I n t e r n a t i o n a l   T e l e c o m m u n i c a t i o n   U n i o n

FINAL ACTS

of the Regional Radiocommunication Conference for planning of the digital terrestrial broadcasting service in parts of Regions 1 and 3, in the frequency bands 174-230 MHz and 470-862 MHz (RRC-06)

TABLE OF CONTENTS

FINAL ACTS

of the Regional Radiocommunication Conference for planning of the digital terrestrial broadcasting service in parts of Regions 1 and 3, in the frequency bands 174-230 MHz and 470-862 MHz (RRC-06)

Page

Articles

Annexes

Resolutions

Preamble

The First Session of the Regional Radiocommunication Conference for planning of the digital terrestrial broadcasting service in parts of Regions 1 and 3, in the frequency bands 174-230 MHz and 470-862 MHz (Geneva, 10-28 May 2004) adopted Resolution COM5/2 (RRC-04), by which it recommended to the Council to modify Resolution 1185 (modified, 2003) with a view to convening the second session of RRC.

At its 2004 session, the Council resolved, by its Resolution 1224, that the Second Session of the RRC be convened in Geneva from 15 May to 16 June 2006, and established its agenda. The agenda, dates and place of the Conference were approved by the required majority of the Member States of the International Telecommunication Union from the Planning Area.

The RRC-06 met in Geneva for the stipulated period and worked on the basis of the agenda approved by the Council. It adopted the *Regional Agreement relating to the planning of the digital terrestrial broadcasting service in Region 1 (parts of Region 1 situated to the west of meridian 170° E and to the north of parallel 40° S, except the territory of Mongolia) and in the Islamic Republic of Iran, in the frequency bands 174-230 MHz and 470-862 MHz (Geneva, 2006)*, as well as associated Resolutions as contained in these Final Acts.

The delegates signing these Final Acts, which are subject to approval by their competent authorities, declare that, should a Member State of the Union make reservations concerning the application of one or more of the provisions of the Regional Agreement, no other Member State shall be obliged to observe that provision or those provisions in its relations with that particular Member State.

REGIONAL AGREEMENT*

Relating to the planning of the digital terrestrial broadcasting service in Region 1 (parts of Region 1 situated to the west of meridian 170° E and to the north of parallel 40° S, except the territory of Mongolia) and in the Islamic Republic of Iran, in the frequency bands 174-230 MHz and 470-862 MHz

(Geneva, 2006)

PREAMBLE

The undersigned delegates of the following Member States of the International Telecommunication Union:

[XXX, YYY, ZZZ…],

meeting in Geneva from 15 May to 16 June 2006 for a Regional Radiocommunication Conference convened under the terms of the ITU *Constitution* and the ITU *Convention*, as referred to in Article 1 of this *Agreement*, have adopted, subject to approval by their competent authorities, the following provisions concerning the terrestrial broadcasting service in the frequency bands 174-230 MHz[1] and 470-862 MHz, together with provisions for *other primary terrestrial services*, as defined in Article 1 of this *Agreement*, in Region 1 (parts of Region 1 situated to the west of meridian 170° E and to the north of parallel 40° S, except the territory of Mongolia) and in the Islamic Republic of Iran.

---

* The provisions of this Agreement shall apply *mutatis mutandis*, to Palestine as referred to in Resolution 99 (Minneapolis, 1998) subject to Palestine notifying the ITU Secretary-General that it accepts the rights and commits to observe the obligations arising therefrom.

[1] For Morocco, the analogue Plan covers the band 170-230 MHz.

ARTICLES

ARTICLE 1

Definitions

1 For the purposes of this Agreement, the following terms shall have the meanings defined below:

1.1 *Union*: The International Telecommunication Union.

1.2 *Secretary-General*: The Secretary-General of the *Union*.

1.3 *Bureau*: The Radiocommunication Bureau.

1.4 *Constitution*: The Constitution of the *Union*.

1.5 *Convention*: The Convention of the *Union*.

1.6 *Radio Regulations*: The Radio Regulations as referred to in No. **31** of the *Constitution*.

1.7 *Conference*: The Regional Radiocommunication Conference 2006 for the planning of the digital terrestrial broadcasting service in Region 1 (parts of Region 1 situated to the west of meridian 170° E and to the north of parallel 40° S, except the territories of Mongolia) and in the Islamic Republic of Iran, in the frequency bands 174-230 MHz and 470-862 MHz (Geneva, 2006) (RRC-06)[1].

1.8 *Planning Area*: Region 1 (those parts of Region 1, as defined in No. **5.3** of the *Radio Regulations*, situated to the west of meridian 170° E and to the north of parallel 40° S, except the territories of Mongolia) and the Islamic Republic of Iran.

1.9 *Agreement*: The Regional Agreement and its Annexes together with its associated *Plans* as drawn up by the *Conference*.

1.10 *Plans*: The analogue Plan and the digital Plan as specified in § 3.1 of Article 3 of this *Agreement* and as subsequently updated through the successful application of the procedure of § 4.1 of Article 4 of this *Agreement*.

1.11 *Contracting Member*: Any Member State from the *Planning Area* which has approved or acceded to the *Agreement*.

1.12 *Administration*: Unless otherwise indicated, the term Administration designates the Administration, as defined in No. **1002** of the *Constitution*, of a *Contracting Member*.

1.13 *MIFR*: Master International Frequency Register.

1.14 *Other primary terrestrial services*: The primary terrestrial services other than the broadcasting service, and the primary radio astronomy service, to which the frequency bands 174-230 MHz and/or 470-862 MHz are allocated in the *Planning Area* in accordance with Article **5** of the *Radio Regulations*.

---

[1] This *Conference* was held in two sessions:

– the first session, responsible for preparing a report to the second session, was held in Geneva from 10 to 28 May 2004;

– the second session, responsible for drawing up an *Agreement* and associated *Plans*, was held in Geneva from 15 May to 16 June 2006.

1.15 *Existing assignments to other primary terrestrial services* (referred to in short as the "*List*"): Assignments to *other primary terrestrial services* contained in Annex 6 to the *Agreement*, as established by the *Conference,* and assignments to *other primary terrestrial services* for which the procedure of § 4.2 of Article 4 of this *Agreement* has been successfully applied.

1.16 *Transition period*: The period following the *Conference* during which the assignments in the analogue Plan (as specified in § 3.1.2 of Article 3 of this *Agreement*) shall be protected (see also Article 12 of this *Agreement*).

1.17 *BR IFIC*: Radiocommunication Bureau International Frequency Information Circular.

ARTICLE 2

Execution of the Agreement

2.1 The *Contracting Members* shall adopt the characteristics specified in the *Plans* for their broadcasting stations in the *Planning Area* operating in the frequency bands referred to in Article 3 of this *Agreement*.

2.2 The *Contracting Members* shall not modify these characteristics or establish stations, except under the relevant provisions of Articles 4 and 5 of this *Agreement*.

2.3 The *Contracting Members* shall undertake to apply the relevant provisions of Articles 4 and 5 of this *Agreement* for the *other primary terrestrial services* to which these bands are also allocated.

ARTICLE 3

Annexes to the Agreement

3.1 Annex 1: Frequency Plans[2]

3.1.1 The digital Plan consisting of two parts: the 174-230 MHz band and the 470-862 MHz band (comprising T-DAB Plan assignments, T-DAB Plan allotments, DVB-T Plan assignments, DVB-T Plan allotments);

3.1.2 The analogue Plan consisting of two parts: the 174-230 MHz[3] band and the 470-862 MHz band.

3.2 Annex 2: Technical elements and criteria used in the development of the Plan and the implementation of the *Agreement*.

---

[2] After the expiry of the *Transition period*, the *Plans* will only contain the digital Plan.

[3] For Morocco, the analogue Plan covers the band 170-230 MHz.

3.3 Annex 3: Basic characteristics to be submitted in application of the *Agreement*.

3.4 Annex 4

3.4.1 Section I: Limits and methodology for determining when agreement with another administration is required.

3.4.2 Section II: Examination of conformity with the digital Plan entry.

3.5 Annex 5: List of assignments to *other primary terrestrial services* as referred to in § 1.15 of Article 1 of the *Agreement*.

ARTICLE 4

Procedure for modifications to the Plans and procedure for coordination of other primary terrestrial services

4.1 Modifications to the *Plans*

4.1.1 When an administration proposes to make a modification to the digital Plan or the analogue Plan, i.e. in cases where an administration needs:

a) to change the characteristics of an allotment, or of an assignment to a broadcasting station, appearing in the *Plans*; or

b) to add to the *Plans* an allotment, or an assignment to a broadcasting station; or

c) to add to the digital Plan an assignment stemming from an allotment in the digital Plan[4]; or

d) to cancel from the *Plans* an allotment, or an assignment to a broadcasting station,

this administration shall apply the procedure contained in this Article before any notification is made under Article 5.

4.1.2 Initiation of the modification procedure

4.1.2.1 Any administration proposing to change the characteristics of an assignment/allotment appearing in the *Plans*, or to add a new assignment/allotment to the *Plans,* shall seek the agreement of any other administration whose broadcasting service and/or *other primary terrestrial services* are considered to be affected.

4.1.2.2 An administration is considered to be affected in respect of its broadcasting service when the limits given in Section I of Annex 4 are exceeded.

---

[4] If the intention is not to include the assignments into the digital Plan, administrations should directly apply Article 5.

4.1.2.3 An administration is considered to be affected in respect of its *other primary terrestrial services* when the limits given in Section I of Annex 4 are exceeded for any of the following assignments:

a) *existing assignments to other primary terrestrial services*;

b) assignments to *other primary terrestrial services* for which the procedure for coordination with the broadcasting service under § 4.2 has been initiated, i.e. for which the complete information referred to in § 4.2.2.6 has been received by the *Bureau*.

4.1.2.4 The agreement referred to in § 4.1.2.1 is not required if:

a) none of the corresponding limits in Section I of Annex 4 referred to in § 4.1.2.2 and § 4.1.2.3 are exceeded; or

b) the proposed modification relates to changes in the technical characteristics which do not increase the existing level of interference and do not increase the existing level of protection required.

4.1.2.5 An administration proposing to modify the *Plans* shall communicate to the *Bureau* the relevant characteristics listed in Annex 3, in electronic form, and shall also indicate, if appropriate, the names of any administrations which have already agreed to the proposed modification on the basis of the characteristics communicated to the *Bureau*.

This communication shall also be considered by the *Bureau,* if so requested, as a request to apply the procedure contained in § 4.1.5.3 in the following cases:

– no agreements are required under § 4.1.2.4 and no administration's name is included under § 4.1.3.2; or

– all agreements have been received and no administration's name is removed under § 4.1.2.9 or included under § 4.1.3.2.

4.1.2.6 If the characteristics submitted under § 4.1.2.5 are found to be incomplete, the *Bureau* shall immediately seek from the administration proposing to modify the *Plans* any clarification required and the information not provided.

4.1.2.7 In application of § 4.1.1 *c)*, if the *Bureau* finds that, in the case of a conversion of an allotment into one or several assignments, the conditions in Section II of Annex 4 are met, the provisions of § 4.1.5.3 shall apply[5]. Otherwise, the *Bureau* shall request the administration proposing the modification to the digital Plan to take appropriate action. The proposed modification shall lapse if the administration does not modify within 30 days the characteristics so that they comply with Section II of Annex 4. This 30-day period starts on the date of the dispatch of the *Bureau's* request.

4.1.2.8 On receipt of the complete information referred to in § 4.1.2.5 or § 4.1.2.6, as appropriate, the *Bureau* shall, within 40 days:

a) identify the administrations considered to be affected, in accordance with § 4.1.2.2 and § 4.1.2.3;

---

[5] In the case of assignments stemming from an allotment in the digital Plan which bears remarks in the "remarks" columns of the Plan, these remarks shall be extended to these assignments.

b) publish the characteristics received in the Special Section of the *BR IFIC*, together with the names of the administrations identified, indicating those whose agreement has been communicated under § 4.1.2.5 by the administration proposing to modify the *Plans*, if appropriate, and the corresponding assignments to the *other primary terrestrial services* which are considered to be affected, if appropriate;

c) inform the administrations identified in *a)* above.

4.1.2.9 An administration whose agreement has been communicated to the *Bureau* under § 4.1.2.5, may, within 40 days from the date of the publication of the *BR IFIC* referred to in § 4.1.2.8 *b)*, request the *Bureau* to remove its name from the list of administrations having given their agreement, as published under § 4.1.2.8 *b)*. A copy of this request shall be sent by the *Bureau* to the administration proposing to modify the *Plans*. In the case of the removal of the name of an administration from the list of administrations having given their agreement, as published under § 4.1.2.8 *b)*, the *Bureau* shall consider that the agreement with that administration has not been obtained.

4.1.3 Request for inclusion in the agreement-seeking process

4.1.3.1 Any administration which considers that it should have been included in the list of administrations considered to be affected may, within 40 days from the date of publication of the *BR IFIC* referred to in § 4.1.2.8 *b)*, request the *Bureau* to include its name in the list of administrations considered to be affected, giving its reasons for doing so based on criteria in Section I of Annex 4.

4.1.3.2 On receipt of this request, the *Bureau* shall examine the matter and, if in accordance with § 4.1.2.2 and § 4.1.2.3, it finds that the name of the administration should have been included in the list of administrations considered to be affected, it shall:

– inform immediately the administration proposing to modify the *Plans* and the administration requesting to be included in the list of administrations considered to be affected; and

– publish, within 30 days from the date of receipt of the request, the name of the administration in an addendum to the Special Section of the *BR IFIC* referred to in § 4.1.2.8 *b)*, and the corresponding assignments to *other primary terrestrial services*, if appropriate.

For the administration whose name has been published in the addendum, the overall period of 75 days specified in § 4.1.4.6, 4.1.4.7, 4.1.4.8, 4.1.4.9, 4.1.4.10 and 4.1.5.1 shall be counted from the date of publication of the addendum to the Special Section of the *BR IFIC* referred to above.

If the *Bureau* finds that the name of the administration should not be included in the list of administrations considered to be affected, it shall inform this administration.

