RESOLUTION 221 (REV.WRC-23)

Use of high altitude platform stations as International Mobile Telecommunications base stations in the frequency bands 1 710-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz[1]

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that there is growing demand for access to mobile broadband, requiring more flexibility in approaches to expanding 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 bands 1 710-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 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 bands 1 710-2 025 MHz and 2 110-2 200 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 conclusion of the compatibility studies between HIBS operating above 1 710 MHz and meteorological-satellite service (MetSat) operations in the adjacent frequency band 1 670-1 710 MHz has assumed that the use of HIBS in the frequency band 1 710-1 785 MHz is limited to reception by HIBS;

i) that the conclusion of the compatibility studies between HIBS operating above 2 110 MHz and space research service (SRS)/space operation service/Earth exploration-satellite service 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 assumed that the use of HIBS in the frequency band 2 110-2 170 MHz is limited to transmission from HIBS,

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 3, the frequency bands 1 710-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz and, in Region 2, the frequency bands 1 710-1 980 MHz and 2 110-2 160 MHz are included in No. **5.388A** for the use of HIBS;

c) that the frequency bands 1 710-1 980 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 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 neighbouring administrations in the frequency band 1 710-1 885 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz, the following limits on power flux-density (pfd) shall apply:

– 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:

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

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 limit for the protection of IMT base stations, unless explicit agreement of the affected administration is provided:

-144.55	dB(W/(m^2 · MHz))	for	$0° \le \theta < 11°$
$-144.55 + 0.45\ (\theta - 11)$	dB(W/(m^2 · MHz))	for	$11° \le \theta < 80°$
-113.55	dB(W/(m^2 · MHz))	for	$80° \le \theta \le 90°$

where θ is the angle of arrival of the incident wave above the horizontal plane, in degrees[2].

1.2 for the purpose of protecting mobile service systems 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 bands 1 710-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 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 of the affected administration is provided:

-145	dB(W/(m^2 · MHz))	for	$0° \le \theta < 11°$
$-145 + 0.4347\ (\theta - 11)$	dB(W/(m^2 · MHz))	for	$11° \le \theta < 80°$
-115	dB(W/(m^2 · MHz))	for	$80° \le \theta < 90°$

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 bands 1 710-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 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:

-150	dB(W/(m^2 · MHz))	for	$0° < \theta \le 2°$
$-150 + 1.78\ (\theta - 2)$	dB(W/(m^2 · MHz))	for	$2° < \theta \le 20°$
$-118 + 0.215\ (\theta - 20)$	dB(W/(m^2 · MHz))	for	$20° < \theta \le 48°$
-112	dB(W/(m^2 · MHz))	for	$48° < \theta \le 90°$

[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.

1.4 for the purpose of protecting fixed-service 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 bands 1 710-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 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 of the affected administration is provided:

-165	dB(W/(m^2 · MHz))	for	$0° < \theta \leq 5°$
$-165 + 1.75\ (\theta - 5)$	dB(W/(m^2 · MHz))	for	$5° < \theta \leq 25°$
-130	dB(W/(m^2 · MHz))	for	$25° < \theta \leq 90°$

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

1.5 in order to protect fixed-service systems in Armenia, Azerbaijan, Belarus, the Russian Federation, Kazakhstan, Mongolia, Uzbekistan, Kyrgyzstan, Tajikistan and Turkmenistan from interference, a HIBS shall not exceed the following limits on out-of-band pfd at the surface of the Earth in the territories of the countries listed above in this *resolves* in the frequency band 2 025-2 110 MHz:

-165	dB(W/(m^2 · MHz))	for	$0° < \theta \leq 5°$
$-165 + 1.75\ (\theta - 5)$	dB(W/(m^2 · MHz))	for	$5° < \theta \leq 25°$
-130	dB(W/(m^2 · MHz))	for	$25° < \theta \leq 90°$

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

1.6 for the purpose of protecting mobile earth stations operating in the territory of other administrations in the frequency bands 2 160-2 200 MHz in Region 2 and 2 170-2 200 MHz in Regions 1 and 3, the pfd of the unwanted emissions per HIBS operating in the frequency bands 2 110-2 160 MHz in Region 2 and 2 110-2 170 MHz in Regions 1 and 3 produced at the surface of the Earth in the territory of other administrations shall not exceed the following limit:

-165	dB(W/(m^2 · 4 kHz));

1.7 for the protection of aeronautical mobile service systems operating in the frequency band 1 780-1 850 MHz from harmful interference, administrations planning to implement HIBS operating within 1 135 km of the border of the territory of other administrations in this frequency band shall obtain agreement with all affected administrations prior to implementation of HIBS unless otherwise agreed between the administrations concerned; this condition does not apply in the countries within the African Broadcasting Area, as described in Nos. **5.10**, **5.11**, **5.12** and **5.13**, and Algeria, Egypt, Libya and Morocco in Region 1;

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 Radiocommunication Bureau for the examination of compliance with the conditions specified in the *resolves* above;

3 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.