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|  | ASIA-PACIFIC TELECOMMUNITY | Document No: |
| **The 2nd Meeting of the APT Conference Preparatory Group for WRC-23 (APG23-2)** | **APG23-2/INF-11** |
| 19 – 23 April 2021, Virtual/Online Meeting | 23 March 2021 |

Chairman, DG on AI 1.4

**brief on wrc-23 agenda item 1.4**

(Note: *This brief was developed for information purpose only. It does not necessarily express the view of APG-23*)

**Agenda Item 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;*

**Relevant Resolutions and Responsible/Contributing ITU-R Groups**

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| 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 | resolves to invite ITU-R1 to study spectrum needs, as appropriate, for high-altitude platform stations as IMT base stations to provide mobile connectivity in the mobile service taking into account:– the existing identification in *recognizing b)*;– the usage and deployment scenario envisioned for high-altitude platform stations as IMT base stations as complementary for terrestrial IMT networks;– the technical and operational characteristics and requirements of high-altitude platform stations as IMT base stations;2 to conduct and complete in time for WRC‑23, taking into account the results of studies already performed and those in progress within ITU‑R, sharing and compatibility studies to ensure the protection of services, without imposing any additional technical or regulatory constraints in their deployment, to which the frequency band is allocated on a primary basis, including other IMT uses, existing systems and the planned development of primary allocated services, and adjacent services, as appropriate, for certain frequency bands below 2.7 GHz, or portions thereof, globally or regionally harmonized for IMT, i.e.:– 694-960 MHz;– 1 710-1 885 MHz (1 710-1 815 MHz to be used for uplink only in Region 3);– 2 500-2 690 MHz (2 500-2 535 MHz to be used for uplink only in Region 3, except 2 655-2 690 MHz in Region 3);3 to study appropriate modifications to the existing footnote and associated resolution in the identification in *recognizing b)* in order to facilitate the use of high-altitude platform stations as IMT base stations with the latest radio interface technologies of IMT;4 to study the definition of high-altitude platform stations as IMT base stations (HIBS) including possible modifications to the provisions of the Radio Regulations, as appropriate;5 to develop ITU‑R Recommendations and Reports, as appropriate, taking into account *resolves to invite ITU-R* 1, 2, 3, and 4 above,further resolves to invite WRC-23to consider, based on the results of the above studies, the use of high altitude platform stations as IMT base stations in certain frequency bands below 2.7 GHz already identified for IMT, on a global or regional level, and take necessary regulatory actions, as appropriate, taking into account that changes to the footnotes in the *recognizing d)* are outside the scope and there should be no additional regulatory or technical constraints imposed on the deployment of ground-based IMT systems in the frequency bands referred to in those footnotes,invites administrationsto participate actively in these studies by submitting contributions to ITU‑R. |

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| **Responsible group** | **Contributing group** |
| WP 5D | WP 3K, WP 3M, WP 4A, WP 4C, WP 5A, WP 5B, WP 5C, WP 6A, WP 7B, WP 7C, WP 7D |