4.1.3.3 The administration proposing to modify the *Plans* shall seek the agreement of the administrations whose agreement has not been obtained (see also § 4.1.2.9) and which are listed in the publication referred to in § 4.1.2.8 *b)* or § 4.1.3.2, as appropriate, by applying the procedure contained in § 4.1.4 below.

4.1.3.4 If all agreements have been received and no administration's name is removed under § 4.1.2.9 and no administration's name is included under § 4.1.3.2, the procedure contained in § 4.1.5.3 applies.

4.1.4 Seeking agreement of the administrations which are considered to be affected and whose agreement has yet to be obtained

4.1.4.1 The Special Section of the *BR IFIC* referred to in § 4.1.2.8 *b)* or § 4.1.3.2, as appropriate, constitutes the formal request for coordination addressed to those administrations whose agreement has yet to be obtained.

4.1.4.2 When seeking the agreement of another administration, the administration proposing to modify the *Plans* may also communicate any additional information relating to proposed criteria to be used as well as other details concerning the terrain data, particular propagation conditions, etc.

4.1.4.3 On receipt of the Special Section of the *BR IFIC* referred to in § 4.1.2.8 *b)* or § 4.1.3.2, as appropriate, any administration listed therein shall examine the effect of the proposed modification to the digital Plan or to the analogue Plan on its broadcasting service and on its assignments to *other primary terrestrial services*, taking into account, as far as possible, the additional information referred to in § 4.1.4.2.

4.1.4.4 An administration from which agreement is sought may request the *Bureau* to assist by providing further information to enable the administration to assess the interference from the proposed modification, using the method described in Section I of Annex 4. The *Bureau* shall send this information by the most expeditious means.

4.1.4.5 An administration from which agreement is sought may send its comments to the administration proposing the modification to the *Plans* either directly or through the *Bureau*. In any event, the *Bureau* shall be informed of these comments.

4.1.4.6 An administration which is not in a position to give its agreement to the proposed modification with respect to its broadcasting service shall give its decision, with reasons related to its broadcasting service, within 75 days from the date of publication of the *BR IFIC* referred to in § 4.1.2.8 *b)* or § 4.1.3.2, as appropriate.

4.1.4.7 An administration which is not in a position to give its agreement to the proposed modification with respect to its *other primary terrestrial services* shall give its reasons, based on its own assignments as referred to in § 4.1.2.3 *a)* and *b)*, within 75 days from the date of publication of the *BR IFIC* referred to in § 4.1.2.8 *b)* or § 4.1.3.2, as appropriate.

4.1.4.8 Fifty days after publication of the *BR IFIC* referred to in § 4.1.2.8 *b)* or § 4.1.3.2, as appropriate, the *Bureau* shall request any administration which has not yet given its decision on the matter to do so. After an overall period of 75 days following the date of publication of the *BR IFIC*, the *Bureau* shall immediately inform the administration proposing the modification to the *Plans* that it has sent out the aforementioned requests and provide it with the names of the administrations which have given their agreement and the name of the administrations which have not replied.

4.1.4.9 When an administration has not replied within this 75-day period, it is deemed that this administration has not agreed to the proposed modification to the *Plans*, unless the provisions of § 4.1.4.10 and § 4.1.4.11 are applied.

4.1.4.10 After this 75-day period, the administration proposing to modify the *Plans* may request the *Bureau* to assist by sending a reminder to the administration which has not replied, requesting a decision. This request shall in no way extend the 24-month period mentioned in § 4.1.5.1.

4.1.4.11 If no decision is communicated to the *Bureau* within 40 days after the date of dispatch of the reminder under § 4.1.4.10, it shall be deemed that the administration which has not given a decision has agreed to the proposed modification to the *Plans*.

4.1.4.12 If, at the end of the periods mentioned in § 4.1.4.9 or § 4.1.4.11 above, there is continuing disagreement, the *Bureau* shall conduct any study that may be requested by either the administration proposing the modification to the *Plans* or administrations from which agreement is sought; within 40 days, it shall inform them of the result of the study and shall make such recommendations as it may be able to offer for the solution of the problem.

4.1.4.13 An administration may, before applying the procedures in § 4.1, or at any stage during application of the procedure described therein, request the assistance of the *Bureau* without this having any implication on the application of the above-mentioned periods.

4.1.4.14 If, in seeking agreement, an administration modifies its initial proposal, it shall again apply the provisions of § 4.1.

4.1.5 Completion of the modification procedure

4.1.5.1 When an administration has obtained the agreement of all the administrations whose names were published in the *BR IFIC* referred to in § 4.1.2.8 *b)* or § 4.1.3.2, as appropriate, it shall inform the *Bureau* of the final agreed characteristics of the assignment/allotment together with the names of the administrations with which agreement has been reached. If the administration proposing the modification to the *Plans* does not inform the *Bureau* within 24 months after the 75-day period referred to in § 4.1.4.6 to § 4.1.4.10, the proposed modification shall lapse.

4.1.5.2 If the above-mentioned final agreed characteristics result in the identification of new affected administrations, the administration proposing the modification to the *Plans* shall again apply the provisions of § 4.1 with respect to these new administrations.

4.1.5.3 From the receipt of the complete information referred to in § 4.1.5.1, the *Bureau* shall, within 30 days, publish in the Special Section of the *BR IFIC* the characteristics of the assignment/allotment together with the names of the administrations which have agreed to the proposed modification to the *Plans* and include the new or modified assignment/allotment in the *Plans*, as appropriate. With respect to *Contracting Members*, the assignment/allotment concerned shall enjoy the same status as those appearing in the *Plans*. However, in the case of an assignment in the Plan resulting from the conversion of an allotment, this assignment shall remain in accordance with the allotment from which it stems and in conformity with Section II of Annex 4.

4.1.5.4 The agreement of the administration(s) affected may also be obtained in accordance with this Article for a specific period of time. The assignment or allotment, as appropriate, shall be removed from the *Plans* and/or from the *MIFR*, as appropriate, by the *Bureau* at the end of this period of time, after it has informed the administration.

4.1.6 Cancellation of an assignment or an allotment

When an assignment or an allotment in the *Plans* is cancelled either under § 4.1.1 *d)* or § 4.1.5.4, the *Bureau* shall publish this information in a Special Section of the *BR IFIC*.

In the case of the cancellation of an allotment, the *Bureau* shall cancel all assignments stemming from this allotment from the digital Plan and from the *MIFR* after having informed the administration.

4.1.7 Updating of the *Plans*

The *Bureau* shall maintain and publish periodically an up-to-date master copy of the *Plans*, taking account of any changes, additions and deletions made in accordance with the procedure of this Article.

4.2 Coordination of assignments to *other primary terrestrial services* with the broadcasting service

4.2.1 When an administration proposes to change the characteristics of an *existing assignment to other primary terrestrial services*, or to bring into use a new assignment to *other primary terrestrial services*, the procedure contained in this Article shall be applied before any notification is made under the provisions of Article 5.

4.2.2 Initiation of the coordination procedure

4.2.2.1 In application of § 4.2.1, an administration shall seek the agreement of any other administration whose broadcasting service is considered to be affected.

4.2.2.2 An administration is considered to be affected in respect of its broadcasting service when the limits given in Section I of Annex 4 are exceeded.

4.2.2.3 The agreement referred to in § 4.2.2.1 is not required if:

a) none of the corresponding limits in Section I of Annex 4 referred to in § 4.2.2.2 are exceeded; or

b) the proposed modification relates to changes in the technical characteristics which do not increase the existing level of interference and do not increase the existing level of protection required.

4.2.2.4 An administration proposing a new or modified assignment shall communicate to the *Bureau* the relevant characteristics listed in Annex 3, in electronic form, and shall also indicate, if appropriate, the names of any administrations which have already agreed to the proposed new or modified assignment on the basis of the characteristics communicated to the *Bureau*.

This communication shall also be considered by the *Bureau,* if so requested, as a request to apply the procedure contained in § 4.2.5.3 in the following cases:

– no agreements are required under § 4.2.2.3 and no administration's name is included under § 4.2.3.2; or

– all agreements have been received and no administration's name is removed under § 4.2.2.7 or included under § 4.2.3.2.

4.2.2.5 If the characteristics submitted under § 4.2.2.4 are found to be incomplete, the *Bureau* shall immediately seek from this administration any clarification required and the information not provided.

4.2.2.6 On receipt of the complete information referred to in § 4.2.2.4 or § 4.2.2.5, as appropriate, the *Bureau* shall, within 40 days:

a) identify the administrations considered to be affected, in accordance with § 4.2.2.2;

b) publish the characteristics received in the Special Section of the *BR IFIC*, together with the names of the administrations identified, indicating those whose agreement has been communicated under § 4.2.2.4 by the administration seeking the agreement;

c) inform the administrations identified in *a)* above.

4.2.2.7 An administration whose agreement has been communicated to the *Bureau* under § 4.2.2.4 may, within 40 days from the date of the publication of the *BR IFIC* referred to in § 4.2.2.6 *b)*, request the *Bureau* to remove its name from the list of administrations having given their agreement, as published under § 4.2.2.6 *b)*. A copy of this request shall be sent by the *Bureau* to the administration seeking the agreement. In the case of the removal of a name of an administration from the list of administrations having given their agreement, as published under § 4.2.2.6 *b)*, the *Bureau* shall consider that the agreement with that administration has not been obtained.

4.2.3 Request for inclusion in the agreement-seeking process

4.2.3.1 Any administration which considers that it should have been included in the list of administrations considered to be affected may, within 40 days from the date of publication of the *BR IFIC*, request the *Bureau* to include its name in the list of administrations considered to be affected, giving its reasons for doing so based on criteria in Section I of Annex 4.

4.2.3.2 On receipt of this request, the *Bureau* shall examine the matter and, if in accordance with § 4.2.2.2, it finds that the name of the administration should have been included in the list of administrations considered to be affected, it shall:

– inform immediately the administration seeking the agreement and the administration requesting to be included in the list of administrations considered to be affected; and

– publish, within 30 days from the date of receipt of the request, the name of the administration in an addendum to the Special Section of the *BR IFIC* referred to in § 4.2.2.6 *b)*.

For the administration whose name has been published in the addendum, the overall period of 75 days specified in § 4.2.4.6, 4.2.4.7, 4.2.4.8, 4.2.4.9 and 4.2.5.1 shall be counted from the date of publication of the addendum to the Special Section of the *BR IFIC* referred to above.

If the *Bureau* finds that the name of the administration should not be included in the list of administrations considered to be affected, it shall inform this administration.

4.2.3.3 The administration proposing the new or modified assignment shall seek the agreement of the administrations whose agreement has not been obtained (see also § 4.2.2.7) and which are listed in the publication referred to in § 4.2.2.6 *b)* or § 4.2.3.2, as appropriate, by applying the procedure contained in § 4.2.4 below.

4.2.3.4 If all agreements have been received and no administration’s name is removed under § 4.2.2.7 and no administration’s name is included under § 4.2.3.2, the procedure contained in § 4.2.5.3 applies.

4.2.4 Seeking agreement of the administrations which are considered to be affected and whose agreement has yet to be obtained

4.2.4.1 The Special Section of the *BR IFIC* referred to in § 4.2.2.6 *b)* or § 4.2.3.2, as appropriate, constitutes the formal request for coordination addressed to those administrations whose agreement has yet to be obtained.

4.2.4.2 When seeking the agreement of another administration, the administration proposing the new or modified assignment may also communicate any additional information relating to proposed criteria to be used as well as other details concerning the terrain data, particular propagation conditions, etc.

4.2.4.3 On receipt of the Special Section of the *BR IFIC* referred to in § 4.2.2.6 *b)* or § 4.2.3.2, as appropriate, any administration listed therein shall examine the effect of the proposed new or modified assignment on its broadcasting service, taking into account, as far as possible, the additional information referred to in § 4.2.4.2.

4.2.4.4 An administration from which agreement is sought may request the *Bureau* to assist by providing further information to enable the administration to assess the interference from the proposed new or modified assignment, using the method described in Section I of Annex 4. The *Bureau* shall send this information by the most expeditious means.

4.2.4.5 An administration from which agreement is sought may send its comments to the administration proposing the new or modified assignment, either directly or through the *Bureau*. In any event, the *Bureau* shall be informed of these comments.

4.2.4.6 An administration which is not in a position to give its agreement to the proposed new or modified assignment shall give its decision, with reasons related to its broadcasting service, within 75 days from the date of publication of the *BR IFIC* referred to in § 4.2.2.6 *b)* or § 4.2.3.2, as appropriate.

4.2.4.7 Fifty days after publication of the *BR IFIC* referred to in § 4.2.2.6 *b*) or § 4.2.3.2, as appropriate, the *Bureau* shall request any administration which has not yet given its decision on the matter to do so. After an overall period of 75 days following the date of publication of the *BR IFIC*, the *Bureau* shall immediately inform the administration proposing the new or modified assignment that it has sent out the aforementioned requests and provide it with the names of the administrations which have given their agreement and the name of the administrations which have not replied.

4.2.4.8 When an administration has not replied within this 75-day period, it is deemed that this administration has not agreed to the proposed new or modified assignment, unless the provisions of § 4.2.4.9 and § 4.2.4.10 are applied.

4.2.4.9 After the 75-day period, the administration proposing the new or modified assignment may request the *Bureau* to assist by sending a reminder to the administration which has not replied, requesting a decision. This request shall in no way extend the 24-month period mentioned in § 4.2.5.1.

4.2.4.10 If no decision is communicated to the *Bureau* within 40 days after the date of dispatch of the reminder under § 4.2.4.9, it shall be deemed that the administration which has not given a decision has agreed to the proposed new or modified assignment.

4.2.4.11 If, at the end of the periods mentioned in § 4.2.4.8 or § 4.2.4.10 above, there is continuing disagreement, the *Bureau* shall conduct any study that may be requested by either the administration proposing the new or modified assignment or administrations from which agreement is sought; within 40 days, it shall inform them of the result of the study and shall make such recommendations as it may be able to offer for the solution of the problem.

4.2.4.12 An administration may, before applying the procedures in § 4.2, or at any stage during application of the procedure described therein, request the assistance of the *Bureau* without this having any implication on the application of the above-mentioned periods.

4.2.4.13 If, in seeking agreement, an administration modifies its initial proposal, it shall again apply the provisions of § 4.2.

