MHz are included in No. 5.388A for the use of HIBS;~~

* ~~Note by the Secretariat: This Resolution was revised by WRC-15 and WRC-19.~~

c) that the frequency bands 1 885-1 980 MHz, 2 010-2 025 MHz, and 2 110-2 170 MHz, or parts thereof, are identified for IMT in accordance with Nos. **5.384A** and **5.388**;

d) that these frequency bands are allocated to the fixed and mobile services on a co-primary basis,

resolves

1 that:

1.1 for the purpose of protecting IMT mobile stations in neighbouring countries from co-channel interference, a HAPS operating as an IMT base station shall not exceed a co-channel power flux density (pfd) of $-117 \text{ dB(W/(m}^2 \cdot \text{MHz))}$ at the Earth's surface outside a country's borders unless explicit agreement of the affected administration is provided at the time of the notification of HAPS;

1.2 a HAPS operating as an IMT base station shall not transmit outside the frequency bands 2 110-2 170 MHz in Regions 1 and 3 and 2 110-2 160 MHz in Region 2;

1.3 in Region 2, for the purpose of protecting MMDS stations in some neighbouring countries in the band 2 150-2 160 MHz from co-channel interference, a HAPS operating as an IMT base station shall not exceed the following co-channel pfd at the Earth's surface outside a country's borders unless explicit agreement of the affected administration is provided at the time of the notification of the HAPS;

$-127 \text{ dB(W/(m}^2 \cdot \text{MHz))}$ for angles of arrival (θ) less than 7° above the horizontal plane;

$-127 + 0.666(\theta - 7) \text{ dB(W/(m}^2 \cdot \text{MHz))}$ for angles of arrival between 7° and 22° above the horizontal plane; and

$-117 \text{ dB(W/(m}^2 \cdot \text{MHz))}$ for angles of arrival between 22° and 90° above the horizontal plane;

1.4 in some countries (see No. **5.388B**), for the purpose of protecting fixed and mobile services, including IMT mobile stations, in their territories from co-channel interference caused by a HAPS operating as an IMT base station in accordance with No. **5.388A** in neighbouring countries, the limits of **5.388B** shall apply;

2 that the limits referred to in this Resolution shall apply to all HAPS operating in accordance with No. **5.388A**;

3 1 that administrations wishing to implement HAPS within a terrestrial IMT systemHIBS shall comply with the following:

1.1 in some countries (see No. **5.388B**), for the purpose of protecting the fixed and mobile services, including IMT mobile stations, in their territories from co-channel interference caused by HIBS in accordance with No. **5.388A** in neighbouring countries, the limits of No. **5.388B** shall apply;

3.1 for the purpose of protecting IMT stations operating in neighbouring countries from co-channel interference, a HAPS operating as a base station within IMT shall use antennas that comply with the following antenna pattern:

$G(\psi) = G_m - 3(\psi/\psi_b)^2$ dBi for $0^\circ \leq \psi \leq \psi_1$

$G(\psi) = G_m + L_N$ dBi for $\psi_1 < \psi \leq \psi_2$

$G(\psi) = X - 60 \log(\psi)$ dBi for $\psi_2 < \psi \leq \psi_3$

$$G(\psi) = L_F \text{ dBi for } \psi_3 < \psi \leq 90^\circ$$

where:

$G(\psi)$: gain at the angle ψ from the main beam direction (dBi)

G_m : maximum gain in the main lobe (dBi)

ψ_b : one half of the 3 dB beamwidth in the plane considered (3 dB below G_m) (degrees)

L_N : near side lobe level (dB) relative to the peak gain required by the system design, and has a maximum value of -25 dB

