RESOLUTION 553 (REV.WRC-23)

Additional regulatory measures for broadcasting-satellite networks in the frequency band 21.4-22 GHz in Regions 1 and 3 for the enhancement of equitable access to this frequency band

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that WARC-92 allocated the frequency band 21.4-22 GHz in Regions 1 and 3 to the broadcasting-satellite service (BSS) to be implemented after 1 April 2007;

b) that the use of the frequency band since 1992 was subject to an interim procedure in accordance with Resolution **525 (WARC-92**, **Rev.WRC-03** and **Rev.WRC-07)**[*];

c) that the frequency band 21.4-22 GHz in Regions 1 and 3 for the BSS was subject to Resolution **507 (Rev.WRC-12)**[**],

considering further

a) that *a priori* planning for BSS networks in the frequency band 21.4-22 GHz in Regions 1 and 3 is not necessary and should be avoided as it freezes access according to technological assumptions at the time of planning and then prevents flexible use taking account of real world demand and technical developments;

b) that WRC-12 established definitive arrangements for the use of the frequency band 21.4-22 GHz;

c) that Articles 12 and 44 of the ITU Constitution lay down the basic principles for the use of the radio-frequency spectrum and the geostationary-satellite and other satellite orbits, taking into account the needs of developing countries;

d) that those principles have been included in the Radio Regulations;

e) that all countries have equal rights in the use of both the radio frequencies allocated to various space radiocommunication services and geostationary-satellite orbit and other satellite orbits for these services;

f) that, accordingly, a country or a group of countries having frequency assignments for the BSS in the frequency band 21.4-22 GHz need to take all practical measures to facilitate the use of new space systems by other countries or groups of countries;

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[*] *Note by the Secretariat*: This Resolution was abrogated by WRC-12.

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

g) that, according to No. **23.13**, in devising the characteristics of a space station in the BSS, all technical means available shall be used to reduce, to the maximum, the radiation over the territory of other countries unless an agreement has been previously reached with such countries,

recognizing

a) that the "first-come, first-served" concept can restrict and sometimes prevents access to and use of certain frequency bands and orbital positions;

b) the relative disadvantage for developing countries in coordination negotiations due to various reasons such as a lack of resources and expertise;

c) the perceived differences in consistency of application of the Radio Regulations,

recognizing further

a) that WRC-12 received information provided by the Bureau or the various submissions received by the Bureau which include assignments in the BSS for Regions 1 or 3 in the frequency band 21.4-22 GHz up until December 2011 and that the table below summarizes the data provided by the Bureau and shows the variations for the number of networks at the various stages;

	Advance publication information	**Coordination request**	**Notification submission**	**Networks in MIFR**	**Resolution 49**	**Confirmed brought into use**
October 2008	605	115	21	2	18	
September 2009	599	158	24	9	22	18
March 2010	558	199	22	11	20	19
June 2010	664	229	22	12	23	19
January 2011	703	242	20	7	18	14
December 2011	890	291	13	8*	16	10*

* Clarification is awaited for one network. One network is suspended under No. **11.49**.

b) that the number of submissions made by some administrations as contained in the above table in this frequency band is large, which may not be realistic and may be difficult to implement within the regulatory time-limit under Article **11**;

c) that the number of submissions as shown in *recognizing further a)* above, is complicating coordination of BSS systems already submitted or planned to be submitted by other administrations,

resolves

that, as of 18 February 2012, the special procedure outlined in the Attachment to this Resolution for processing of coordination requests for BSS frequency assignments in Regions 1 and 3 in the frequency band 21.4-22 GHz shall be applied in respect of submissions of administrations meeting the specified requirements in the Attachment.

ATTACHMENT TO RESOLUTION 553 (REV.WRC-23)

Special procedure to be applied for an assignment for a broadcasting-satellite service system in the frequency band 21.4-22 GHz in Regions 1 and 3

1 The special procedure described in this attachment can only be applied to one network at a time (except as described in § 4 below) by an administration or an administration acting on behalf of a group of named administrations when, for the frequency band 21.4-22 GHz, none of those administrations have:

– a network in the Master International Frequency Register (MIFR), notified under Article **11**; or

– more than one network successfully examined under No. **9.34** and published under No. **9.38** at the same orbital position as the one of the network subject to this special procedure; or

– a network successfully examined under No. **9.34** and published under No. **9.38** at an orbital position different from the one of the network subject to this special procedure.