4.2.5 Completion of the coordination procedure

4.2.5.1 When an administration has obtained the agreement of all the administrations whose names were published in the *BR IFIC* referred to in § 4.2.2.6 *b)* or § 4.2.3.2, as appropriate, it shall inform the *Bureau* of the final agreed characteristics of the assignment together with the names of the administrations with which agreement has been reached. If the administration proposing the new or modified assignment does not inform the *Bureau* within 24 months after the 75-day period referred to in § 4.2.4.6 to 4.2.4.9, the proposed modification shall lapse.

4.2.5.2 If the above-mentioned final agreed characteristics result in the identification of new affected administrations, the administration proposing the new or modified assignment shall again apply the provisions of § 4.2 with respect to these new administrations.

4.2.5.3 From the receipt of the complete information referred to in § 4.2.5.1, the *Bureau* shall, within 30 days, publish in the Special Section of the *BR IFIC* the characteristics of the assignment together with the names of the administrations which have agreed to the proposed new or modified assignment and include the new or modified assignment in the *List*.

4.2.5.4 The proposed new or modified assignment shall lapse if it is not notified under Article 5 within 12 months after the publication referred to in § 4.2.5.3.

4.2.5.5 The agreement of the administration(s) affected may also be obtained in accordance with this Article for a specific period of time. The assignment shall be removed from the *List* and/or from the *MIFR*, as appropriate, by the *Bureau* at the end of this period of time, after it has informed the administration.

4.2.6 Updating of the *List*

The *Bureau* shall maintain and publish periodically an up-to-date master copy of the *List*, taking account of any changes, additions and deletions made in accordance with the procedure of this Article.

ARTICLE 5

Notification of frequency assignments

5.1 Notification of frequency assignments to broadcasting stations

5.1.1 When an administration proposes to bring into use an assignment to a broadcasting station, it shall notify to the *Bureau*, in accordance with the provisions of Article **11** of the *Radio Regulations*, the characteristics of this assignment, as specified in Annex 3 of the *Agreement*.

5.1.2 Under the examination by the *Bureau* of the assignment with respect to No. **11.34** of the *Radio Regulations*, i.e. its conformity with the *Plans* and the associated provisions, the finding shall be favourable if:

a) the assignment is contained in the *Plans*[6] and not bearing any remark with respect to assignments in the analogue Plan, to *existing assignments to other primary terrestrial services* or to entries in the digital Plan, and the conditions of Section II of Annex 4 are met; or

b) the assignment is contained in the digital Plan and bearing a remark with respect to:

– assignments in the analogue Plan or to *existing assignments to other primary terrestrial services*, and all the necessary agreements have been obtained, and the conditions of Section II of Annex 4 are met; and/or

– entries in the digital Plan, and the notifying administration states that all conditions associated with the remark are fully met, and the conditions of Section II of Annex 4 are met; or

c) in the case of an assignment stemming from an allotment in the digital Plan, which does not bear any remark with respect to assignments in the analogue Plan, to *existing assignments to other primary terrestrial services*, or to entries in the digital Plan, the conditions of Section II of Annex 4 are met; or

d) in the case of an assignment stemming from an allotment in the digital Plan, which bears a remark with respect to:

– assignments in the analogue Plan or to *existing assignments to other primary terrestrial services*, all the necessary agreements have been obtained and the conditions of Section II of Annex 4 are met; and/or

– entries in the digital Plan, the conditions of Section II of Annex 4 are met and the notifying administration states that all conditions associated with the remark are fully met; or

e) in the case of the use of an entry in the digital Plan, with different characteristics, within the DVB-T or T-DAB systems, the conditions specified in Section II of Annex 4 are met.

5.1.3 A digital entry in the Plan may also be notified with characteristics different from those appearing in the Plan, for transmissions in the broadcasting service or in *other primary terrestrial services* operating in conformity with the *Radio Regulations*, provided that the peak power density in any 4 kHz of the above-mentioned notified assignments shall not exceed the spectral power density in the same 4 kHz of the digital entry in the Plan. Such use shall not claim more protection than that afforded to the above-mentioned digital entry.

---

[6] This provision shall not be applicable to the analogue Plan after the end of the *Transition period*.

5.1.4 If the examination referred to in § 5.1.2, and § 5.1.3 where appropriate, leads to a favourable finding, the assignment shall be recorded in the *MIFR*. In relations between *Contracting Members,* all broadcasting frequency assignments recorded in the *MIFR* and in conformity with the *Agreement* shall be considered to have the same status irrespective of the date of receipt of the notices by the *Bureau* for such frequency assignments or of the date on which they are brought into service.

5.1.5 If the examination referred to in § 5.1.2 or § 5.1.3, as appropriate, leads to an unfavourable finding, the notice shall be returned to the notifying administration with the reasons therefor.

5.1.6 If the administration resubmits the notice and the re-examination by the *Bureau* under § 5.1.2, and § 5.1.3 where appropriate, leads to a favourable finding, the assignment shall be recorded in the *MIFR*.

5.1.7 If the re-examination under § 5.1.2 leads to an unfavourable finding, the assignment shall be recorded with a favourable finding under No. **11.31**, and with an unfavourable finding under No. **11.34** together with the name(s) of the administration(s) with which there is continuing disagreement, indicating that with respect to this (these) administration(s) the recorded assignment shall be operated under the conditions of not causing unacceptable interference to, and not claiming protection from, any station operating in conformity with the *Agreement* and its associated *Plans*.

5.1.8 The notice for resubmission shall also include a signed commitment by the notifying administration, indicating that use of an assignment submitted for recording in the *MIFR* under § 5.1.7 shall not cause unacceptable interference to, nor claim protection from, any station of the administration with which there is continuing disagreement operating in conformity with the *Agreement* and its associated *Plans* and recorded in the *MIFR* with a favourable finding with respect to Nos. **11.31** and **11.34**.

5.1.9 Should unacceptable interference be caused by the use of this assignment to any assignment of the administration with which there is continuing disagreement operating in conformity with the *Agreement* and its associated *Plans* and recorded in the *MIFR* with a favourable finding with respect to Nos. **11.31** and **11.34**, the administration causing unacceptable interference shall, upon receipt of advice thereof, immediately eliminate this interference.

5.2 Notification of frequency assignments to *other primary terrestrial services*

5.2.1 When an administration proposes to bring into use an assignment to *other primary terrestrial services*, it shall notify the assignment to the *Bureau* in accordance with the provisions of Article **11** of the *Radio Regulations*.

5.2.2 Under the examination by the *Bureau* of conformity with the *Agreement*, the *Bureau* shall examine the notice with respect to the successful application of the procedure contained in § 4.2 of the *Agreement*.

5.2.3 If the examination referred to in § 5.2.2 above leads to a favourable finding, the assignment shall be recorded in the *MIFR*. Otherwise, the notice shall be returned to the notifying administration with the reasons therefor.

5.2.4 If the administration resubmits the notice and the re-examination by the *Bureau* under § 5.2.2 above leads to a favourable finding, the assignment shall be recorded in the *MIFR* accordingly.

5.2.5 If the re-examination under § 5.2.2 leads to an unfavourable finding, the assignment shall be recorded with a favourable finding under No. **11.31**, and with an unfavourable finding under No. **11.34** together with the name(s) of the administration(s) with which there is continuing disagreement, indicating that with respect to this (these) administration(s) the recorded assignment shall be operated under the conditions of not causing unacceptable interference to, and not claiming protection from, any station operating in conformity with the *Agreement* and its associated *Plans*.

5.2.6 The notice for resubmission shall also include a signed commitment by the notifying administration, indicating that use of an assignment recorded in the *MIFR* under § 5.2.5 shall not cause unacceptable interference to, nor claim protection from, any station of the administration with which there is continuing disagreement operating in conformity with the *Agreement* and its associated *Plans* and recorded in the *MIFR* with a favourable finding with respect to Nos. **11.31** and **11.34**.

5.2.7 Should unacceptable interference be caused by the use of this assignment to any assignment of the administration with which there is continuing disagreement operating in conformity with the *Agreement* and its associated *Plans* and recorded in the *MIFR* with a favourable finding with respect to Nos. **11.31** and **11.34**, the administration causing unacceptable interference shall, upon receipt of advice thereof, immediately eliminate this interference.

ARTICLE 6

Settlement of disputes

6.1 If, after application of the procedure described in the above articles, the administrations concerned have been unable to reach agreement, they may resort to the procedure described in Article **56** of the *Constitution*. They may also agree to apply the Optional Protocol on the compulsory settlement of disputes relating to the ITU Constitution, the ITU Convention and to the Administrative Regulations.

ARTICLE 7

Accession to the Agreement

7.1 Any Member State in the *Planning Area* which has not signed the *Agreement* may at any time deposit an instrument of accession with the *Secretary-General*, who shall immediately inform the other Member States. Accession to the *Agreement* shall be made without reservations and shall apply to the *Plans* as they stand at the time of accession.

7.2 Accession to the *Agreement* shall become effective on the date on which the instrument of accession is received by the *Secretary-General*.

ARTICLE 8

Scope of application of the Agreement

8.1 The *Agreement* shall bind *Contracting Members* in their relations with one another but shall not bind those members in their relations with non-contracting members.

8.2 If a *Contracting Member* enters reservations with regard to the application of any provision of the *Agreement*, other *Contracting Members* shall be free to disregard such provision in their relations with the member which has made such reservations.

ARTICLE 9

Approval of the Agreement

9.1 Member States signatories to the *Agreement* shall notify their approval of this *Agreement*, as promptly as possible, to the *Secretary-General*, who shall at once inform the other Member States.

ARTICLE 10

Denunciation of the Agreement

10.1 Any *Contracting Member* may denounce the *Agreement* at any time by a notification sent to the *Secretary-General*, who shall inform the other Member States.

10.2 Denunciation shall become effective one year after the date on which the *Secretary-General* receives the notification of denunciation.

10.3 On the date on which the denunciation becomes effective, the *Bureau* shall delete from the *Plans* the assignments and/or the allotments entered in the name of the Member State which has denounced the *Agreement*.

ARTICLE 11

Revision of the Agreement

11.1 No revision of the *Agreement* shall be undertaken except by a competent regional radiocommunication conference convened in accordance with the procedure laid down in the *Constitution* and *Convention*, to which all the Member States in the *Planning Area* shall be invited.

ARTICLE 12

Entry into force, duration and provisional application of the Agreement

12.1 The *Agreement* shall enter into force on 17 June 2007 at 0001 hours UTC.

12.2 The provisions of the *Agreement* shall be provisionally applicable as of 17 June 2006 at 0001 hours UTC.

12.3 As from the date mentioned in § 12.2 above, broadcasting stations in operation with frequency assignments which do not appear in the *Plans* or which are not in conformity with the *Agreement* and its associated *Plans* (see § 5.1.2 of Article 5) may continue to be operated under the conditions of not causing unacceptable interference to, and not claiming protection from, any assignments in conformity with the *Agreement* and its associated *Plans*.

12.4 The *Agreement* shall remain in force until it is revised in accordance with Article 11 of the *Agreement*.

12.5 The *Transition period* shall commence on 17 June 2006 at 0001 hours UTC. During the *Transition period*, assignments in the analogue Plan (as specified in § 3.1.2 of Article 3) shall be protected.

12.6 The *Transition period* shall end on 17 June 2015 at 0001 hours UTC. However, for the countries listed in footnote 1 below[7], for the band 174-230 MHz[8], the *Transition period* shall end on 17 June 2020 at 0001 hours UTC. After the end of the applicable *Transition period*, the corresponding entries in the analogue Plan shall be cancelled by the *Bureau*, and

– the provisions of § 4.1 of Article 4 referring to the modification of the analogue Plan; and

– remarks with respect to analogue assignments

shall cease to apply to the analogue assignments in the corresponding countries.

---

[7] List of the countries: Algeria (People's Democratic Republic of), Burkina Faso, Cameroon (Republic of), Congo (Republic of the), Côte d'Ivoire (Republic of), Egypt (Arab Republic of), Gabonese Republic, Ghana, Guinea (Republic of), Iran (Islamic Republic of), Jordan (Hashemite Kingdom of), Mali (Republic of), Morocco (Kingdom of), Mauritania (Islamic Republic of), Nigeria (Federal Republic of), Syrian Arab Republic, Sudan (Republic of the), Chad (Republic of), Togolese Republic, Tunisia, Yemen (Republic of).

For the following administrations which were not present at RRC-06, namely Benin (Republic of), Central African Republic, Eritrea, Ethiopia (Federal Democratic Republic of), Guinea-Bissau (Republic of), Equatorial Guinea (Republic of), Liberia (Republic of), Madagascar (Republic of), Niger (Republic of the), Democratic Republic of the Congo, Sao Tome and Principe (Democratic Republic of), Sierra Leone and Somali Democratic Republic, the date of the end of the transition period in the VHF band (174-230 MHz) is 17 June 2020 at 0001 hours UTC, unless any of the aforementioned administrations communicates to the *Bureau* during the 90-day period from the end of RRC-06 that it selects 17 June 2015 at 0001 hours UTC.

[8] 170-230 MHz for Morocco.

12.7 After the end of the above-mentioned *Transition period*, the *Bureau* shall review the status of the assignments which were contained in the analogue Plan and recorded in the *MIFR* and invite the administrations to cancel the corresponding entries in the *MIFR*.

12.8 Following the action of the *Bureau* under § 12.7 above, administrations may request the *Bureau* to cancel the corresponding assignments, or continue to operate them, under the conditions that these analogue assignments:

a) were contained in the Plan and already brought into use, and

b) shall not cause unacceptable interference to, and shall not claim protection from, any assignments in conformity with the *Agreement* and its associated *Plans* (see § 5.1.2 of Article 5).

12.9 The *Bureau* shall update the *MIFR* accordingly.

IN WITNESS WHEREOF, the delegates of the Member States of the International Telecommunication Union from the *Planning Area*, named below have, on behalf of their respective competent authorities, signed one copy of these Final Acts. In case of dispute, the French text shall prevail. This copy shall remain deposited in the archives of the Union. The Secretary-General shall forward one certified true copy to each Member State of the International Telecommunication Union from the *Planning Area*.