L_F : far side lobe level, $G_m = 73$ dBi

$$\psi_1 = \psi_b \sqrt{L_N / 3} \text{ degrees}$$

$$\psi_2 = 3.745 \psi_b \text{ degrees}$$

$$X = G_m + L_N + 60 \log(\psi_2) \text{ dBi}$$

$$\psi_3 = 10^{(X - L_F) / 60} \text{ degrees}$$

The 3 dB beamwidth ($2\psi_b$) is estimated by:

$$(\psi_b)^2 = 7.442 / (10^{0.1 G_m}) \text{ degrees}^2;$$

1.2 for the purpose of protecting IMT mobile stations in the territory of other administrations in the frequency bands 1 885-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz, the power flux-density (pfd) level per HIBS produced at the surface of the Earth in the territory of other administrations shall not exceed the following limit, unless explicit agreement of the affected administration is provided:

$$-111 \text{ dB(W/(m}^2 \cdot \text{MHz)) for } 0^\circ < \theta \leq 90^\circ$$

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

1.3 for the purpose of protecting IMT base stations in the territory of other administrations in the frequency bands 1 850-1 880 MHz, 1 920-1 980 MHz and 2 010-2 025 MHz, the power flux-density (pfd) level per HIBS produced at the surface of the Earth in the territory of other administrations shall not exceed the following limit, unless explicit agreement of the affected administration is provided:

$$-131 + 0.21 (\theta)^2 \text{ dB(W/(m}^2 \cdot \text{MHz)) for } 0^\circ \leq \theta \leq 8.3^\circ$$

$$-116.8 + 0.08 (\theta) \text{ dB(W/(m}^2 \cdot \text{MHz)) for } 8.3^\circ < \theta \leq 90^\circ$$

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

3.2 for the purpose of protecting mobile earth stations within the satellite component of IMT from interference, a HAPS operating as an IMT base station, shall not exceed an out-of-band pfd of -165 dB(W/(m² · 4 kHz)) at the Earth's surface in the bands 2 160-2 200 MHz in Region 2 and 2 170-2 200 MHz in Regions 1 and 3;

1.4 for the purpose of protecting mobile earth stations within the satellite component of IMT in the territory of other administrations in the frequency bands 2 100-2 160 MHz in Region 2 and 2 100-2 170 MHz in Region 3, the power flux-density (pfd) level per HIBS operating in the frequency bands 2 160-2 200 MHz in Region 2 and 2 170-2 200 MHz in Regions 1 and 3 produced

at the surface of the Earth in the territory of other administrations shall not exceed the following out-of-band limit:

$$\underline{\quad\quad\quad -165 \quad\quad\quad \text{dB(W/(m}^2 \cdot 4 \text{ kHz)),}$$

Example 1 for resolves 1.5:

(This provision is not necessary to be included in the Resolution.)

~~3.3~~ a HAPS operating as an IMT base station, in order to protect fixed stations from interference, shall not exceed the following limits of out-of-band power flux density (pfd) at the Earth's surface in the bands 2 025-2 110 MHz:

~~— -165 dB(W/(m² · MHz)) for angles of arrival (θ) less than 5° above the horizontal plane;~~

~~— -165 + 1.75 ($\theta - 5$) dB(W/(m² · MHz)) for angles of arrival between 5° and 25° above the horizontal plane; and~~

~~— -130 dB(W/(m² · MHz)) for angles of arrival between 25° and 90° above the horizontal plane;~~

1.5 (not used);

1.6 for the purpose of protecting fixed-service systems in the territory of other administrations in the frequency bands 1 885-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz, the power flux-density (pfd) level per HIBS produced at the surface of the Earth in the territory of other administrations shall not exceed the following limits, unless explicit agreement of the affected administration is provided:

$$\underline{\quad\quad\quad -144 \quad\quad\quad \text{dB(W/(m}^2 \cdot \text{MHz))} \quad \text{for} \quad 0^\circ < \theta \leq 10^\circ}$$

$$\underline{\quad\quad\quad -144 + 1.6 (\theta - 10) \quad\quad\quad \text{dB(W/(m}^2 \cdot \text{MHz))} \quad \text{for} \quad 10^\circ < \theta \leq 25^\circ}$$

$$\underline{\quad\quad\quad -120 \quad\quad\quad \text{dB(W/(m}^2 \cdot \text{MHz))} \quad \text{for} \quad 25^\circ < \theta \leq 90^\circ}$$