In the case of countries complying with § 4 below, the special procedure described in this Attachment can also be applied[1] by an administration when the administration has networks in the MIFR, notified under Article **11**, or more than one network successfully examined under No. **9.34** and published under No. **9.38** at the same orbital position as the one of the network subject to this special procedure, or a network successfully examined under No. **9.34** and published under No. **9.38** at an orbital position different from the one of the network subject to this special procedure for the frequency band 21.4-22 GHz, but which, combined, do not include its entire territory in the service area. Each one of the administrations in a group will lose its right to apply this special procedure individually or as a member of another group.

2 In the case that an administration that has already made a submission under this special procedure, either individually or as a part of a group (except as described in § 4 below), at a later stage submits a new submission, this new submission cannot benefit from this special procedure except where the network associated with the previous submission under this special procedure has not been notified prior to the regulatory deadline.

[1] The number of submissions shall not exceed the number of orbital locations for national assignments in the Appendix **30** Plan, reduced by the number of orbit locations of that administration for networks in the MIFR, submissions notified under Article **11** and submissions successfully examined under No. **9.34** and published under No. **9.38**.

3 In order to benefit from the application of this special procedure, the submitting administration may either withdraw or modify its submission previously sent to the Bureau under the normal procedure and successfully examined under No. **9.34** and published under No. **9.38**. In the case of modification, such modification shall remain within the envelope characteristics of the previous submission in order to retain the original date of receipt. If the previous assignment includes several frequency bands, the modification can be applied to the frequency band 21.4-22 GHz to be separated as an independent submission under the special procedure.

4 In order to meet the concerns of some countries with a large territory or dispersed territories that cannot be covered from one orbital location, under this procedure the requirement of such countries having large territory would be met by allowing them to apply this special procedure for submissions to cover their territories from an absolute minimum number of orbital locations[2] that enable them to cover the entire territory in question.

5 Administrations seeking to apply this special procedure shall submit their request to the Bureau, with the following information:

a) the geographical coordinates of not more than 20 points for determining the minimal ellipse[3] to cover its/their national territory[4];

b) the height above sea level of each of its points;

c) any special requirement which is to be taken into account, to the extent practicable.

6 In submitting their request under § 5 above, administrations may seek the assistance of the Bureau to suggest candidate orbital locations for a submission.

7 Upon receipt of the complete information (mentioned in § 5 above) from an administration seeking the assistance of the Bureau under § 6, the Bureau shall expeditiously generate the minimum coverage ellipse and candidate orbital locations (if requested by the administration) for a prospective submission. The Bureau shall send this information to the requesting administration.

8 Before an administration notifies to the Bureau or brings into use a frequency assignment subject to this special procedure, it shall effect coordination with other administrations as required in § 11 below.

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[2] The number of orbital locations shall not exceed the number of orbital locations for national assignments in the Appendix **30** Plan.

[3] In some cases, use of composite beams may be necessary to provide required coverage while reducing undesired coverage of adjacent geographical areas.

[4] Countries requiring more than one orbital location to cover their national territory (see § 4 above) shall submit points for different orbital locations such that the polygons drawn between the points do not overlap with those from other orbital locations of the same administration.

9 Upon receipt of the information under § 7 above, administrations seeking assistance in applying this special procedure shall submit a request for coordination together with the appropriate information listed in Appendix **4**.

10 Administrations not seeking the assistance of the Bureau may submit a request for coordination together with the appropriate information listed in Appendix **4** at the same time as submitting the information under § 5 above.

11 On receipt of the complete information sent under § 9 or § 10 above, the Bureau shall, ahead of submissions not yet processed under No. **9.34**, promptly:

a) examine the information with respect to conformity with Annex 1 to this Attachment and §§ 1 to 4 above;

b) examine the information with respect to its conformity with No. **11.31**;

c) identify, in accordance with Annex 2 to this Attachment, any administration with which coordination may need to be effected[5];

d) include their names in the publication under *e)* below;

e) publish[6], as appropriate, the complete information in its International Frequency Information Circular (BR IFIC) within four months. Where the Bureau is not in a position to comply with the time-limit referred to above, it shall periodically so inform the administrations, giving the reasons therefor;

f) inform the administrations concerned of its actions and communicate the results of its calculations, drawing attention to the relevant BR IFIC.