Done at Geneva, 16 June 2006

ANNEXES

ANNEX 1

Frequency Plans

1.1 T-DAB Plan assignments

No.	Data item
1	ITU serial number
2	ITU symbol for administration responsible for the T-DAB assignment
3	Unique identification code given by the administration for the assignment (AdminRefId)
4	Plan entry code (1 – Assignment, 2 – SFN, 3 – Allotment, 4 – Allotment with linked assignment(s) and SFN_id, 5 – Allotment with a single linked assignment and no SFN_id)
5	Assignment Code (L – Linked, or C – Converted, or S – Standalone)
6	Unique identification code for the associated allotment
7	ITU symbol for country or geographical area
8	Name of the location of the transmitting station
9	Geographical coordinates of the transmitting antenna
	9a latitude (±DDMMSS)
	9b longitude (±DDDMMSS)
10	Altitude of site above sea level (m)
11	Reference planning configuration (RPC 4, RPC 5)
12	Assigned frequency (MHz)
13	Frequency block
14	Frequency offset between the centre frequency of the emission and the centre frequency of the channel (kHz)
15	Polarization (H – Horizontal, V – Vertical, M – Mixed, U – Unspecified)
16	Maximum effective radiated power of the horizontally polarized component in the horizontal plane (dBW)
17	Maximum effective radiated power of the vertically polarized component in the horizontal plane (dBW)
18	Antenna directivity (D – Directional, ND – Non-directional)
19	Height of transmitting antenna above ground level (m)
20	Maximum effective antenna height (m)
21	Effective antenna height (m), at 36 different azimuths in 10° intervals, measured in the horizontal plane from True North in a clockwise direction
22	Antenna attenuation (dB) – horizontal: value of attenuation of the horizontally polarized component, normalized to 0 dB, at 36 different azimuths in 10° intervals, measured in the horizontal plane from True North in a clockwise direction
23	Antenna attenuation (dB) – vertical: value of attenuation of the vertically polarized component, normalized to 0 dB, at 36 different azimuths in 10° intervals, measured in the horizontal plane from True North in a clockwise direction
24	Spectrum mask (1, 2, 3 – see § 3.6.1 of Chapter 3 of Annex 2 of this Agreement)

No.	Data item
25	Identification code for an SFN
26	Remarks
26-1	Remarks with respect to assignments in the analogue Plan of the following administrations (ITU symbol)
26-2	Remarks with respect to entries to the digital Plan of the following administrations (ITU symbol)
26-3	Remarks with respect to *existing assignments to other primary terrestrial services* of the following administrations (ITU symbol)

1.2 T-DAB Plan allotments

No.	Data item
1	ITU serial number
2	ITU symbol for administration responsible for the T-DAB allotment
3	Unique identification code given by the administration for the allotment (AdminRefId)
4	Plan entry code (1 – Assignment, 2 – SFN, 3 – Allotment, 4 – Allotment with linked assignment(s) and SFN_id, 5 – Allotment with a single linked assignment and no SFN_id)
5	ITU symbol for country or geographical area
6	Digital broadcasting allotment name
7	ITU symbol for country or geographical area if all the test points for the allotment are on country or geographical area boundary
8	Number of subareas (up to 9) within the allotment if not all the test points for the allotment are on the country boundary; if there is no subdivision of the allotment, number = 1
9	For each subarea within the allotment:
	9a a unique contour number (1 to 9)
	9b the number of subarea boundary test points (up to 99)
	9c the geographical coordinates of each subarea boundary test point consisting of:
	9c1 latitude (±DDMMSS)
	9c2 longitude (±DDDMMSS)
10	Reference planning configuration (RPC 4, RPC 5)
11	Assigned frequency (MHz)
12	Frequency block
13	Frequency offset between the centre frequency of the emission and the centre frequency of the channel (kHz)
14	Polarization (H – Horizontal, V – Vertical, M – Mixed, U – Unspecified)
15	Spectrum mask (1, 2, 3 – see § 3.6.1 of Chapter 3 of Annex 2 of this Agreement)
16	Identification code for an SFN
17	Remarks
17-1	Remarks with respect to assignments in the analogue Plan of the following administrations (ITU symbol)
17-2	Remarks with respect to entries to the digital Plan of the following administrations (ITU symbol)
17-3	Remarks with respect to *existing assignments to other primary terrestrial services* of the following administrations (ITU symbol)

1.3 DVB-T Plan assignments

No.	Data item
1	ITU serial number
2	ITU symbol for administration responsible for the DVB-T assignment
3	Unique identification code given by the administration for the assignment (AdminRefId)
4	Plan entry code (1 – Assignment, 2 – SFN, 3 – Allotment, 4 – Allotment with linked assignment(s) and SFN_id, 5 – Allotment with a single linked assignment and no SFN_id)
5	Assignment Code (L – Linked, or C – Converted, or S – Standalone)
6	Unique identification code for the associated allotment
7	ITU symbol for country or geographical area
8	Name of the location of the transmitting station
9	Geographical coordinates of the transmitting antenna:
	9a latitude (±DDMMSS)
	9b longitude (±DDDMMSS)
10	Altitude of site above sea level (m)
	Either 11 and 12, or 13
11	Digital television system (A, B, C, D, E, F and 1, 2, 3, 5, 7)
12	Reception mode (FX, PO, PI, MO)
13	Reference planning configuration (RPC 1, RPC 2, RPC 3)
14	Assigned frequency (MHz)
15	Channel number
16	Frequency offset between the centre frequency of the emission and the centre frequency of the channel (kHz)
17	Polarization (H – Horizontal, V – Vertical, M – Mixed, U – Unspecified)
18	Maximum effective radiated power of the horizontally polarized component in the horizontal plane (dBW)
19	Maximum effective radiated power of the vertically polarized component in the horizontal plane (dBW)
20	Antenna directivity (D – Directional, ND – Non-directional)
21	Height of transmitting antenna above ground level (m)
22	Maximum effective antenna height (m)
23	Effective antenna height (m), at 36 different azimuths in 10° intervals, measured in the horizontal plane from True North in a clockwise direction
24	Antenna attenuation (dB) – horizontal: value of attenuation of the horizontally polarized component, normalized to 0 dB, at 36 different azimuths in 10° intervals, measured in the horizontal plane from True North in a clockwise direction
25	Antenna attenuation (dB) – vertical: value of attenuation of the vertically polarized component, normalized to 0 dB, at 36 different azimuths in 10° intervals, measured in the horizontal plane from True North in a clockwise direction
26	Spectrum mask (N = Non-critical, S = Sensitive)
27	Identification code for an SFN

No.	Data item
28	Remarks
28-1	Remarks with respect to assignments in the analogue Plan of the following administrations (ITU symbol)
28-2	Remarks with respect to entries to the digital Plan of the following administrations (ITU symbol)
28-3	Remarks with respect to *existing assignments to other primary terrestrial services* of the following administrations (ITU symbol)

1.4 DVB-T Plan allotments

No.	Data item
1	ITU serial number
2	ITU symbol for administration responsible for the DVB-T allotment
3	Unique identification code given by the administration for the allotment (AdminRefId)
4	Plan entry code (1 – Assignment, 2 – SFN, 3 – Allotment, 4 – Allotment with linked assignment(s) and SFN_id, 5 – Allotment with a single linked assignment and no SFN_id)
5	ITU symbol for country or geographical area
6	Digital broadcasting allotment name
7	ITU symbol for country or geographical area if all the test points for the allotment are on the country or geographical area boundary
8	Number of subareas (up to 9) within the allotment if not all the test points for the allotment are on the country boundary; if there is no subdivision of the allotment, number = 1
9	For each subarea within the allotment:
	9a a unique contour number (1 to 9)
	9b the number of subarea boundary test points (up to 99)
	9c the geographical coordinates of each subarea boundary test point consisting of:
	9c1 latitude (±DDMMSS)
	9c2 longitude (±DDDMMSS)
10	Reference planning configuration (RPC 1, RPC 2, RPC 3)
11	Type of reference network (RN1, RN2, RN3, RN4)
12	Assigned frequency (MHz)
13	Channel number
14	Frequency offset between the centre frequency of the emission and the centre frequency of the channel (kHz)
15	Polarization (H – Horizontal, V – Vertical, M – Mixed, U – Unspecified)
16	Spectrum mask (N = Non-critical, S = Sensitive)
17	Identification code for an SFN
18	Remarks
18-1	Remarks with respect to assignments in the analogue Plan of the following administrations (ITU symbol)
18-2	Remarks with respect to entries to the digital Plan of the following administrations (ITU symbol)
18-3	Remarks with respect to *existing assignments to other primary terrestrial services* of the following administrations (ITU symbol)

1.5 Frequency Assignment Plan for Analogue Television Broadcasting in the frequency bands 174-230 MHz (for Morocco 170-230 MHz) and 470-862 MHz in the transition period (see Article 12 of the Agreement)

Information included in the data items of the Plan

No.	Data item
1	ITU serial number
2	ITU symbol for administration responsible for the analogue assignment
3	Unique identification code given by the administration for the assignment (AdminRefId)
4	Channel number
5	Assigned frequency (MHz)
6	Vision carrier frequency offset (positive or negative multiples of 1/12 line frequency or kHz)
7	Sound carrier frequency offset (positive or negative multiples of 1/12 line frequency or kHz)
8	Frequency stability indicator (RELAXED, NORMAL or PRECISION)
9	Television system (B, B1, D, D1, G, H, I, K, K1, L, or M)
10	Colour system (P = PAL, S = SECAM)
11	Name of the location of the transmitting station
12	ITU symbol for country or geographical area
13	Geographical coordinates of the transmitting antenna:
	13a latitude (±DDMMSS)
	13b longitude (±DDDMMSS)
14	Altitude of site above sea level (m)
15	Height of transmitting antenna above ground level (m)
16	Maximum effective antenna height (m)
17	Effective antenna height (m) at 36 different azimuths in 10° intervals, measured in the horizontal plane from True North in a clockwise direction; if not provided, the value of the maximum effective antenna height is used for all 36 values
18	Polarization (H, V, M)
19	Maximum effective radiated power of the horizontally polarized component (dBW)
20	Maximum effective radiated power of the vertically polarized component (dBW)
21	Vision to sound carrier power ratio
22	Antenna directivity (D, ND)
23	Antenna attenuation (dB) – horizontal. The value of attenuation of the horizontally polarized component, at 36 different azimuths in 10° intervals, measured in the horizontal plane from True North in a clockwise direction, relative to the maximum gain of the transmitting antenna
24	Antenna attenuation (dB) – vertical. The value of attenuation of the vertically polarized component, at 36 different azimuths in 10° intervals, measured in the horizontal plane from True North in a clockwise direction, relative to the maximum gain of the transmitting antenna
25	Remarks

Note – The analogue television broadcasting plan is published in electronic format at http://www.itu.int/md/R06-RRC.06-R-0001/. The recapitulative list of the number of analogue television assignments, per administration, is provided in Table A1-1.

TABLE A1-1

Recapitulative list of number of analogue television assignments as they appear in the Frequency Assignment Plan for Analogue Television Broadcasting in the frequency bands 174-230 MHz (for Morocco 170-230 MHz) and 470-862 MHz in the transition period (see Article 12 of the Agreement)

Member State	ITU symbol	No. of analogue television assignments included in the analogue television plan
Albania (Republic of)	ALB	4
Algeria (People's Democratic Republic of)	ALG	1009
Germany (Federal Republic of)	D	9590
Andorra (Principality of)	AND	4
Angola (Republic of)	AGL	193
Saudi Arabia (Kingdom of)	ARS	412
Armenia (Republic of)	ARM	12
Austria	AUT	1736
Azerbaijani Republic	AZE	52
Bahrain (Kingdom of)	BHR	3
Belarus (Republic of)	BLR	314
Belgium	BEL	66
Benin (Republic of)	BEN	55
Bosnia and Herzegovina	BIH	660
Botswana (Republic of)	BOT	221
Bulgaria (Republic of)	BUL	1594
Burkina Faso	BFA	195
Burundi (Republic of)	BDI	32
Cameroon (Republic of)	CME	244
Cape Verde (Republic of)	CPV	35
Central African Republic	CAF	329
Cyprus (Republic of)	CYP	59
Vatican City State	CVA	4
Comoros (Union of the)	COM	40
Congo (Republic of the)	COG	326
Côte d'Ivoire (Republic of)	CTI	200
Croatia (Republic of)	HRV	1422
Denmark	DNK	260
Djibouti (Republic of)	DJI	12
Egypt (Arab Republic of)	EGY	308
United Arab Emirates	UAE	58
Eritrea	ERI	12
Spain	E	8410
Estonia (Republic of)	EST	68
Ethiopia (Federal Democratic Republic of)	ETH	111

TABLE A1-1 (*continued*)

Member State	**ITU symbol**	**No. of analogue television assignments included in the analogue television plan**
Russian Federation	RUS	6681
Finland	FIN	818
France	F	13125
Gabonese Republic	GAB	224
Gambia (Republic of the)	GMB	12
Georgia	GEO	94
Ghana	GHA	39
Greece	GRC	2105
Guinea (Republic of)	GUI	103
Guinea-Bissau (Republic of)	GNB	28
Equatorial Guinea (Republic of)	GNE	25
Hungary (Republic of)	HNG	714
Iran (Islamic Republic of)	IRN	2096
Iraq (Republic of)	IRQ	345
Ireland	IRL	781
Iceland	ISL	4
Israel (State of)	ISR	15
Italy	I	3677
Socialist People's Libyan Arab Jamahiriya	LBY	322
Jordan (Hashemite Kingdom of)	JOR	140
Kazakhstan (Republic of)	KAZ	1837
Kenya (Republic of)	KEN	497
Kuwait (State of)	KWT	22
Lesotho (Kingdom of)	LSO	22
Latvia (Republic of)	LVA	106
The Former Yugoslav Republic of Macedonia	MKD	472
Lebanon	LBN	21
Liberia (Republic of)	LBR	41
Liechtenstein (Principality of)	LIE	12
Lithuania (Republic of)	LTU	154
Luxembourg	LUX	11
Madagascar (Republic of)	MDG	117
Malawi	MWI	51
Mali (Republic of)	MLI	287
Malta	MLT	11
Morocco (Kingdom of)	MRC	356
Mauritius (Republic of)	MAU	29