**1. Background Information**

* This Agenda Item was initiated by APT ([24A24-A4](https://www.itu.int/dms_pub/itu-r/md/16/wrc19/c/R16-WRC19-C-0024%21A24-A4%21MSW-E.docx)), ATU ([46A24-A8](https://www.itu.int/dms_ties/itu-r/md/16/wrc19/c/R16-WRC19-C-0046%21A24-A8%21MSW-E.docx)), CITEL ([11A24-A2)](https://www.itu.int/dms_pub/itu-r/md/16/wrc19/c/R16-WRC19-C-0011%21A24-A2%21MSW-E.docx) and PNG ([67A24](https://www.itu.int/dms_pub/itu-r/md/16/wrc19/c/R16-WRC19-C-0067%21A24%21MSW-E.docx)) in WRC-19.
* At WRC-2000, the bands 1 885-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz in Regions 1 and 3 and the bands 1 885-1 980 MHz and 2 110-2 160 MHz in Region 2 were identified in the mobile service for HIBS in RR No. **5.388A** and Resolution **221** **(Rev.WRC-07)** stipulates to develop an ITU-R Recommendation providing technical guidance to facicilate consultations with neighboring administrations for HIBS. Since 2000, IMT systems have evolved significantly in terms of spectrum identification, network deployment and radio access technology, with the standardization of IMT-Advanced and IMT-2020. It is now timely to review the existing ITU Radio Regulations (RR) provisions in order to provide the same flexibility granted in No. **5.388A** to other bands below 2.7 GHz globally or regionally harmonized for IMT.
* In addition, HIBS would be used as part of terrestrial IMT networks and may use the same frequency bands as ground-based IMT base stations. In this sense, the user equipment to be served, whether by the high-altitude or the ground-based IMT base stations, are the same. Currently user equipment already supports a variety of frequency bands identified for IMT, which is another reason to expand the use of HIBS to other globally or regionally harmonized IMT bands below 2.7 GHz.
* List of relevant documents:
* [Recommendation ITU-R M.1456](https://www.itu.int/rec/R-REC-M.1456/recommendation.asp?lang=en&parent=R-REC-M.1456-0-200005-I) “Minimum performance characteristics and operational conditions for high altitude platform stations providing IMT-2000 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”
* [Recommendation ITU-R M.1641](https://www.itu.int/rec/R-REC-M.1641/recommendation.asp?lang=en&parent=R-REC-M.1641-1-200603-I) ” A methodology for co-channel interference evaluation to determine separation distance from a system using high-altitude platform stations to a cellular system to provide IMT-2000 service ”
* [APT/AWG/REP-92](https://www.apt.int/sites/default/files/2019/07/APT-AWG-REP-92_-_Report_on_HIBS.docx) ”APT Report on Technical and Operational Analysis for Using High Altitude Platform Station as IMT Base Stations (HIBS) in the Frequency Bands below 2.7 GHz identified for IMT”