2 that administrations intending to implement HIBS system shall notify, in accordance with Article 11, the frequency assignments to transmitting and receiving HIBS stations by submitting all mandatory elements of Appendix 4 to the Radiocommunication Bureau for the examination of compliance with the conditions specified in the resolves above,

~~4 that, for facilitating consultations between administrations, administrations planning to implement a HAPS as an IMT base station shall furnish to the concerned administrations the additional data elements listed in the Annex to this Resolution, if so requested;~~

~~5 that administrations planning to implement a HAPS as an IMT base station 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 1.1, 1.3 and 1.4 above;~~

~~6 that, since 5 July 2003, the Bureau and administrations provisionally apply Nos. 5.388A and 5.388B as revised by WRC-03 for the frequency assignments to HAPS referred to in this Resolution, including those received before this date but not yet processed by the Bureau,~~

invites administrations

to adopt appropriate frequency arrangements for HIBS in order to consider the benefits of harmonized utilization of the spectrum for HIBS and protection of existing services and systems

operating on a primary basis taking into account the *resolves* above and the relevant ITU-R Recommendations and Reports,

invites ITU-R

~~to develop, as a matter of urgency, an ITU-R Recommendation providing technical guidance to facilitate consultations with neighbouring administrations.~~

instructs the Director of the Radiocommunication Bureau

to take all necessary measures to implement this Resolution.

~~ANNEX TO RESOLUTION 221 (REV.WRC-07)~~

~~Characteristics of a HAPS operating as an IMT base station in the frequency bands given in Resolution 221 (Rev.WRC-07)~~

~~A — General characteristics to be provided for the station~~

~~A.1 — Identity of the station~~

- ~~a) — Identity of the station~~
- ~~b) — Country~~

~~A.2 — Date of bringing into use~~

~~The date (actual or foreseen, as appropriate) of bringing the frequency assignment (new or modified) into use.~~

~~A.3 — Administration or operating agency~~

~~Symbols for the administration or operating agency and for the address of the administration to which communication should be sent on urgent matters regarding interference, quality of emissions and questions referring to the technical operation of the station (see Article 15).~~

~~A.4 — Position information of the HAPS~~

- ~~a) — The nominal geographical longitude for the HAPS~~
- ~~b) — The nominal geographical latitude for the HAPS~~
- ~~c) — The nominal altitude for the HAPS~~
- ~~d) — The planned longitudinal and latitudinal tolerance for the HAPS~~
- ~~e) — The planned tolerance of altitude for the HAPS~~

~~A.5 — Agreements~~

~~If appropriate, the country symbol of any administration or administration representing a group of administrations with which agreement has been reached, including where the agreement is to exceed the limits prescribed in Resolution 221 (Rev.WRC-07).~~

~~B — Characteristics to be provided for each antenna beam~~

~~B.1 — HAPS antenna characteristics~~

- ~~a) — The maximum isotropic gain (dBi).~~

~~b) HAPS antenna gain contours plotted on a map of the Earth's surface.~~

~~C Characteristics to be provided for each frequency assignment for HAPS antenna beam~~

~~C.1 Frequency range~~

~~C.2 Power density characteristics of the transmission~~

~~The maximum value of the maximum power density (dB(W/MHz)), averaged over the worst 1 MHz supplied to the input of the antenna.~~

~~D Calculated pfd limit produced over any country in visibility of HAPS~~

~~The maximum pfd calculated at the Earth's surface within each administration's territory over which the HAPS may be visible and over which these calculated pfd levels exceed the limits indicated in *resolves* 1.1, 1.3 and 1.4 of Resolution 221 (Rev.WRC-07).~~

Reasons: To revise the conditions associated with the use of HIBS in the frequency band 1710 - 1885 MHz, 1885 - 1980 MHz, 2010 - 2025 MHz and 2110 - 2170 MHz for ensuring the protection of existing primary services.

SUP AFCP/6046A4/13

RESOLUTION 247 (WRC-19)

**Facilitating mobile connectivity in certain frequency bands below 2.7 GHz
using high-altitude platform stations as International Mobile
Telecommunications base stations**

Reasons: The work has been completed therefore no need to maintain this resolution.