TABLE A1-1 (*continued)*

Member State	ITU symbol	No. of analogue television assignments included in the analogue television plan
Mauritania (Islamic Republic of)	MTN	132
Moldova (Republic of)	MDA	298
Monaco (Principality of)	MCO	3
Mozambique (Republic of)	MOZ	242
Namibia (Republic of)	NMB	309
Niger (Republic of the)	NGR	159
Nigeria (Federal Republic of)	NIG	225
Norway	NOR	3979
Oman (Sultanate of)	OMA	255
Uganda (Republic of)	UGA	36
Uzbekistan (Republic of)	UZB	1213
Netherlands (Kingdom of the)	HOL	71
Poland (Republic of)	POL	802
Portugal	POR	694
Qatar (State of)	QAT	17
Syrian Arab Republic	SYR	56
Democratic Republic of the Congo	COD	362
Kyrgyz Republic	KGZ	670
Slovak Republic	SVK	918
Czech Republic	CZE	1660
Romania	ROU	323
United Kingdom of Great Britain and Northern Ireland	G	6344
Rwanda (Republic of)	RRW	56
San Marino (Republic of)	SMR	1
Sao Tome and Principe (Democratic Republic of)	STP	3
Senegal (Republic of)	SEN	39
Serbia (Republic of) (see Note 1)	SCG	1154 (see Note 1)
Seychelles (Republic of)	SEY	11
Sierra Leone	SRL	14
Slovenia (Republic of)	SVN	867
Somali Democratic Republic	SOM	114
Sudan (Republic of the)	SDN	224
South Africa (Republic of)	AFS	712
Sweden	S	1551
Switzerland (Confederation of)	SUI	2581
Swaziland (Kingdom of)	SWZ	20

TABLE A1-1 (*end)*

Member State	ITU symbol	No. of analogue television assignments included in the analogue television plan
Tajikistan (Republic of)	TJK	672
Tanzania (United Republic of)	TZA	183
Chad (Republic of)	TCD	189
Togolese Republic	TGO	29
Tunisia	TUN	224
Turkmenistan	TKM	115
Turkey	TUR	539
Ukraine	UKR	1555
Yemen (Republic of)	YEM	1066
Zambia (Republic of)	ZMB	205
Zimbabwe (Republic of)	ZWE	200

NOTE 1 – In these Final Acts, the symbol SCG is used with the following meanings:

a) When used for designating a geographical area, the symbol SCG includes the entire territory of the former ITU Member State "Serbia and Montenegro" which existed prior to 3 June 2006.

b) When used for designating an administration of a Member State, or an administration responsible for an analogue assignment or a digital Plan entry, the symbol SCG designates, on a provisional basis, the Administration of the Republic of Serbia. However, the Administration of the Republic of Serbia has indicated that it is responsible for those analogue assignments and/or digital Plan entries which are situated on the territory of the Republic of Serbia.

c) The repartition of the analogue assignments and/or digital Plan entries which are included under the symbol SCG (in its geographical meaning) to the two independent States, namely the Republic of Serbia as continuator of "Serbia and Montenegro" and the Republic of Montenegro, will be done on geographical principles after the Conference.

ANNEX 2

Technical elements and criteria used in the development of the Plan and the implementation of the Agreement

CHAPTER 1
TO ANNEX 2

Definitions

TABLE OF CONTENTS

Page

Page

1.1 Digital terrestrial broadcasting systems

1.1.1 Digital terrestrial television broadcasting (DTTB)

Digital television systems in the terrestrial broadcasting service which are described in Recommendation ITU-R BT.1306-3. DVB-T (Terrestrial Digital Video Broadcasting) corresponds to the DVB system, which is designated as “System B”.

1.1.2 Digital terrestrial sound broadcasting (DTSB)

Digital sound systems in the terrestrial broadcasting service which are described in Recommendation ITU-R BS.1114-5. T-DAB (Terrestrial Digital Audio Broadcasting) corresponds to the Eureka 147 DAB system, which is designated as “Digital System A”.

1.2 Frequency management

1.2.1 Frequency bands

Band III

Frequency range: 174-230 MHz.

Band IV

Frequency range: 470-582 MHz.

Band V

Frequency range: 582-862 MHz.

1.2.2 Coverage area

The coverage area of a broadcasting station, or a group of broadcasting stations, in the case of a single-frequency network (SFN, see definition in § 1.3.15 to this chapter), is the area within which the wanted field strength is equal to or exceeds the usable field strength defined for specified reception conditions and for an envisaged percentage of covered receiving locations.

In defining the coverage area for each reception condition, a three-level approach is taken:

– *Level 1: Receiving location*

  The smallest unit is a receiving location; optimal receiving conditions will be found by moving the antenna up to 0.5 m in any direction.

  A receiving location is regarded as being covered if the level of the wanted signal is high enough to overcome noise and interference for a given percentage of the time.

– *Level 2: Small area coverage*

  The second level is a “small area” (typically 100 m by 100 m).

  In this small area the percentage of covered receiving locations is indicated.

– *Level 3: Coverage area*

The coverage area of a broadcasting station, or a group of broadcasting stations, is made up of the sum of the individual small areas in which a given percentage (e.g. 70% to 99%) of coverage is achieved.

1.2.3 Service area

The area within which the administration has the right to demand that the agreed protection conditions be provided.

1.3 Network planning

1.3.1 Allotment planning

In allotment planning, a specific channel is "given" to an administration to provide coverage over a defined area within its service area, called the allotment area. Transmitter sites and their characteristics are unknown at the planning stage and should be defined at the time of the conversion of the allotment into one or more assignments.

1.3.2 Assignment planning

In assignment planning, a specific channel is assigned to an individual transmitter location with defined transmission characteristics (for example, radiated power, antenna height, etc.).

1.3.3 Test points

A test point is a geographically defined location at which specified calculations are carried out.

1.3.4 Nuisance field strength

The nuisance field strength (E_n), expressed in dB(μV/m), is the field strength, for 50% of locations and for a given percentage of the time, of an unwanted signal from any potential interfering source, to which has been added the relevant protection ratio in decibels.

NOTE 1 – Where relevant, the appropriate value in decibels of receiving antenna directivity or polarization discrimination must be taken into account.

NOTE 2 – Where there are several unwanted signals, a method for combination of individual nuisance field strengths shall be applied, such as the power sum method or some other appropriate method for signal summation, in order to obtain the resultant nuisance field strength.

1.3.5 Minimum usable field strength/minimum field strength to be protected

Minimum value of the field strength necessary to permit a desired reception quality, under specified receiving conditions, in the presence of natural and man-made noise, but in the absence of interference from other transmitters.

NOTE 1 – The term "minimum usable field strength" corresponds to the term "minimum field strength to be protected" which appears in many ITU texts and it also corresponds to the term "minimum median field strength", which appears in § 1.3.9 to this chapter as E_{med} used for coverage by a single transmitter only.

1.3.6 Usable field strength

Minimum value of the field strength necessary to permit a desired reception quality, under specified receiving conditions, in the presence of natural and man-made noise and of interference, either in an existing situation or as determined by agreements or frequency plans.

NOTE 1 – The term "usable field strength" corresponds to the term "necessary field strength" which appears in many ITU texts.

NOTE 2 – The usable field strength is calculated by combining the individual nuisance field strengths (E_n) and the combined location correction factor. One of the individual nuisance field-strength contributions is the minimum median field strength (E_{med}), which represents the noise level.

1.3.7 Reference field strength

The agreed value of the field strength that can serve as a reference or basis for frequency planning.

NOTE 1 – Depending on the receiving conditions and the quality required, there may be several reference field-strength values for the same service.

1.3.8 Minimum power flux-density φ_{min} (dB(W/m^2))

The minimum value of power flux-density at a particular receiving antenna location which is required to ensure that the minimum signal level is achieved for the receiver to successfully decode the signal.

NOTE 1 – φ_{min} is equal to the minimum required value of receiver input power (dBW) from which is subtracted the effective antenna aperture (dBm^2) and to which is added, when necessary, the feeder loss (dB).

1.3.9 Minimum median field strength E_{med} (dB(μV/m))

The appropriate value of minimum usable field strength to be used for coverage by a single transmitter only, being a value for 50% of locations and for 50% of the time at 10 m above ground level.

NOTE 1 – E_{med} depends on the median value of the minimum field strength (E_{min}) at the receiving place which is required for a given percentage of locations and percentage of the time to ensure that the minimum signal level necessary for the receiver to successfully decode the signal is achieved.

NOTE 2 – E_{med} is calculated from the minimum field strength (E_{min}) by adding, where relevant, appropriate correction factors as described in Annex 3.4 of Chapter 3 of Annex 2 of the Agreement.

NOTE 3 – In the case of wideband signals where the spectral power density may not be constant across the occupied bandwidth, the term "field strength" is often replaced by the term "equivalent field strength". The equivalent field strength is the field strength of a single unmodulated RF carrier radiated with the same power as the total radiated power of the wideband signal.

1.3.10 Coordination trigger field strength

Field-strength level which, when exceeded, determines that coordination is required (also referred to as trigger field strength).

1.3.11 Fixed reception

Fixed reception is defined as reception where a directional receiving antenna mounted at roof level is used.

It is assumed that near-optimal reception conditions (within a relatively small volume on the roof) are found when the antenna is installed.

In calculating the field strength for fixed antenna reception, a receiving antenna height of 10 m above ground level is considered to be representative for the broadcasting service. Other heights might be used for other services.

1.3.12 Portable reception

Portable reception is defined as:

– class A (outdoor), which means reception where a portable receiver with an attached or built-in antenna is used outdoors at no less than 1.5 m above ground level;

– class B (ground floor, indoor), which means reception where a portable receiver with an attached or built-in antenna is used indoors at no less than 1.5 m above floor level in rooms with the following characteristics:

  a) on the ground floor;

  b) with a window in an external wall.

Portable indoor reception on the higher floors will be regarded as class B reception with signal level corrections applied, although indoor ground floor reception is likely to be the most common case.

In both classes A and B, it is assumed that:

– optimal receiving conditions will be found by moving the antenna up to 0.5 m in any direction;

– the portable receiver is not moved during reception and large objects near the receiver are also not moved;

– extreme cases, such as reception in completely shielded rooms, are disregarded.

1.3.13 Mobile reception

Mobile reception is defined as reception by a receiver in motion with an antenna situated at no less than 1.5 m above ground level. This could for example be a car receiver or handheld equipment.

The dominant factor with regard to local reception effects is thought to be due to fading in a Rayleigh channel. Fade margins are intended to offset these effects. Fade margins depend on the frequency and the velocity.

1.3.14 Multifrequency network (MFN)

A network of transmitting stations using several RF channels.

1.3.15 Single-frequency network (SFN)

A network of synchronized transmitting stations radiating identical signals in the same RF channel.

1.3.16 Reference planning configuration (RPC)

A representative combination of criteria and parameters to be used for frequency planning purposes.

1.3.17 Reference network (RN)

A generic network structure representing a real network, as yet unknown, for the purposes of a compatibility analysis. The main purpose is to determine the potential for and susceptibility to interference of typical digital broadcasting networks.

1.3.18 Digital Plan entry

An assignment, or an allotment, or a combination of assignments that may or may not be linked to a single allotment and that, for the purposes of the implementation of the *Plan* and its modifications, is treated as a single entity.

APPENDIX 1.1

Definitions given in the Radio Regulations (RR) (Edition of 2004) and complemented by explanations in some relevant ITU-R Recommendations

Accepted interference (RR No. 1.168)

Administration (RR No. 1.2)

Aeronautical mobile service (RR No. 1.32)

Aeronautical mobile-satellite service (RR No. 1.35)

Aeronautical radionavigation service (RR No. 1.46)

African Broadcasting Area (RR Nos 5.10 to 5.13)

Allotment (of a radio frequency or radio-frequency channel) (RR No. 1.17)

Assigned frequency (RR No. 1.148)

Assignment (of a radio frequency or radio-frequency channel) (RR No. 1.18)

Broadcasting service (RR No. 1.38)

Broadcasting station (RR No. 1.85)

Broadcasting-satellite service (RR No. 1.39)

Carrier power (of a radio transmitter) (RR No. 1.159, Recommendation ITU-R V.573-4)

Coordination contour (RR No. 1.172)

Effective radiated power (e.r.p.) (in a given direction) (RR No. 1.162,
Recommendation ITU-R V.573-4)

Emission (RR No. 1.138)

Equivalent isotropically radiated power (e.i.r.p.) (RR No. 1.161, Recommendation ITU-R V.573-4)

European Broadcasting Area (RR No. 5.14)

Fixed service (RR No. 1.20)

Gain of an antenna (RR No. 1.160)

Interference (RR No. 1.166)

Land mobile service (RR No. 1.26)

Mean power (of a radio transmitter) (RR No. 1.158)

Mobile service (RR No. 1.24)

Mobile-satellite service (RR No. 1.25)

Necessary bandwidth (RR. No. 1.152)

Out-of-band emission (RR No. 1.144)

Peak envelope power (of a radio transmitter) (RR No. 1.157)

Permissible interference (RR No. 1.167)

Power (RR No. 1.156)

Protection ratio (R.F.) (RR No. 1.170)

Radiation (RR No. 1.137)

Radio astronomy service (RR No. 1.58)

Radionavigation service (RR No. 1.42)

Spurious emission (RR No. 1.145)

Station (RR No. 1.61)

Terrestrial station (RR No. 1.62)

Unwanted emissions (RR No. 1.146)

CHAPTER 2
TO ANNEX 2

Propagation information

TABLE OF CONTENTS

Page

2.1 Overview

Recommendation ITU-R P.1546-2 forms the basis of a field-strength prediction method applicable for the broadcasting, land mobile, maritime mobile and certain fixed services (e.g. those using point-to-multipoint systems). The complete description of the prediction method is provided in Annex 2.1 to this chapter. The method can be applied using either graphical or automated (computer) procedures.

For the latter, tabulated values of the field-strength curves are provided in Annex 2.2 to this chapter, along with detailed instructions for interpolation and extrapolation. Field-strength curves associated with these tabulated values are provided in Annex 2.3 to this chapter.