12 If the information is found to be incomplete, the Bureau shall immediately seek from the administration concerned any clarification required and information not provided.

13 The provisions in this Resolution are in addition to the provisions of Articles **9** and **11**.

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5 The Bureau shall also identify the specific satellite networks with which coordination needs to be effected.

6 If the payments are not received in accordance with the provisions of Council Decision 482, as amended, on the implementation of cost recovery for satellite network filings, the Bureau shall cancel the publication, after informing the administration concerned. The Bureau shall inform all administrations of such action and that the network specified in the publication in question no longer has to be taken into consideration by the Bureau and other administrations. The Bureau shall send a reminder to the notifying administration not later than two months prior to the deadline for the payment in accordance with the above-mentioned Council Decision 482 unless the payment has already been received. (WRC-12)

ANNEX 1

TO

ATTACHMENT TO RESOLUTION 553 (REV.WRC-23)

Technical parameters to be used for submissions for Regions 1 and 3 broadcasting-satellite service networks under the special procedure of this Resolution

a) The receiving earth station antenna diameter should be in the range 45-120 cm. The radiation pattern of the receiving terminal antenna should comply with Recommendation ITU-R BO.1900.

b) The noise temperature of the receiving earth station should be in the range 145-200 K.

c) The transmitting equivalent isotropically radiated power (e.i.r.p.) of the space station shall be in the range from 43.2 dBW/MHz to 58.2 dBW/MHz[7].

d) The service area shall be limited by the national borders of the country and the minimum coverage ellipse generated by the Bureau.

e) In the case of an administration with a large territory or dispersed territories, requiring more than one orbit location to cover the territory of their country, the polygons drawn between the points submitted under § 5 above for each submitted orbital location shall not overlap each other and shall not overlap with service areas of networks of this administration successfully examined under No. **9.34** and published under No. **9.38**.

f) The minimum coverage ellipse, generated from not more than 20 points with associated geographical coordinates[8].

g) The reference pattern of the transmitting space station shall be in compliance with Figure 1 below.

h) The maximum pointing error of the transmitting space station antenna shall be 0.1° in any direction.

i) The maximum rotational error of the transmitting space station antenna shall be ±1°.

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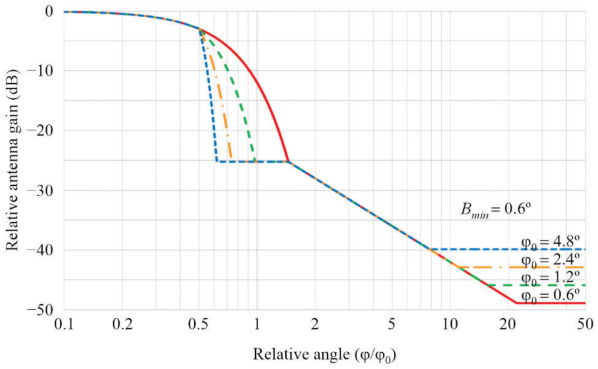
[7] The maximum pfd produced at high elevation angles at the Earth's surface under free-space conditions shall not exceed −105 dB(W/(m^2 · MHz)).

[8] In some cases use of composite beams may be necessary to provide required coverage while reducing undesired coverage of adjacent geographical areas.

FIGURE 1* (WRC-12)

Reference patterns for satellite antennas with fast roll-off in the main beam



$$G_{max} = 44.45 - 10 \log (\varphi_{01} \cdot \varphi_{02}) \quad \text{dBi} \quad \text{(WRC-12)}$$

Curve A: dB relative to main beam gain

$-12\,(\varphi/\varphi_0)^2$ for $0 \le (\varphi/\varphi_0) \le 0.5$

$$-12\left[\frac{(\varphi/\varphi_0)-x}{B_{min}/\varphi_0}\right]^2 \quad \text{for } 0.5 < (\varphi/\varphi_0) \le \left(\frac{1.45B_{min}}{\varphi_0}+x\right)$$

-25.23 for $\left(\frac{1.45\,B_{min}}{\varphi_0}+x\right) < (\varphi/\varphi_0) \le 1.45$

$-(22 + 20 \log (\varphi/\varphi_0))$ for $(\varphi/\varphi_0) > 1.45$

after intersection with Curve B: Curve B.