ADD AFCP/6046A4/14

DRAFT NEW RESOLUTION [A14-HIBS 694-960 MHz] (WRC-23)

**Use of high-altitude platform stations as International Mobile
Telecommunications base stations (HIBS) in the frequency
band 694-960 MHz, or portions thereof**

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that the favourable propagation characteristics of the frequency band 694-960 MHz are beneficial to provide cost-effective solutions for coverage, including large areas of low population density;

- b) that the operation of high-altitude platform stations as International Mobile Telecommunications (IMT) base stations (HIBS) in the same geographical area with existing services may create compatibility issues;
 - c) that it is necessary to adequately protect existing services in this frequency band;
 - d) that there is growing demand for access to mobile broadband, requiring more flexibility in the approaches to expand the capacity and coverage provided by IMT systems;
 - e) that HIBS would be used as part of terrestrial IMT networks, and may use the same frequency bands as ground-based IMT base stations in order to provide mobile-broadband connectivity to underserved communities, and in rural and remote areas;
 - f) that HIBS would offer a new means of providing IMT services with minimal network infrastructure as they are capable of providing service to a large footprint together with a dense coverage;
 - g) that the use of HIBS is optional for administrations, and that such use should not have any priority over other terrestrial IMT use;
 - h) that the mobile station to be served, whether by HIBS or ground-based IMT base stations, is the same, and currently supports a variety of the frequency bands identified for IMT;
 - i) that under certain deployment scenarios, HIBS could operate at an altitude down to 18 km;
 - j) that some sensitivity studies have shown that the difference of interference from HIBS at altitudes between 18 km and 20 km would be negligible;
 - k) that the ITU Radiocommunication Sector (ITU-R) has addressed sharing and compatibility between HIBS and existing systems of primary allocated services, and adjacent services in the frequency band 694-960 MHz;
 - l) that spectrum needs, usage and deployment scenarios, and typical technical and operational characteristics for HIBS are provided in the WDPDN Report ITU-R M.[HIBS-CHARACTERISTICS],
recognizing
- a) that, in Article 5 of the Radio Regulations, the frequency band 694-960 MHz, or parts thereof, is allocated on a primary basis to various services;
 - b) that the use of the frequency band 470-862 MHz by the broadcasting service and other primary services in Region 1 (except Mongolia) and the Islamic Republic of Iran is covered by the GE06 Agreement;
 - c) that high-altitude platform station (HAPS) is defined in No. 1.66A 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;
 - d) that the frequency band 694-960 MHz, or parts thereof, are identified for IMT in accordance with Nos. 5.313A and 5.317A;
 - e) that these frequency bands are allocated to the fixed and mobile services on a co-primary basis;
 - f) that second harmonics of the HIBS downlink transmissions in the frequency band 805.3-806.9 MHz may cause harmful interference to radio astronomy observations in the frequency band 1 610.6-1 613.8 MHz,

emphasizing

that the requirements of the different services to which the frequency band is allocated, including the mobile, aeronautical radionavigation (in accordance with Nos. **5.312** and **5.323**), fixed and broadcasting services, shall be taken into account,