Predictions can be made within the frequency range of the Plan for the following parameter ranges: path distance of 1 to 1 000 km; percentage of time of 1 to 50%; and for various transmitting antenna heights. The method draws a distinction between paths over land, cold seas and warm seas, makes due allowance for location variability for land area-service predictions and takes account of local clutter surrounding the receiving location. It also provides procedures for handling negative effective transmitting antenna heights and mixed-path propagation (i.e. with combinations of land and sea). The predictions are also used for calculating interference from mobile services where the term “base station” is used.

The method can be used with or without a terrain height database, although increased prediction accuracy would be expected when such data are available. However, terrain data were not used in the planning process.

For bilateral or multilateral coordinations, more path-specific propagation prediction methods can be used, for example using terrain height and/or ground cover data to achieve increased prediction accuracy with the prediction method described in Annex 2.1 to this chapter, and by calculating corrections for the terrain clearance angle.

For airborne stations of the aeronautical radionavigation service, free-space propagation should be used if there is a line-of-sight path instead of the method in Annex 2.1 to this chapter; otherwise, it is assumed that there is no signal. This is because, in general, the exact location of the aircraft is not known.

The source Recommendation ITU-R P.1546-2 applies to antenna heights up to 3 000 m only. For RRC-06 purposes, it is considered that terrestrial transmitter antenna heights greater than 3 000 m are erroneous.

2.2 General description of the methodology

The tabulated values of field strength versus distance in Annex 2.2 to this chapter give the predicted field-strength value as a function of frequency and effective antenna height, exceeded for 50% of locations for time percentages of 50%, 10% and 1%. The field-strength values are expressed in decibels relative to 1 µV/m (dB(µV/m)) for an e.r.p. of 1 kW in the direction of the reception point.

Effective transmitting antenna height values should be provided by administrations. Terrain data information could be used to provide a set of effective height values for cases where the relevant administration is not able to supply such information and requests assistance in determining these values. For calculation work in the ITU process, no terrain data is used.

The tabulated data are given for various types of areas and climates, namely, land, cold sea and warm sea, and the method includes a procedure for extrapolating the data to areas subject to extreme superrefractivity. Because of the very significant differences in propagation conditions for land and sea paths, a coastline must be included in the propagation prediction calculations to permit account to be taken of these differences in the calculation of interference levels.

Information on the type of propagation path, such as land, sea or mixed land-sea paths should be derived from digital maps indicating the coastlines, such as the ITU digitized world map (IDWM) available from BR. Information on cold sea/warm sea divisions and geographic data for other propagation areas and path types is given in § 2.2.2 to this chapter.

The following sections contain a general description of the main aspects of the methodology in Annex 2.1 to this chapter and the use of the data in Annexes 2.2 and 2.3 to this chapter.

2.2.1 Propagation curves

The propagation curves represented in the figures in Annex 2.3 to this chapter (and the corresponding tabulated values in Annex 2.2 to this chapter) establish the relationship between the field strength and the path length. The curves give the values of the field strength exceeded at 50% of locations and each figure corresponds to time percentages of 50%, 10% and 1% for one of the geographical zones defined below and shown on the map in Fig. 2.2-1.

The set of curves in each figure provide field-strength values for nominal values of the frequency, effective transmitting/base antenna heights and distance. For other values, interpolation/extrapolation formulas are provided in Annex 2.1 to this chapter.

All of the curves are given for field-strength values corresponding to a receiving/mobile antenna height of 10 m over neighbouring ground in open area. For other values and other environments, a correction factor is specified in Annex 2.1 to this chapter.

2.2.2 Geographical division

The propagation data used for the propagation prediction method are based on different geographic regions and climates, namely land, cold sea, warm sea and geographic regions subject to extreme superrefractivity.

Information on the type of propagation path, such as land, sea or mixed land-sea paths should be derived from digital maps indicating the coastlines, such as the IDWM available from BR. The definitions of the cold sea/warm sea divisions and geographic regions are shown below.

Zone 1: temperate and subtropical regions;

Zone 2: regions displaying propagation conditions characterized by low humidity, low precipitation and small annual variations in climate;

Zone 3: equatorial regions, displaying propagation conditions characteristic of hot and humid climates;

Zone 4: maritime regions, displaying propagation conditions found over warm seas where superrefraction conditions occasionally occur (Caspian Sea, Black Sea and all the seas around the African continent are Zone 4 except Zones A and B designated below);

Zone 5: maritime regions, displaying propagation conditions found over cold seas;

Zone A: maritime zone at low latitudes, frequently displaying superrefractivity;

Zone B: maritime zone at low latitudes, displaying superrefractivity to a lesser extent than Zone A;

Zone C: maritime zone from the junction of the coastline of the Islamic Republic of Iran with its border to Pakistan westward along the coastlines of the Islamic Republic of Iran and of Iraq, through point 48° E, 30° N along the coastline of Kuwait, the eastern coastline of Saudi Arabia, the coastlines of Qatar, the United Arab Emirates and Oman down to the intersection with parallel 22° N;

Zone D: land strip of maximum depth of 100 km surrounding Zone C and the West African land region consisting of two parts. The northerly part extends no more than 50 km inland from the Atlantic Ocean but is limited to the east by a line from 30° N 10° W to 20° N 13° W and to the west by the Atlantic coast. The southerly part is the land area west of two lines, one from 20° N 15° W to 15° N 12° W and the other from 15° N 12° W to 9° N 13° W, but not extending beyond the coastline.

Table 2.2-1 provides all the information on the parameters used to derive the tabulated values (see Annex 2.2 to this chapter) and the curves (see Annex 2.3 to this chapter) for different propagation zones. The d*N*-values are based on vertical refractivity gradient data in the lowest 65 m of the atmosphere (see Recommendation ITU-R P.453-9).

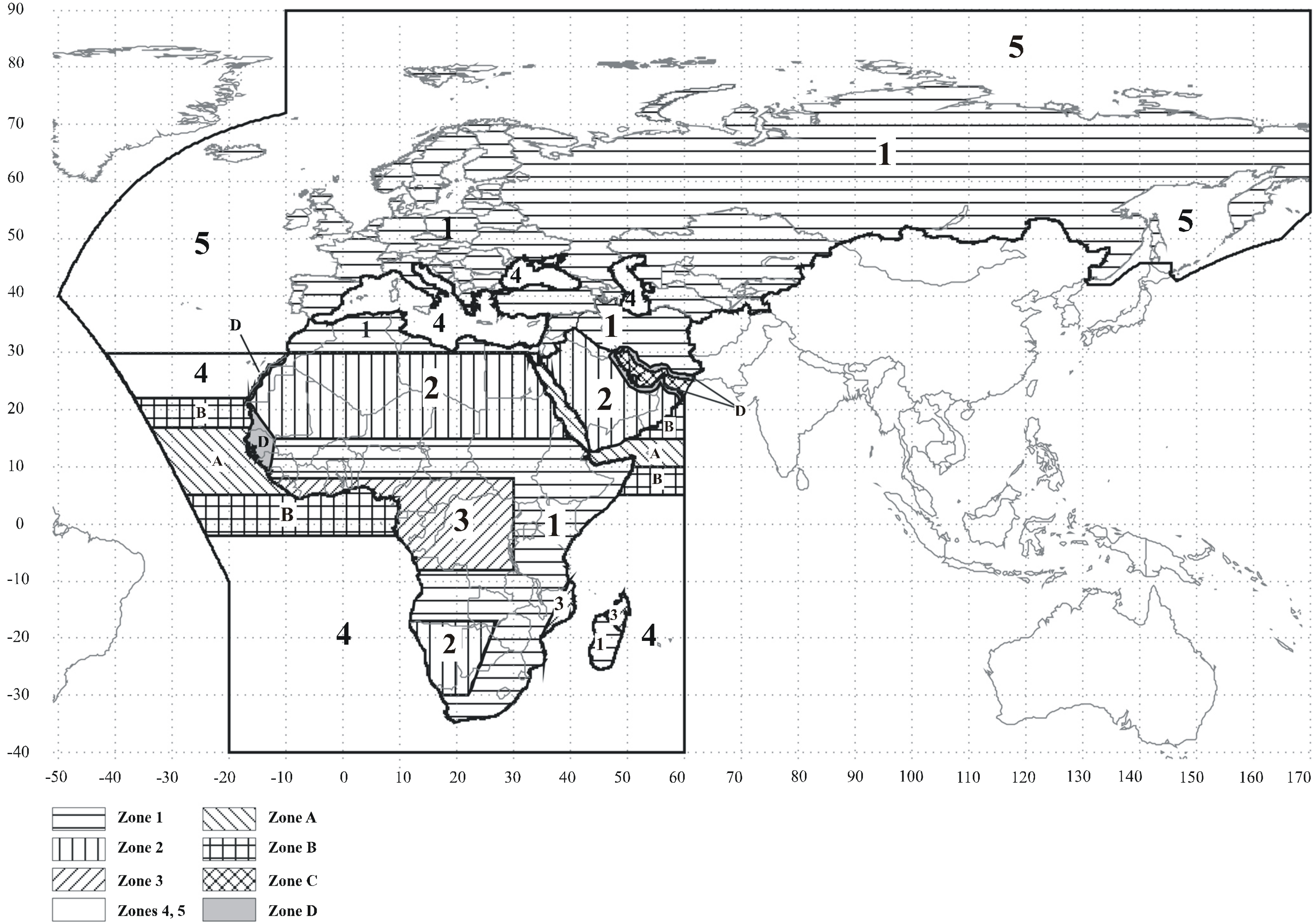
TABLE 2.2-1

Parameters used when deriving curves in Annex 2.3 to this chapter

Zone	Path type	Derived from zone type	Refractivity gradient, d*N*, not exceeded for		
			1% time	10% time	50% time
1	Land		–301.3	–141.9	–43.3
2	Land	1	–200.0	–110.0	–30.0
3	Land	1	–250.0	–130.0	–40.0
4	Sea		–301.3	–141.9	–43.3
5	Sea		–301.3	–141.9	–43.3
A	Sea	4	–1 150.0	–1 000.0	–720.0
B	Sea	4	–680.0	–500.0	–320.0
C	Sea	4	–1 233.0	–850.0	–239.0
D	Land	1	–694.0	–393.0	–120.0

FIGURE 2.2-1

Geographical division of the planning area into propagation zones



RRC06-A2-C2-2-1

Note – Islands in the Mediterranean sea are in Zone 1.

2.2.3 Prediction of wanted field strengths

When predicting wanted field strengths for an individual transmitter-to-receiver path, it is appropriate to use the values for 50% of the time given in Annex 2.1 to this chapter, since those values are also applicable to the 99% time requirement for wanted signals. For the short distances involved (up to about 60 km), the difference in the field-strength values for 50% and 99% of the time is negligible. However, there are differences in propagation over the various zones and it is thus necessary to take account of the nature of any individual propagation path.

2.2.4 Prediction of interfering field strengths

During the planning and coordination processes, it is necessary to predict the level of interfering field strength produced in the service area of a assignment/allotment by another assignment/allotment. When calculating the level of interfering field strength, the time percentage curves in Annex 2.3 to this chapter for the service area and propagation zone concerned should be used. For interfering field strengths, the percentage of time the field strength is exceeded is normally 1%. However, for specific cases (in particular for other services), other values may be used.

Ideally, the calculation should be made for points defining the service area of the assignment/allotment to be protected. However, in some circumstances, this may not be possible or necessary. The two following cases can be distinguished.

2.2.4.1 Prediction of interfering field strength for a service area

In cases where the assignment/allotment to be protected is represented by a service area, predictions of interfering field strengths would normally be made for points on the periphery of this service area. The points defining the edge of the service area may be specified or calculated. Where they are calculated, this may be achieved on the basis of 36 equally spaced radials from the transmitter site.

2.2.4.2 Prediction of interfering field strength for a specific antenna site

In some cases it may not be possible or necessary to define the service area in the manner described in the preceding paragraph, e.g. a radionavigation land station where the interference would be measured at the radar antenna. An example of this would be where the station to be protected is a broadcasting station with a service area of very small radius. To define the service area and calculate interference levels at many points would involve unnecessary computation. In this case, the location of the transmitting station can be taken as representative of the service area to be protected, and the prediction of interfering field strength can be made for that point.

2.2.5 Correction factors

The accuracy of the propagation prediction model can be improved by the application of a number of correction factors. The requirement for these correction factors and when they are used is explained below.

2.2.5.1 Negative effective transmitting antenna height

For a negative effective transmitting antenna height, for a land or mixed land-sea path, a correction factor must be applied which is a function of the terrain clearance angle (see § A.2.1.4.3 to this chapter).

2.2.5.2 Receiving antenna height

When the ground cover at the receiver location is not known (for example, during the planning), a receiving antenna at a height of 10 m in open or suburban areas is assumed. To correct the predicted values for different receiving antenna heights above ground level, a correction factor is applied using the method described in § A.2.1.9 to this chapter.

2.2.5.3 Terrain clearance angle

If greater precision is required for coordination purposes (and the data are available) for predicting the field strength for reception conditions in specific areas, a correction for terrain clearance angle is applied over land paths, or on a land section of a mixed path (see Annex 2.1 to this chapter).

2.2.5.4 Location statistics

Within a small area of 100 m × 100 m to 200 m × 200 m, there will be a random variation of field strength with location, which is due to local terrain irregularities and reflection from objects near the receiving location. The statistics of this type of variation may be characterized by a log-normal distribution of the field strengths. Recent measurements for digital signals have shown that for outdoor paths the standard deviation will be about 5.5 dB, depending to some extent on the environment surrounding the receiving location. Any values related to outdoor service in the remainder of this chapter will be based on a standard deviation of 5.5 dB. For indoor reception, the standard deviation will be larger (see also Chapter 3 of Annex 2, § 3.2.2.2).

Different percentages of locations can be calculated using the relevant multipliers given in Table A.2.1-2 of Annex 2.1 to this chapter. For example, the difference for 50% and 95% of outdoor locations is taken to be 9 dB for cases where the standard deviation is 5.5 dB. This value takes no account of the inherent inaccuracies of any propagation prediction method.

