

RESOLUTION 218 (WRC-23)

**Use of high-altitude platform stations as International Mobile
Telecommunications base stations in the frequency
band 2 500-2 690 MHz, or portions thereof¹**

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 (HAPS) 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 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, platform transmissions in the frequency band 2 500-2 690 MHz may occur at altitudes down to 18 km, and some sensitivity studies have shown that the difference of interference at this altitude would be negligible;
- g)* that the ITU Radiocommunication Sector (ITU-R) has addressed sharing and compatibility between HIBS and existing systems of primary allocated services in the frequency band 2 500-2 690 MHz and services in the adjacent bands;

¹ HIBS: High-altitude platform station as IMT base station. The conditions in this Resolution refer to these platforms operating between 18 km and 25 km.

h) that the frequency band 2 690-2 700 MHz is allocated to the Earth exploration-satellite service (passive), the space research service (passive) and the radio astronomy service, and that No. **5.340** applies in this frequency band,

recognizing

a) that a 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 (the frequency band 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 (the frequency band 2 500-2 535 MHz is limited to reception by HIBS in Region 3) are included in No. **5.409A** 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, according to No. **5.423**,

resolves

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

1.1 for the purpose of protecting the mobile service, including IMT terrestrial 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:

– the pfd level per HIBS produced at the surface of the Earth in the territory of other administrations shall not exceed the following limit for the protection of IMT mobile stations, 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;

– the pfd level per HIBS produced at the surface of the Earth in the territory of other administrations shall not exceed the following limits for the protection of IMT base stations, unless explicit agreement of the affected administration is provided:

$$-144.55 \quad \text{dB(W/(m}^2 \cdot \text{MHz))} \quad \text{for} \quad 0^\circ \leq \theta < 11^\circ$$

$$-144.55 + 0.45 (\theta - 11) \quad \text{dB(W/(m}^2 \cdot \text{MHz))} \quad \text{for} \quad 11^\circ \leq \theta < 80^\circ$$

$$-113.55 \quad \text{dB(W/(m}^2 \cdot \text{MHz))} \quad \text{for} \quad 80^\circ \leq \theta \leq 90^\circ$$

where θ is the angle of arrival of the incident wave above the horizontal plane, in degrees²;

² The pfd levels to protect IMT base stations will apply unless the affected administration informs the Radiocommunication Bureau that only terminal stations need to be protected.

1.2 for the purpose of protecting the mobile service including IMT terrestrial systems in the territories of Armenia, Azerbaijan, Belarus, the Russian Federation, Kazakhstan, Mongolia, Uzbekistan, Kyrgyzstan, the Democratic People's Republic of Korea, Tajikistan and Turkmenistan in the frequency band 2 500-2 690 MHz, the pfd level per HIBS produced at the surface of the Earth in the territories of the countries listed above in this *resolves* shall not exceed the following limits, unless explicit agreement is received from the administration affected:

-147	dB(W/(m ² · MHz))	for	0° ≤ θ < 11°
-147 + 0.45 (θ - 11)	dB(W/(m ² · MHz))	for	11° ≤ θ < 80°
-116	dB(W/(m ² · MHz))	for	80° ≤ θ < 90°

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 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:

-148	dB(W/(m ² · MHz))	for	0° < θ ≤ 2°
-148 + 0.71 (θ - 2)	dB(W/(m ² · MHz))	for	2° < θ ≤ 47°
-116	dB(W/(m ² · MHz))	for	47° < θ ≤ 90°

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

1.4 for the purpose of protecting the broadcasting-satellite service (BSS) in the territory of other administrations in the frequency band 2 520-2 630 MHz, the 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 is received from the administration affected:

-130.5	dB(W/(m ² · MHz))	for	0° < θ ≤ 20°
-139.8	dB(W/(m ² · MHz))	for	20° < θ < 90°

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

1.4.1 in addition, in Region 3, in the frequency band 2 520-2 630 MHz, the use of HIBS shall not cause unacceptable interference to, nor claim protection from, the BSS operating in Region 3;

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 pfd level per 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 limits, unless explicit agreement of the affected administration is provided:

-156.2	dB(W/(m ² · MHz))	for	θ ≤ 7°
-163 + 15 · log ₁₀ (θ - 4)	dB(W/(m ² · MHz))	for	7° < θ < 30.5°
-141 + 2.7 · log ₁₀ (θ - 4)	dB(W/(m ² · MHz))	for	θ = 30.5°
-157 + 14 · log ₁₀ (θ - 4)	dB(W/(m ² · MHz))	for	30.5° < θ ≤ 40.5°
-101.5	dB(W/(m ² · MHz))	for	θ > 40.5°

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 pfd level per 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 limits, unless explicit agreement of the affected administration is provided:

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

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 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:

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

1.8 *resolves* 1.7 applies at any radio astronomy station that was in operation prior to 15 December 2023 and has been notified to the Radiocommunication Bureau in the frequency band 2 690-2 700 MHz before 17 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* 1.6 applies; for radio astronomy stations notified after these dates an agreement needs to be sought with administrations that have notified HIBS;

1.9 for the purpose of protecting the mobile-satellite service (MSS) (space-to-Earth) and radiodetermination-satellite service (space-to-Earth) in the frequency band 2 483.5-2 500 MHz, the use of HIBS 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;

1.10 for the purpose of protecting MSS (Earth-to-space) in the frequency band 2 655-2 690 MHz in Region 3, the notifying administration of HIBS shall ensure an enforceable commitment that, in case of causing unacceptable interference, it undertakes to immediately cease emission or reduce the interference to an acceptable level;

2 that administrations intending to implement HIBS systems 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 Bureau for the examination of compliance with the conditions specified in the *resolves* above;

3 that the notifying administration of HIBS at the time of submission of the Appendix 4 information shall provide a firm, objective, actionable, measurable and enforceable commitment to the Bureau to immediately eliminate unacceptable interference to existing primary services or reduce it to an acceptable level should such interference occur,

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.