Curve B: Minus the on-axis gain (Curve B represents examples of four antennas having different values of φ_0 as labelled in Fig. 1. The on-axis gains of these antennas are approximately 39.9, 42.9, 45.9 and 48.9 dBi, respectively) (WRC-12)

where:

φ: off-axis angle (degrees)

φ_0: cross-sectional half-power beamwidth in the direction of interest (degrees)

φ_{01}, φ_{02}: major and minor axis half-power beamwidth, respectively, of elliptical beam (degrees) (WRC-12)

$$x = 0.5\left(1 - \frac{B_{min}}{\varphi_0}\right)$$

where:

$B_{min} = 0.6°$

* Figure 1 represents patterns for some values of φ_0. (WRC-12)

ANNEX 2

TO

ATTACHMENT TO RESOLUTION 553 (REV.WRC-23)

Technical criteria to determine coordination requirements for submissions under the special procedure to be applied for an assignment for a broadcasting-satellite service system in the frequency band 21.4-22 GHz in Regions 1 and 3

Coordination of assignments for a broadcasting-satellite service (BSS) space station with respect to other BSS networks is not required if the power flux-density (pfd) produced under assumed free space propagation conditions does not exceed the threshold values shown below, anywhere within the service area of the potentially affected assignment:

a) this mask shall be applied for frequency assignments subject to this Resolution with regard to frequency assignments not subject to this Resolution for which:

– notification is not submitted under Article **11**; and

– complete information under Resolution **552 (Rev.WRC-23)** is not received by the Bureau,

at the date of receipt of complete information under § 9 and 10 of the Attachment to this Resolution,

-146.88	dB(W/(m^2 · MHz))	for	$0° \le \theta < 0.6°$
$-150.2 + 9.3\ \theta^2$	dB(W/(m^2 · MHz))	for	$0.6° \le \theta < 1.05°$
$-140.5 + 27.2 \log \theta$	dB(W/(m^2 · MHz))	for	$1.05° \le \theta < 2.65°$
$-138.1 + 1.3\ \theta^2$	dB(W/(m^2 · MHz))	for	$2.65° \le \theta < 4.35°$
$-130.2 + 26.1 \log \theta$	dB(W/(m^2 · MHz))	for	$4.35° \le \theta < 9.1°$
-105	dB(W/(m^2 · MHz))	for	$9.1° \le \theta$

where θ is the minimum nominal geocentric orbital separation, in degrees, between the wanted and interfering space stations, taking into account the respective east-west station-keeping accuracies;

b) this mask shall be applied for frequency assignment subject to this Resolution with regard to:

– frequency assignments subject to this Resolution; or

– frequency assignments not subject to this Resolution for which:

  – notification is submitted under Article **11**; or

  – complete information under Resolution **552 (Rev.WRC-23)** is received by the Bureau,

at the date of receipt of complete information under § 9 and 10 of the Attachment to this Resolution,

-149.88	dB(W/(m^2 · MHz))	for	$0° \leq \theta < 0.6°$
$-153.2 + 9.3\ \theta^2$	dB(W/(m^2 · MHz))	for	$0.6° \leq \theta < 1.05°$
$-143.5 + 27.2 \log \theta$	dB(W/(m^2 · MHz))	for	$1.05° \leq \theta < 2.65°$
$-141.1 + 1.3\ \theta^2$	dB(W/(m^2 · MHz))	for	$2.65° \leq \theta < 4.35°$
$-133.2 + 26.1 \log \theta$	dB(W/(m^2 · MHz))	for	$4.35° \leq \theta < 12°$
-105	dB(W/(m^2 · MHz))	for	$12° \leq \theta$

where θ is the minimum nominal geocentric orbital separation, in degrees, between the wanted and interfering space stations, taking into account the respective east-west station-keeping accuracies.