In the case that the wanted signal is composed of several signals from different transmitters, the resulting standard deviation becomes variable, depending on the individual signal strengths. As a consequence, the difference between wanted signals for 50% and 70% or 95% of locations becomes variable. However, it always will be smaller than that of an individual signal.

2.3 Propagation information for assessing compatibility between the broadcasting service and other primary terrestrial services

2.3.1 Compatibility between the broadcasting service and other primary terrestrial services

In the case of interference to or from the broadcasting service, the propagation prediction method and the procedure described in Annex 2.1 to this chapter are to be used, taking into account the relevant information on the interfering or affected stations in the other primary terrestrial services.

2.3.2 Compatibility between the broadcasting service and airborne stations in the aeronautical services

In the case of interference to or from airborne stations in the aeronautical mobile or aeronautical radionavigation services:

– the free-space propagation prediction model should be used in cases where there is a line-of-sight path between the transmitting and receiving antennas; and

– zero interference should be assumed in the case where there is no line-of-sight.

The free-space field strength relative to a half-wave dipole for 1 kW e.r.p. is given by:

$$E = 106.9 - 20 \log d$$

where:

E: free-space field strength (dB(μV/m))

d: distance (km) between transmitting and receiving antenna.

ANNEX 2.1

The propagation prediction method

Terminology used in this Annex

For the purposes of clarity, the term “*transmitting/base antenna*” used in this annex shall be understood to mean “*the transmitting antenna*”.

The tabulated values of the propagation curves in Annex 2.2 to this chapter are given for certain frequencies, effective transmitting antenna heights, distances and time percentages only. These values are defined as “nominal” throughout the text in Annex 2.1 to this chapter.

A.2.1.1 Introduction

This annex describes separate stages of the calculation. A step-by-step description of the procedure to be followed for the overall method is given in § A.2.1.15 to this chapter.

A.2.1.2 Maximum field-strength values

The field strength for any given propagation zone must not exceed a maximum value E_{max} given by the curve indicated as a maximum in each of the figures in Annex 2.3 to this chapter. In the case of mixed paths, it will be necessary to calculate the maximum field strength by linear interpolation between the all-land and all-sea values. This is given by:

$$E_{max} = (d_l\, E_{ml} + d_s\, E_{ms}) \,/\, d_{total} \qquad \text{dB}(\mu\text{V/m}) \tag{1}$$

where:

E_{ml}: maximum value of field strength for relevant all-land path (dB(μV/m))

E_{ms}: maximum value of field strength for relevant all-sea path (dB(μV/m))

d_l: total land distance (km)

d_s: total sea distance (km)

d_{total}: total path distance (km).

Any correction which increases a field strength shall not be allowed to produce values greater than these limits for the relevant family of curves. However, limitation to maximum values shall be applied only where indicated in § A.2.1.15 to this Chapter.

A.2.1.3 Determination of transmitting/base antenna height, h_1

The transmitting/base antenna height, h_1, to be used in calculation depends on the type and length of the path and on various items of height information.

The effective height of the transmitting/base antenna, h_{eff}, is defined as its height in metres over the average level of the ground between the distances of 3 and 15 km from the transmitting/base antenna in the direction of the receiving/mobile antenna.

The value of h_1 to be used in calculation shall be obtained using the method given in § A.2.1.3.1, A.2.1.3.2 or in A.2.1.3.3 to this chapter, as appropriate.

A.2.1.3.1 Land paths shorter than 15 km

For land paths less than 15 km one of the following two methods shall be used.

A.2.1.3.1.1 Terrain information not available

If no terrain information is available for the purpose of propagation predictions, the value of h_1 is calculated according to path length d, as follows:

$$h_1 = h_a \quad \text{m} \qquad \text{for} \qquad d \leq 3 \text{ km} \tag{2}$$

$$h_1 = h_a + (h_{eff} - h_a)\,(d - 3)/12 \quad \text{m} \qquad \text{for} \qquad 3 \text{ km} < d < 15 \text{ km} \tag{3}$$

where h_a is the antenna height above ground (e.g. height of the mast).

A.2.1.3.1.2 Terrain information available

If terrain information is available for the purpose of propagation predictions:

$$h_1 = h_b \quad \text{m} \tag{4}$$

where h_b is the height of the antenna above terrain height averaged between $0.2d$ and d km.

A.2.1.3.2 Land paths of 15 km or longer

For these paths:

$$h_1 = h_{eff} \quad \text{m} \tag{5a}$$

A.2.1.3.3 Sea paths

For these paths:

$$h_1 = h_{eff} \quad \text{m} \tag{5b}$$

This propagation prediction method shall not be used in the case of an all-sea path for h_1 values less than 1 m.

A.2.1.4 Application of transmitting/base antenna height, h_1

The value of h_1 determines which curve or curves are selected from which to obtain field-strength values, and the interpolation or extrapolation which may be necessary. The following cases are distinguished.

A.2.1.4.1 Transmitting/base antenna height, h_1, in the range 10 to 3 000 m

If the value of h_1 coincides with one of the eight heights for which curves are provided, namely 10, 20, 37.5, 75, 150, 300, 600 or 1 200 m, the required field strength may be obtained directly from the plotted curves or the associated tabulations. Otherwise, the required field strength shall be interpolated or extrapolated from field strengths obtained from two curves using:

$$E = E_{inf} + (E_{sup} - E_{inf}) \log (h_1/h_{inf}) / \log (h_{sup}/h_{inf}) \quad \text{dB}(\mu\text{V/m}) \tag{6}$$

where:

h_{inf}: 600 m if $h_1 > 1\,200$ m, otherwise the nearest nominal effective height below h_1

h_{sup}: 1 200 m if $h_1 > 1\,200$ m, otherwise the nearest nominal effective height above h_1

E_{inf}: field-strength value for h_{inf} at the required distance (dB(μV/m))

E_{sup}: field-strength value for h_{sup} at the required distance (dB(μV/m)).

The field strength resulting from extrapolation for $h_1 > 1\,200$ m shall be limited, if necessary, such that it does not exceed the maximum defined in § A.2.1.2 to this chapter.

This propagation prediction method shall not be used for $h_1 > 3\,000$ m.

A.2.1.4.2 Transmitting/base antenna height, h_1, in the range 0 to 10 m

When h_1 is less than 10 m, the method depends on whether the path is over land or sea.

For a land path or a mixed path:

The procedure for extrapolating field strength at a required distance d km for values of h_1 in the range 0 to 10 m is based on smooth-Earth horizon distances (km), written as $d_H(h) = 4.1\sqrt{h}$, where h is the required value of transmitting/base antenna height h_1 (m).

For $d < d_H(h_1)$, the field strength is given by the 10 m height curve at its horizon distance, plus ΔE, where ΔE is the difference between field strengths for the 10 m height curve, at distance d and at the horizon distance for h_1.

For $d \geq d_H(h_1)$, the field strength is given by the 10 m height curve at distance Δd beyond its horizon distance, where Δd is the difference between d and the horizon distance for h_1.

This is expressed in the following formulae, where $E_{10}(d)$ is the field strength (dB(μV/m)) taken from the 10 m height curve for a distance d (km):

$$E = E_{10}(d_H(10)) + E_{10}(d) - E_{10}(d_H(h_1)) \qquad \text{dB}(\mu\text{V/m}) \qquad \text{for } d < d_H(h_1) \tag{7a}$$

$$E = E_{10}(d_H(10) + d - d_H(h_1)) \qquad \text{dB}(\mu\text{V/m}) \qquad \text{for } d > d_H(h_1) \tag{7b}$$

If, in equation (7b), $d_H(10) + d - d_H(h_1)$ exceeds 1 000 km, even though $d \leq 1\,000$ km, E shall be found from linear extrapolation for log (distance) of the curve, given by:

$$E = E_{inf} + (E_{sup} - E_{inf}) \log(d / D_{inf}) / \log(D_{sup} / D_{inf}) \qquad \text{dB}(\mu\text{V/m}) \tag{7c}$$

where:

D_{inf}: penultimate tabulation distance (km)

D_{sup}: final tabulation distance (km)

E_{inf}: field strength at penultimate tabulation distance (dB(μV/m))

E_{sup}: field strength at final tabulation distance (dB(μV/m)).

Note that this propagation prediction method is not to be used for distances greater than 1 000 km. Equation (7c) shall be used only for extrapolating for $h_1 < 10$ m.

For an all-sea path:

Note that for an all-sea path, h_1 shall not be less than 1 m. The procedure requires that the distance at which the path has 0.6 of the radius of the first Fresnel zone unobstructed by the sea surface be known. This is given by:

$$D_{h_1} = D_{06}\,(f, h_1, 10) \qquad \text{km} \tag{8a}$$

where the function D_{06} is defined in § A.2.1.14 to this Chapter and f is the nominal frequency.

If $d > D_{h_1}$ it will be necessary to also calculate the 0.6 Fresnel clearance for a sea path where the transmitting/base antenna height is 20 m, given by:

$$D_{20} = D_{06}\,(f, 20, 10) \quad \text{km} \tag{8b}$$

where f is the nominal frequency.

The field strength for the required distance d and value of h_1 is then given by:

$$E = E_{max} \quad \text{dB}(\mu\text{V/m}) \qquad \text{for} \qquad d \le D_{h_1} \tag{9a}$$

$$E = E_{D_{h_1}} + (E_{D_{20}} - E_{D_{h_1}}) \times \log(d / D_{h_1}) / \log(D_{20} / D_{h_1}) \quad \text{dB}(\mu\text{V/m}) \quad \text{for } D_{h_1} < d < D_{20} \tag{9b}$$

$$E = E'\,(1 - F_S) + E''\,F_S \qquad \text{dB}(\mu\text{V/m}) \qquad \text{for} \qquad d \ge D_{20} \tag{9c}$$

where:

E_{max}: maximum field strength at the required distance given in § A.2.1.2 to this Chapter

$E_{D_{h_1}}$: E_{max} for distance D_{h_1} as given in § A.2.1.2 to this chapter

$E_{D_{20}}$ = $E_{10}(D_{20}) + (E_{20}(D_{20}) - E_{10}(D_{20}))\log(h_1 / 10) / \log(20/10)$

$E_{10}(x)$: field strength for $h_1 = 10$ m interpolated for distance x (dB(μV/m))

$E_{20}(x)$: field strength for $h_1 = 20$ m interpolated for distance x (dB(μV/m))

E'= $E_{10}(d) + (E_{20}(d) - E_{10}(d))\log(h_1/10) / \log(20/10)$ dB(μV/m)

E'': field strength for distance d calculated using the method for land paths given above

F_S = $(d - D_{20}) / d$.

A.2.1.4.3 Negative values of transmitting/base antenna height, h_1

For land paths and mixed paths, it is possible for the effective transmitting/base antenna height h_{eff} to have a negative value, since it is based on the average terrain height at distances from 3 km to 15 km. Thus, h_1 may be negative.

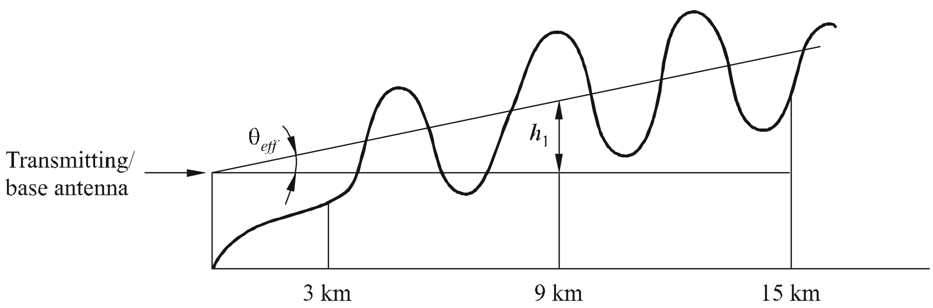
The procedure for negative values of h_1 is to obtain the field strength for $h_1 = 0$, as described in § A.2.1.4.2 to this chapter, and to calculate a correction based on the terrain clearance angle described in § A.2.1.10 to this chapter. The clearance angle is calculated for the nominal frequency, as follows:

a) In cases where a terrain database is available, the terrain clearance angle from the transmitting/base antenna shall be calculated as the elevation angle of a line which just clears all terrain obstructions up to 15 km from the transmitting/base antenna in the direction of (but not going beyond) the receiving/mobile antenna. This clearance angle, which will have a positive value, shall be used instead of θ_{tca} in equation (23f) in the terrain clearance angle correction method given in § A.2.1.10 to this chapter to obtain a correction, C_a, which is added to the field strength obtained for $h_1 = 0$. It should be noted that using this method can result in a discontinuity in field strength at the transition around $h_1 = 0$.

b) In cases where a terrain database is not available, the (positive) effective terrain clearance angle, θ_{eff}, may be estimated assuming an obstruction of height h_1, calculated as in § A.2.1.3.1.1 to this chapter, at a distance of 9 km from the transmitting/base antenna. Note that this is used for all path lengths, even when less than 9 km. That is, the irregular ground over the range 3 km to 15 km from the transmitting/base antenna, is approximated by a regular slope whose height at 9 km is $|h_1|$, as indicated in Fig. A.2.1-1. The value of θ_{eff} shall be used instead of θ_{tca} in equation (23f) in the terrain clearance angle-correction method given in § A.2.1.10 to this chapter to obtain a correction, C_a, which is added to the field strength obtained for $h_1 = 0$. This correction is only to be applied if it results in a reduction of the field strength.

FIGURE A.2.1-1

Effective clearance angle for $h_1 < 0$



θ_{eff}: effective terrain clearance angle (positive)
h_1: transmitting/base antenna height used for calculation

RRC06-A2-C2-A2-1-1

The effect of tropospheric loss can be taken into account by a correction, C_t, given by:

$$C_t = \max[C_a, C_{tropo}] \tag{10a}$$

where:

$$C_{tropo} = 30 \log\left[\frac{\theta_e}{\theta_e + \theta_{tca}}\right] \tag{10b}$$

and

$$\theta_e = \frac{180d}{a\pi k} \quad \text{degrees} \tag{10c}$$

with:

- d: path length (km)
- a: 6 370 km, radius of the Earth
- k: 4/3, effective Earth radius factor for median refractivity conditions.