resolves

- 1 (not used);
- 2 (not used);
- 3 that administrations shall take into account the need to protect existing and planned broadcasting stations, both analogue and digital, except analogue in the GE06 planning area, in the frequency band 470-806/862 MHz, as well as other primary terrestrial services;
- 4 that, in Region 1 (excluding Mongolia) and in the Islamic Republic of Iran, the implementation of HIBS is subject to the application of procedures contained in the GE06 Agreement; in so doing:
 - 4.1 administrations that deploy HIBS operating in the frequency band 694/698-862 MHz for which coordination was not required, or without having obtained the prior consent of those administrations that may be affected, shall not cause unacceptable interference to, nor claim protection from, stations of the broadcasting service of administrations operating in conformity with the GE06 Agreement; this should include a signed commitment as required under § 5.2.6 of the GE06 Agreement;
 - 4.2 for the implementation of *resolves* 4.1 above, the notifying administrations of HIBS at the time of submission of Appendix 4 information to the Radiocommunication Bureau (BR) shall also submit an objective, measurable and enforceable commitment that, in case of causing unacceptable interference, it undertakes to immediately reduce the interference to an acceptable level or cease that interference; as for enforceability referred to in this *resolves*, should the interference not be ceased or reduced to acceptable level, the assignments in question shall be submitted by the Bureau to the Radio Regulations Board to review for suppression from the Master International Frequency Register (MIFR) and the Bureau's database;
 - 4.3 administrations that deploy HIBS for which coordination was not required, or without having obtained the prior consent of those administrations that may be affected, shall not object to nor prevent the entry into the GE06 Plan or recording in the Master International Frequency Register (MIFR) of additional future broadcasting allotments or assignments of any other administration in the GE06 Plan with reference to those HIBS;
 - 4.4 the coordination threshold of the power flux-density (pfd) level of $-135.8 \text{ dB(W/(m}^2 \cdot \text{Hz))}$ per HIBS shall be used, instead of those given in Appendix 1 of the GE06 Agreement, which is produced in the territory of other administrations, at the highest of the clutter height or 10 m;
- 5 that, where the GE06 Agreement does not apply, use of the frequency band 728-862 MHz by HIBS is subject to agreement obtained under No. **9.21** with respect to the broadcasting service. The coordination threshold of the power flux-density (pfd) level of $-135.8 \text{ dB(W/(m}^2 \cdot \text{MHz))}$ which is produced in the territory of other administrations, at the highest of the clutter height or 10 m, per HIBS shall be used;
- 6 that administrations wishing to implement HIBS shall comply with the following:
 - 6.1 for the purpose of protecting IMT mobile stations in the territory of other administrations in the frequency band 694-960 MHz, the power flux-density (pfd) level

per HIBS produced at the surface of the Earth in the territory of other administrations shall not exceed the following limit, unless explicit agreement of the affected administration is provided:

$$-114 \quad \text{dB(W/(m}^2 \cdot \text{MHz))} \quad \text{for} \quad 0^\circ < \theta \leq 90^\circ$$

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

- 6.2 for the purpose of protecting IMT base stations in the territory of other administrations in the frequency band 694-960 MHz, the power flux-density (pfd) level per HIBS produced at the surface of the Earth in the territory of other administrations shall not exceed the following limit, unless explicit agreement of the affected administration is provided:

$$-136 + 0.21 (\theta)^2 \quad \text{dB(W/(m}^2 \cdot \text{MHz))} \quad \text{for} \quad 0^\circ \leq \theta \leq 8.3^\circ$$

$$-121.8 + 0.08 (\theta) \quad \text{dB(W/(m}^2 \cdot \text{MHz))} \quad \text{for} \quad 8.3^\circ < \theta \leq 90^\circ$$

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

- 6.3 for the purpose of protecting radio astronomy stations in the frequency band 1 610.6-1 613.8 MHz, the power flux-density (pfd) of HIBS downlinks operating in the frequency band 805.3-806.9 MHz shall not exceed the following value in the frequency band 1 610.6-1 613.8 MHz at any radio astronomy station without the explicit agreement of the affected administrations:

$$-194 \text{ dB(W/(m}^2 \cdot 20 \text{ kHz))};$$

- 6.4 that *resolves* 6.3 applies at any radio astronomy station that was in operation prior to XX November 2023 and has been notified to the BR in the frequency band 1 610.6-1 613.8 MHz before XX May 2024, or at any radio astronomy station that was notified before the date of receipt of the complete Appendix 4 information for notification, for the HIBS system to which *resolves* 6.3 applies; radio astronomy stations notified after this date may seek an agreement with administrations that have authorized HIBS;

- 7 that administrations intending to implement HIBS system shall notify, in accordance with Article 11, the frequency assignments to transmitting and receiving HIBS stations by submitting all mandatory elements of Appendix 4 to the Radiocommunication Bureau for the examination of compliance with the conditions specified in the *resolves* above,

resolves further

that, HIBS may operate in the frequency band 694-960 MHz with an altitude down to 18 km, in derogation to No. **1.66A**,

invites administrations

- 1 to adopt appropriate frequency arrangements for HIBS in order to consider the benefits of harmonized utilization of the spectrum for HIBS and protection of existing services and systems operating on a primary basis taking into account the *resolves* above and the relevant ITU-R Recommendations and Reports;

- 2 to review their entries for the broadcasting service in the MIFR in the frequency band above 694 MHz and to remove those no longer required according to Article 8,

instructs the Director of the Radiocommunication Bureau

to take all necessary measures to implement this Resolution.