**2. Information on on-going ITU-R Study**

* ITU-R WP 5D is developing WD towards preliminary draft CPM text, WD towards PDN Report ITU-R M.[HIBS-CHARACTERISTICS]/WD related to WRC-23 AI 1.4 and WD towards sharing and compatibility studies of HIBS under WRC-23 agenda item 1.4 (Attachments 4.xx, 4.yy and 4.zz to 5D/545 (=5D/[TEMP/332](https://www.itu.int/md/R19-WP5D-210301-TD-0332/en), TEMP/[335](https://www.itu.int/md/R19-WP5D-210301-TD-0335/en)).
* There are still some points highlighted in the working documents for which different views were expressed. Further discussions are required on those topics in the future WP 5D meetings.
* WD towards PDN Report ITU-R M.[HIBS-CHARACTERISTICS]/WD related to WRC-23 AI 1.4 consists of the following contents; basic concept, spectrum needs, usage and deployment scenarios and technical and operational characteristics. Contentious issues under discussion in WP 5D are as follows:
	1. Spectrum needs
	A new section was proposed to compile possible scenarios received from administrations regarding spectrum needs for HIBS by those administrations, and one proposed study was included in this section. However, discussions are still needed in which cases spectrum needs studies specifically for HIBS are required, considering HIBS is a part of terrestrial IMT and all frequency bands for this agenda item were already identified for IMT.
	2. Operational altitude of HIBS
	There was a proposal to consider 15 – 24 km of operational altitude for the worst-case scenario for sharing and compatibility studies considering the actual operation of HIBS, noting resolves 4 of Resolution 247 (WRC-19) to study the definition of HIBS. Concerns were raised that the altitude lower than 20 km does not meet the definition of *high-altitude platform station* (RR **1.66A**) and cannot be included in studies in this agenda. As a compromise, it was proposed to study at 20 km as a baseline and at lower than 20 km as a sensitivity analysis, however views were still divided whether to include an altitude lower than 20 km or not.
	3. Description of gateway links
	There was a proposal to describe the possibility of providing a gateway link by Inter-HIBS or satellite backhaul in this report so that administrations can consider these links depending on the situation in their country. However, the proposed descriptions were deleted since HIBS gateway links were considered outside the scope of this agenda item in ITU-R.
	4. Parameters of HIBS for sharing and compatibility studies
	Further considerations are required for some parameters.
* WD towards sharing and compatibility studies of HIBS under WRC-23 AI 1.4 was initiated in 37th WP 5D meeting as an initial framework to support the studies under WRC-23 agenda item 1.4 in the frequency ranges of 694-960 MHz, 1 710-1 885 MHz, 1 885-1 980 MHz, 2 010-2 025 MHz, 2 110-2 170 MHz, 2 500-2 690 MHz. It is noted that the list of services and applications that would need to be studied should consider further the information provided by the contributing Working Parties by the deadline of 23 July 2021, and be adjusted as appropriate. Also note that the list of studies should be reviewed after the deadline of 23 July 2021 to check whether information for all the services/applications listed have been received from the responsible WP, and if the information has not been received by WP 5D, the study with such service should be excluded from the list. Different views were raised for the following studies:
	1. Compatibility studies between radio astronomy service in 1 400-1 427 MHz, 1 610.6-1 613.8 MHz and 1 660-1 670 MHz frequency bands and second harmonics of HIBS operating in the 694-960 MHz frequency range
		+ Some views were expressed that studies on second harmonics of RAS should not be performed, as it is not included in Resolution 247 (WRC-19). Also, it would not be necessary considering the FDD arrangements of M.1036 (A4-A11), the possible harmonics listed for RAS would come from the HIBS uplink in the 700 MHz band, and no studies with UE are necessary. Other views were expressed that arrangement A3 (also known as 800 MHz band) is widely used. This arrangement uses a reverse duplexer (BS in the lower part, UE in the upper part). Therefore, in this case the BS’s 2nd harmonics of this arrangement would fall into the 1610.6-1613.8 MHz band.
	2. Sharing and compatibility studies between mobile satellite service (space-to-Earth and Earth-to-Space) in 2 500-2 535 MHz and 2 655-2 690 MHz and HIBS operating in the 2 500-2 690 MHz frequency range
		+ A view was expressed that with regards to MSS(E-s) in 2655-2690 MHz, as invite ITU-R 2 in Res.247, HIBS in Region 3 will not use 2655-2690 MHz. Compatibility studies between MSS operating in 2500-2535 MHz (s-E) and 2655-2690 MHz (E-s) and HIBS operating in adjacent frequency bands in Region 3 may be undertaken and included. Regarding the interference from HIBS in Regions 1 and 2 to MSS(E-s) in Region 3, or part thereof as the case may be, sharing and compatibility studies may be undertaken and included. Other views were expressed that studies are not necessary with MSS bands that are not to be used by HIBS in Region 3.

**3. Position of the Regional Group (if available)**

* ATU
* ASMG (July 2020)
	+ Inviting ASMG administrations to determine the possibility of using HIBS in the bands mentioned in Resolution **247 (WRC-19)** with consideration of sharing and compatibility studies in order to ensure protection of the existing services, including other uses of IMT, in these bans and adjacent bands.
* CEPT (December 2020)
	+ TBD
* CITEL (December 2020)
	+ Preliminary Views
		- Some administrations support studies on WRC-23 agenda item 1.4, in accordance with Resolution **247 (WRC-19)**.
		- An Administration considers that modifications to the identifications to IMT (RR Nos. **5.286AA, 5.317A, 5.341A, 5.341B, 5.341C, 5.346, 5.346A, 5.384A** and **5.388**) in the Radio Regulations are outside the scope of WRC-23 Agenda Item 1.4; there should be no additional regulatory or technical constraints imposed on the deployment of terrestrial IMT in the frequency bands referred to in those footnotes.
* RCC (September 2020)
	+ The RCC Administrations consider it necessary to identify the possibility of using HIBS in the frequency bands referred to in Resolution **247 (WRC-19)**, taking into account the protection requirements for incumbent services, in these and adjacent frequency bands, based on the result of compatibility studies carried out by ITU-R.

**4. Position of International Organizations (if available)**

* ICAO
* IMO
* WMO (February 2020)
	+ WMO is of the opinion that studies must be conducted to specify the HIBS out-of-band unwanted emissions to prevent interference:
		- to meteorological radars in the 2700-2900 MHz band from HIBS operated in the 2500-2690 MHz band,
		- to MetSat service in the 1675-1710 MHz from HIBS operated in the 1710-1885 MHz band.
* IARU R3
* Etc…