RESOLUTION 212 (REV.WRC-23)

Implementation of International Mobile Telecommunications in the frequency bands 1 885-2 025 MHz and 2 110-2 200 MHz

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that Resolution ITU-R 56 defines the naming for International Mobile Telecommunications (IMT);

b) that the ITU Radiocommunication Sector (ITU-R), for WRC-97, recommended approximately 230 MHz for use by the terrestrial and satellite components of IMT;

c) that ITU-R studies forecast that additional spectrum may be required to support the future services of IMT and to accommodate future user requirements and network deployments;

d) that ITU-R has recognized that the satellite component is an integral part of IMT;

e) that, in No. **5.388**, WARC-92 identified frequency bands to accommodate certain mobile applications defined as IMT,

noting

a) that both the terrestrial and satellite components of IMT have already been deployed or are being considered for deployment within the frequency bands 1 885-2 025 MHz and 2 110-2 200 MHz;

b) that the availability of the satellite component of IMT in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz simultaneously with the terrestrial component of IMT in the frequency bands identified in No. **5.388** would improve the overall use of IMT,

noting further

a) that co-coverage, co-frequency deployment of independent satellite and terrestrial IMT components is not feasible unless techniques, such as the use of an appropriate guardband or other mitigation techniques, are applied to ensure coexistence and compatibility between the terrestrial and satellite components of IMT, but that co-coverage, co-frequency deployment of terrestrial and satellite components of IMT could be feasible if deployed as integrated networks supported by a system providing the management of frequency utilization by both components;

b) that, when the satellite and terrestrial components of IMT are deployed in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz, technical or operational measures may need to be implemented to avoid harmful interference,

resolves

1 that administrations which implement IMT:

a) should make the necessary frequencies available for system development;

b) should use those frequencies when IMT is implemented;

c) should use the relevant international technical characteristics, as identified by Recommendations of ITU-R and of the ITU Telecommunication Standardization Sector;

2 that administrations should take the technical and operational measures, such as those found in the Annex to this Resolution, to facilitate coexistence and compatibility between the terrestrial and satellite components of IMT in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz;

3 that, in the event of harmful interference, the concerned administrations should investigate and take technical and operational measures, as appropriate, to reduce interference to an acceptable level,

invites the ITU Radiocommunication Sector

to study possible technical and operational measures to improve co-existence and compatibility between the terrestrial and satellite components of IMT in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz where those frequency bands are shared by the mobile service and the mobile-satellite service in different countries, in particular for the deployment of independent satellite and terrestrial components of IMT and to facilitate development of both the satellite and terrestrial components of IMT,

invites administrations

1 to give due consideration to the accommodation of other services currently operating in these frequency bands when implementing IMT;

2 to facilitate coexistence of the satellite component of IMT with the terrestrial component of IMT in the frequency band 1 980-2 010 MHz, by the concerned administrations, as appropriate, considering the following:

a) to apply an uplink direction from user equipment to IMT base stations as provided in the most recent version of Recommendation ITU-R M.1036, for the user equipment belonging to the terrestrial component of IMT in the frequency band 1 980-2 010 MHz (see the Annex to this Resolution);

b) that, in the event of harmful interference to the satellite component of the IMT space station, the concerned administrations may take additional steps to facilitate the reduction of harmful interference to an acceptable level;

3 to facilitate coexistence of the terrestrial component of IMT stations with the satellite component of IMT in the frequency band 2 170-2 200 MHz, by the concerned administrations, as appropriate, considering the following:

a) to apply an appropriate power flux-density value to the IMT space stations in the frequency band 2 170-2 200 MHz (see the Annex to this Resolution);

b) that, in the event of harmful interference to the terrestrial component of IMT, the concerned administrations may take additional steps to facilitate the reduction of harmful interference to an acceptable level.

ANNEX TO RESOLUTION 212 (REV.WRC-23)

Guidance on the implementation of technical and operational measures to facilitate coexistence between terrestrial and satellite components of International Mobile Telecommunications in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz

This Annex provides guidance to concerned administrations on the following technical, operational and other applicable measures in the deployment of terrestrial and satellite components of International Mobile Telecommunications (IMT) for reducing the potential of harmful interference between the terrestrial and satellite components of IMT in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz for the interference scenarios indicated in the table below, noting the applicability of any relevant Article **9** coordination procedures for scenarios A2, B1 and B2. The identified measures may be applicable for some scenarios and may not be applicable to other scenarios, and may or may not be implementable in satellite and terrestrial IMT system designs.

Interference scenarios

Scenario	From	To
A1	Terrestrial IMT base station or mobile station	Satellite IMT space station
A2	Terrestrial IMT base station	Satellite IMT mobile earth station
B1	Satellite IMT mobile earth station	Terrestrial IMT base station or user equipment
B2	Satellite IMT space station	Terrestrial IMT user equipment

1) Measures for the terrestrial component of IMT:

a) Use base station antennas with improved sidelobe performance as shown in relevant ITU-R Recommendations and Reports (e.g. improved antenna patterns compared with those contained in the most recent version of Recommendation ITU-R F.1336).

b) Consider the orientation in elevation and/or in azimuth of the IMT base station antenna pointing in the coexistence analysis with a view to reducing the interference level from the IMT base station above the horizon.

c) Consider the impact of the actual deployment scenario, including the activity factor values of the terrestrial component of IMT, on the coexistence.

d) Consider attenuation from terrain and clutter taking into account the deployment environments and propagation effects in the coexistence analysis.

e) Consider reducing the equivalent isotropically radiated power in the frequency band 1 980-2 010 MHz to a level sufficient for coexistence, for example, nominally to −10 dB(W/5 MHz)[1].

[1] See user terminal characteristics in Report ITU-R M.2292.

f) Set the transmission direction for the use of the frequency band 1 980-2 010 MHz with regard to the IMT base station to operate in receive mode as found in relevant ITU-R Recommendations.

g) Implement other applicable interference mitigation techniques.

2) Measures for the satellite component of IMT:

a) Use narrower spot beams and steeper roll-off from the boresight of the satellite antenna (i.e. not only reducing the interference level from the antenna sidelobe but also increasing frequency reuse and resilience to interference).

b) Antenna steering, where such capability exists in the satellite design.

c) Beamforming and/or beam nulling of the satellite antenna (e.g. digital processing of multi-element beamforming technique, which has the capability to suppress received interference from regions on the Earth).

d) Dynamic frequency management paired with geographical separation (e.g. monitoring interference in real time and dynamically assigning channels and/or beams).

e) Consider reducing the power flux-density to a level sufficient for coexistence, for example to nominally −122 dBW/m^2 for 1 MHz[2] for the protection of some base stations or nominally −108.8 dBW/m^2 for 1 MHz for the protection of some user equipment on the Earth's surface on the territories of other administrations using this frequency band for the terrestrial IMT component.

f) Consider an appropriate elevation angle model of an earth station and handover method by a satellite control system in the coexistence analysis.

g) Consider actual activity factor values, which may result in a reduction of interference.

h) Apply a polarization of the satellite antenna different from that of the terrestrial station receiver (for example, use of linear polarization by the terrestrial station receivers and circular polarization by the satellite may provide some benefit).

i) Implement other applicable interference mitigation techniques.

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2 See Resolution **539 (Rev.WRC-19)** for the frequency band 2 605-2 655 MHz.