Reasons: To determine the conditions associated with the use of HIBS in the frequency band 694 - 960 MHz for ensuring the protection of existing primary services.

ADD AFCP/6046A4/15

DRAFT NEW RESOLUTION [B14-HIBS 2 500-2 690 MHz] (WRC-23)

Use of high-altitude platform stations as International Mobile Telecommunications base stations (HIBS) in the frequency band 2 500-2 690 MHz, or portions thereof

The World Radiocommunication Conference (Dubai, 2023),

considering

- a)* that there is growing demand for access to mobile broadband, requiring more flexibility in the approaches to expand the capacity and coverage provided by International Mobile Telecommunications (IMT) systems;
- b)* that high-altitude platform stations as IMT base stations (HIBS) would be used as part of terrestrial IMT networks, and may use the same frequency bands as ground-based IMT base stations in order to provide mobile-broadband connectivity to underserved communities, and in rural and remote areas;
- c)* that HIBS would offer a new means of providing IMT services with minimal network infrastructure as they are capable of providing service to a large footprint together with a dense coverage;
- d)* that the use of HIBS is optional for administrations, and that such use should not have any priority over other terrestrial IMT use;
- e)* that the IMT mobile station to be served, whether by HIBS or ground-based IMT base stations, is the same, and currently supports a variety of the frequency bands identified for IMT;
- f)* that, under certain deployment scenarios, HIBS could operate at an altitude down to 18 km;
- g)* that some sensitivity studies have shown that the difference of interference from HIBS at altitudes between 18 km and 20 km would be negligible;
- h)* that the ITU Radiocommunication Sector (ITU-R) has addressed sharing and compatibility between HIBS and existing systems of primary allocated services, and adjacent services in the frequency band 2 500-2 690 MHz;
- i)* that spectrum needs, usage and deployment scenarios, and typical technical and operational characteristics for HIBS are provided in the WDPDN Report ITU-R M.[HIBS-CHARACTERISTICS];
- j)* that the frequency band 2 690-2 700 MHz is allocated to the Earth exploration-satellite service (EESS) (passive), the space research service (SRS) (passive) and the radio astronomy service (RAS), and that No. **5.340** applies in this frequency band;
- k)* that in Regions 1 and 2, the use of the frequency band 2 500-2 510 MHz is limited to reception by HIBS, in accordance with Nos. [**5.L14 / 5.M14 / 5.N14 and 5.O14**],

recognizing

- a) that a high-altitude platform station (HAPS) is defined in No. **1.66A** 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;
- b) that, in Regions 1 and 2, the frequency band 2 500-2 690 MHz (2 500-2 510 MHz is limited to reception by HIBS in Regions 1 and 2), and in Region 3, the frequency band 2 500-2 655 MHz (2 500-2 535 MHz is limited to reception by HIBS in Region 3) are included in No[s]. [**5.L14** / **5.M14** / **5.N14**, **5.O14** and **5.P14**] for the use of HIBS;
- c) that the frequency band 2 500-2 690 MHz, or parts thereof, is identified for IMT in accordance with No. **5.384A**;
- d) that this frequency band is allocated to the fixed and mobile services on a co-primary basis;
- e) that, in the frequency band 2 700-2 900 MHz, ground-based meteorological radar stations under the radiolocation service are authorized to operate on a basis of equality with stations of the aeronautical radionavigation service per No. **5.423**,

resolves

1 that administrations wishing to implement HIBS shall comply with the following:

1.1 for the purpose of protecting IMT mobile stations in the territory of other administrations in the frequency band 2 500-2 690 MHz, the power flux-density (pfd) level per HIBS produced at the surface of the Earth in the territory of other administrations shall not exceed the following limit, unless explicit agreement of the affected administration is provided:

$$-109 \quad \text{dB(W/(m}^2 \cdot \text{MHz))} \quad \text{for} \quad 0^\circ < \theta \leq 90^\circ$$

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

1.2 for the purpose of protecting IMT base stations in the territory of other administrations in the frequency band 2 500-2 690 MHz, the power flux-density (pfd) level per HIBS produced at the surface of the Earth in the territory of other administrations shall not exceed the following limit, unless explicit agreement of the affected administration is provided:

$$\begin{aligned} -131 + 0.21 (\theta)^2 & \quad \text{dB(W/(m}^2 \cdot \text{MHz))} \quad \text{for} \quad 0^\circ \leq \theta \leq 8.3^\circ \\ -116.8 + 0.08 (\theta) & \quad \text{dB(W/(m}^2 \cdot \text{MHz))} \quad \text{for} \quad 8.3^\circ < \theta \leq 90^\circ \end{aligned}$$

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

1.3 for the purpose of protecting fixed-service systems in the territory of other administrations in the frequency band 2 500-2 690 MHz, the power flux-density (pfd) level per HIBS produced at the surface of the Earth in the territory of other administrations shall not exceed the following limits, unless explicit agreement of the affected administration is provided:

$$\begin{aligned} -135 & \quad \text{dB(W/(m}^2 \cdot \text{MHz))} \quad \text{for} \quad 0^\circ < \theta \leq 20^\circ \\ -135 + 0.7 (\theta - 20) & \quad \text{dB(W/(m}^2 \cdot \text{MHz))} \quad \text{for} \quad 20^\circ < \theta \leq 47^\circ \\ -116 & \quad \text{dB(W/(m}^2 \cdot \text{MHz))} \quad \text{for} \quad 47^\circ < \theta \leq 90^\circ \end{aligned}$$

1.4 for the purpose of protecting the broadcasting satellite services in the territory of other administrations in the frequency band 2 520-2 630 MHz, the power flux-density (pfd) level per HIBS produced at the surface of the Earth in the territory of other administrations shall not exceed the following limit, unless explicit agreement of the affected administration is provided:

$$-130.5 \quad \text{dB(W/(m}^2 \cdot \text{MHz))} \quad \text{for} \quad 0^\circ < \theta \leq 20^\circ$$

$$-139.8 \qquad \text{dB(W/(m}^2 \cdot \text{MHz))} \quad \text{for} \quad 20^\circ < \theta < 90^\circ$$

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

1.4.1 In addition, in Regions 1 and 3, in the frequency band 2 520-2 690 MHz, the use of HIBS shall not cause unacceptable interference nor claim protection from the broadcasting-satellite service operating in Region 3. Upon receipt of a report of unacceptable interference, the notifying administration of HIBS shall immediately eliminate or reduce interference to an acceptable level;

1.4.2 for the implementation of *resolves* 1.4 above, the notifying administrations of HIBS at the time of submission of Appendix 4 information to the Radiocommunication Bureau (BR) shall also submit an objective, measurable and enforceable commitment that, in case of causing unacceptable interference, it undertakes to immediately cease emission or reduce the interference to an acceptable level; as for enforceability referred to in this *resolves*, should the interference not be ceased or reduced to acceptable level, the assignments in question shall be submitted by the Bureau to the Radio Regulations Board to review for suppression from the Master International Frequency Register (MIFR) and the Bureau's database;

1.5 for the purpose of protecting aeronautical-radionavigation service systems in the territory of other administrations in the frequency band 2 700-2 900 MHz, the power flux-density (pfd) level from HIBS operating in the frequency band 2 500-2 690 MHz produced at the surface of the Earth in the territory of other administrations shall not exceed the following unwanted emissions limit, unless explicit agreement of the affected administration is provided:

$$\begin{aligned} -156.2 & \qquad \text{dB(W/(m}^2 \cdot \text{MHz))} \quad \text{for} \quad \theta \leq 7^\circ \\ -163 + 15 \cdot \log_{10}(\theta - 4) & \text{ dB(W/(m}^2 \cdot \text{MHz))} \quad \text{for} \quad 7^\circ < \theta < 30.5^\circ \\ -141 + 2.7 \cdot \log_{10}(\theta - 4) & \text{ dB(W/(m}^2 \cdot \text{MHz))} \quad \text{for} \quad \theta = 30.5^\circ \\ -157 + 14 \cdot \log_{10}(\theta - 4) & \text{ dB(W/(m}^2 \cdot \text{MHz))} \quad \text{for} \quad 30.5^\circ < \theta \leq 40.5^\circ \\ -101.5 & \qquad \text{dB(W/(m}^2 \cdot \text{MHz))} \quad \text{for} \quad \theta > 40.5^\circ \end{aligned}$$

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

1.6 for the purpose of protecting radiolocation service systems in the territory of other administrations, in particular those systems operating in accordance with No. 5.423, in the frequency band 2 700-2 900 MHz, the power flux-density (pfd) level from HIBS operating in the frequency band 2 500-2 690 MHz produced at the surface of the Earth in the territory of other administrations shall not exceed the following unwanted emissions limit, unless explicit agreement of the affected administration is provided:

$$\begin{aligned} -165.6 & \qquad \text{dB(W/(m}^2 \cdot \text{MHz))} \quad \text{for} \quad \theta \leq 37^\circ \\ -165.6 + 5.5(\theta - 37) & \text{ dB(W/(m}^2 \cdot \text{MHz))} \quad \text{for} \quad 37^\circ < \theta < 45^\circ \\ -121.6 + (\theta - 45) / 3 & \text{ dB(W/(m}^2 \cdot \text{MHz))} \quad \text{for} \quad 45^\circ < \theta \leq 90^\circ \end{aligned}$$

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

1.7 for the purpose of protecting radio astronomy service stations in the frequency band 2 690-2 700 MHz, the power flux-density (pfd) level of HIBS operating in the frequency band 2 500-2 690 MHz produced at any radio astronomy observatory site shall not exceed the following unwanted emissions limit, unless explicit agreement of the affected administration is provided:

$$-177 \qquad \text{dB(W/(m}^2 \cdot 10 \text{ MHz))}$$

1.8 that *resolves* 1.7 applies at any radio astronomy station that was in operation prior to XX November 2023 and has been notified to the Radiocommunication Bureau (BR) in the frequency band 2 690-2 700 MHz before XX May 2024, or at any radio astronomy station that was

notified before the date of receipt of the complete Appendix 4 information for notification, for the HIBS system to which *resolves* 1.7 applies; radio astronomy stations notified after this date need to seek an agreement with administrations that have notified HIBS;

1.9 that for the purpose of protecting MSS (space-to-Earth) and RDSS (space-to-Earth) in the frequency band 2 483.5-2 500 MHz, the use of HIBS platform in the frequency band 2 500-2 690 MHz shall comply with an unwanted emission limit of -30 dBm/MHz in the frequency band 2 483.5-2 500 MHz;

2 that administrations intending to implement HIBS system shall notify, in accordance with Article 11, the frequency assignments to transmitting and receiving HIBS stations by submitting all mandatory elements of Appendix 4 to the Radiocommunication Bureau for the examination of compliance with the conditions specified in the *resolves* above,

resolves further

that HIBS may operate in the frequency band 2 500-2 690 MHz with an altitude down to 18 km, in derogation to No. 1.66A,

invites administrations

to adopt appropriate frequency arrangements for HIBS in order to consider the benefits of harmonized utilization of the spectrum for HIBS and protection of existing services and systems operating on a primary basis taking into account the *resolves* above and the relevant ITU-R Recommendations and Reports,

instructs the Director of the Radiocommunication Bureau

to take all necessary measures to implement this Resolution.

Reasons: To determine the conditions associated with the use of HIBS in the frequency band 2500 - 2690 MHz for ensuring the protection of existing primary services.