It is assumed that θ_{tca} has the value of 0.0 for an effective height of 0 m.

A.2.1.5 Interpolation of field strength as a function of distance

The figures in Annex 2.3 to this chapter show field strength plotted against distance, d, between 1 km and 1 000 km. No interpolation for distance is needed if field strengths are read directly from these curves. For greater precision, and for computer implementation, field strengths should be obtained from the associated tabulations (available from the BR). In this case, unless d coincides with one of the tabulation distances given in Table A.2.1-1, the field strength, E (dB(μV/m)), shall be linearly interpolated for the logarithm of the distance using the following equation:

$$E = E_{inf} + (E_{sup} - E_{inf}) \log (d / d_{inf}) / \log (d_{sup} / d_{inf}) \quad \text{dB}(\mu\text{V/m}) \tag{11}$$

where:

- d: distance for which the prediction is required (km)
- d_{inf}: nearest tabulation distance less than d (km)
- d_{sup}: nearest tabulation distance greater than d (km)
- E_{inf}: field-strength value for d_{inf} (dB(μV/m))
- E_{sup}: field-strength value for d_{sup} (dB(μV/m)).

This propagation prediction method is not valid for values of d less than 1 km or greater than 1 000 km.

TABLE A.2.1-1

Values of distance (km) used in the tables of field strengths

1	14	55	140	375	700
2	15	60	150	400	725
3	16	65	160	425	750
4	17	70	170	450	775
5	18	75	180	475	800
6	19	80	190	500	825
7	20	85	200	525	850
8	25	90	225	550	875
9	30	95	250	575	900
10	35	100	275	600	925
11	40	110	300	625	950
12	45	120	325	650	975
13	50	130	350	675	1 000

A.2.1.6 Interpolation of field strength as a function of frequency

Field-strength values for a given required frequency shall be obtained by interpolating between the values for the nominal frequency values of 100 MHz, 600 MHz and 2 000 MHz. The required field strength, E, shall be calculated using:

$$E = E_{inf} + (E_{sup} - E_{inf}) \log(f / f_{inf}) / \log(f_{sup} / f_{inf}) \quad \text{dB}(\mu\text{V/m}) \tag{12}$$

where:

f: frequency for which the prediction is required (MHz)

f_{inf}: lower nominal frequency (100 MHz if f < 600 MHz, 600 MHz otherwise)

f_{sup}: higher nominal frequency (600 MHz if f < 600 MHz, 2 000 MHz otherwise)

E_{inf}: field-strength value for f_{inf} (dB(μV/m))

E_{sup}: field-strength value for f_{sup} (dB(μV/m)).

A.2.1.7 Interpolation of field strength as a function of time percentage

Field-strength values for a required percentage of the time between 1% and 50% shall be calculated by interpolation between the nominal values 1% and 10% or between the nominal values 10% and 50% using:

$$E = E_{sup} \, (Q_{inf} - Q_t) / (Q_{inf} - Q_{sup}) + E_{inf}(Q_t - Q_{sup}) / (Q_{inf} - Q_{sup}) \quad \text{dB}(\mu\text{V/m}) \tag{13}$$

where:

$Q_t = Q_i(t/100)$

$Q_{inf} = Q_i(t_{inf}/100)$

$Q_{sup} = Q_i(t_{sup}/100)$

E_{inf}: field-strength value for time percentage t_{inf} (dB(μV/m))

E_{sup}: field-strength value for time percentage t_{sup} (dB(μV/m))

t: percentage of the time for which the prediction is required

t_{inf}: lower nominal time percentage

t_{sup}: upper nominal time percentage

where $Q_i(x)$ is the inverse complementary cumulative normal distribution function.

This propagation prediction method shall be used for field strengths exceeded for time percentages in the range 1% to 50% only. Extrapolation outside the range 1% to 50% time is not valid.

A method for the calculation of $Q_i(x)$ is given in § A.2.1.12 to this chapter.

A.2.1.8 Mixed paths

When paths occur over different propagation zones, e.g. land, sea, areas of different refractivity, the method given below shall be used for the following conditions:

a) for all frequencies and all percentages of the time and for those combinations of propagation zone which do not involve any land/sea or land/coastal land transitions, the following procedure for calculating the field strength shall be used:

$$E_{m,t} = \sum_i \frac{d_i}{d_T} E_{i,t} \tag{14}$$

where:

$E_{m,t}$: field strength for mixed path for t% of the time (dB(μV/m))

$E_{i,t}$: field strength for path in zone i equal in length to the mixed path for t% of the time (dB(μV/m))

d_i: length of path in zone i (km)

d_T: length of total path (km);

b) for all frequencies and all percentages of time and for those combinations of propagation zone which involve only a single land propagation category and a single sea or coastal land propagation category, the following procedure for calculating the field strength shall be used:

$$E_{m,t} = (1 - A) \cdot E_{l,t} + A \cdot E_{s,t} \tag{15a}$$

where:

$E_{m,t}$: field strength for mixed path for t% of the time (dB(μV/m))

$E_{l,t}$: field strength for land path equal in length to the mixed path for t% of the time (dB(μV/m))

$E_{s,t}$: field strength for sea or coastal land path equal in length to the mixed path for t% of the time (dB(μV/m))

A : interpolation factor as given in § A.2.1.8.1 to this chapter;

c) for all frequencies and all percentages of time and for those combinations of three or more propagation zones which involve at least one land/sea or land/coastal land boundary, the following procedure for calculating the field strength shall be used:

$$E_{m,t} = \{1 - A\} \cdot \frac{\sum_{i=1}^{n_l} d_i E_{li,t}}{d_{lT}} + A \cdot \frac{\sum_{j=1}^{n_s} d_j E_{sj,t}}{d_{sT}} \qquad (15b)^*$$

where:

$E_{m,t}$: field strength for mixed path for t% of the time (dB(μV/m))

$E_{li,t}$: field strength for land path i equal in length to the mixed path for t% of the time, i = 1, ..., n_l; n_l is the number of land zones traversed (dB(μV/m))

$E_{sj,t}$: field strength for sea or coastal land path j equal in length to the mixed path for t% of the time, j = 1, ..., n_s, where n_s is the total number of sea and coastal land zones traversed (dB(μV/m))

A: interpolation factor as given in § A.2.1.8.1 to this chapter (note that the "fraction of path over sea" is calculated as: d_{sT} / d_T)

d_i, d_j: length of path in zones i, j (km)

d_{lT}: length of total land path $= \sum_{i=1}^{n_l} d_i$ (km)

d_{sT}: length of total sea and coastal land path $= \sum_{j=1}^{n_s} d_j$ (km)

d_T: length of total propagation path $= d_{lT} + d_{sT}$ (km).

* Note that equation (15b) reduces to equation (15a) in the case of mixed propagation paths which involve only a single land propagation category and a single sea or coastal land propagation category.

A.2.1.8.1 The mixed path interpolation factor, *A*

The following notation will be used:

N_s: total number of sea zones and coastal land zones

n: sea-path or coastal land-path zone number; $n = 1, 2, ..., N_s$

M_l: total number of land zones

m: land-path zone number; $m = 1, 2, ..., M_l$

d_{sn}: distance traversed in sea or coastal land zone n (km)

d_{lm}: distance traversed in land zone m (km).

Then:

$$d_{sT} = \sum_{n=1}^{N_s} d_{sn} \quad \text{total length of sea and coastal land paths traversed} \tag{16a}$$

$$d_{lT} = \sum_{m=1}^{M_l} d_{lm} \quad \text{total length of land paths traversed} \tag{16b}$$

$$d_T = d_{sT} + d_{lT} \quad \text{length of the total propagation path.} \tag{16c}$$

The following field-strength values are needed:

$E_{sn}(d_T)$: field-strength value dB(μV/m) for distance d_T, assumed to be all of sea or coastal-land zone type n

$E_{lm}(d_T)$: field-strength value dB(μV/m) for distance d_T, assumed to be all of land zone type m.

The interpolation factor[1], A, is given by:

$$A = [A_0(F_s)]^V \tag{17}$$

where:

$A_0(F_s)$: basic interpolation factor as shown in Fig. A.2.1-2.

[1] The interpolation factor is applied to all frequencies and to all time percentages. It must be noted that the interpolation is only applied to:

- land-sea paths
- land-coastal land paths
- land-(sea and coastal land) paths

and not to:

- land-land paths
- or any combination of sea and/or coastal-land paths.

The fraction of path over the sea, F_s, used in Fig. A.2.1-2 is given by:

$$F_s = \frac{d_{sT}}{d_T} \tag{18}$$

and V is calculated using the expression:

$$V = \max\left[1.0, 1.0 + \frac{\Delta}{40.0}\right] \tag{19}$$

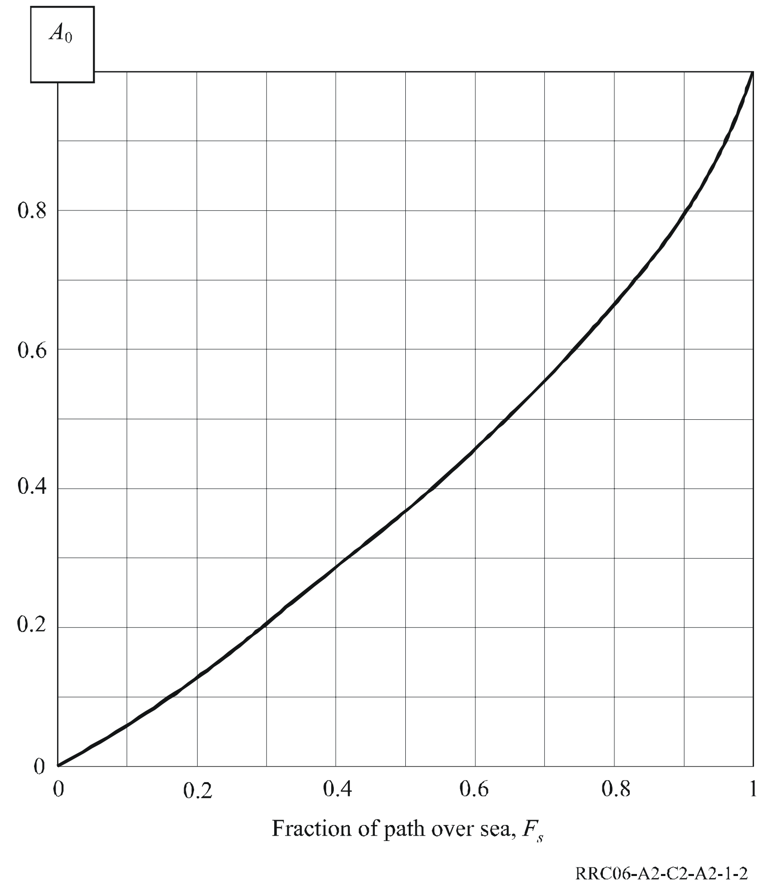
with:

$$\Delta = \sum_{n=1}^{N_s} E_{sn}(d_T)\frac{d_{sn}}{d_{sT}} - \sum_{m=1}^{M_l} E_{lm}(d_T)\frac{d_{lm}}{d_{lT}} \tag{20}$$

Figure A.2.1-2 shows $A_0\,(F_s)$, which is applicable for all time percentages.

FIGURE A.2.1-2

Basic interpolation factor, A_0, for mixed propagation



A.2.1.9 Correction for receiving/mobile antenna height

The field-strength values given by the land curves and associated tabulations in this propagation prediction method are for a reference receiving/mobile antenna at a height R (m), representative of the height of the ground cover surrounding the receiving/mobile antenna, subject to a minimum height value of 10 m. For open and suburban areas, and also for sea paths, the notional value of R is 10 m.

Where the site of the receiving/mobile antenna is on land, account shall first be taken of the elevation angle of the arriving ray by calculating a modified representative clutter height R' (m), given by:

$$R' = (1\,000\,d\,R - 15\,h_1)/(1\,000\,d - 15) \qquad \text{m} \qquad (21)$$

where h_1 and R are given in metres and the distance d is in kilometres.

Note that for $h_1 < 6.5d + R$, $R' \approx R$.

The value of R' must be limited, if necessary, such that it is not less than 1 m.

Where the receiving/mobile antenna is in either a suburban or urban environment, the correction is then given by:

$$\text{Correction} = 6.03 - J(\nu) \qquad \text{dB} \qquad \text{for } h_2 < R' \qquad (22a)$$

$$= K_{h_2} \log (h_2 / R') \qquad \text{dB} \qquad \text{for } h_2 \geq R' \qquad (22b)$$

h_2: height of the receiving/mobile antenna above ground (m)

where $J(\nu)$ is given by equation (23d),

and:

$$\nu = K_{nu} \sqrt{h_{dif}\theta_{clut}} \qquad (22c)$$

$$h_{dif} = R' - h_2 \qquad \text{m} \qquad (22d)$$

$$\theta_{clut} = \arctan (h_{dif} / 27) \qquad \text{degrees} \qquad (22e)$$

$$K_{h_2} = 3.2 + 6.2 \log (f) \qquad (22f)$$

$$K_{nu} = 0.0108 \sqrt{f} \qquad (22g)$$

f: required frequency (MHz).

Where the receiving/mobile antenna is on land in a rural or open environment, the correction is given by equation (22b) for all values of h_2.

Where the site of the receiving/mobile antenna is on the sea, for $h_2 \geq 10$ m, the correction shall be calculated using equation (22b), with R' set to 10 m.

Where the site of the receiving/mobile antenna is on the sea, for $h_2 < 10$ m, an alternative method shall be used, based upon the path lengths at which 0.6 of the radius of the first Fresnel zone is clear of obstruction by the sea surface. An approximate method for calculating this distance is given in § A.2.1.14 to this chapter.

The distance d_{10} at which the path would have 0.6 Fresnel clearance for the required value of h_1 and for $h_2 = 10$ m shall be calculated as $D_{06}(f, h_1, 10)$ in § A.2.1.14 to this chapter.

If the required distance is equal to or greater than d_{10}, then again the correction for the required value of h_2 shall be calculated using equation (22b), with R' set to 10 m.

If the required distance is less than d_{10}, then the correction to be added to the field strength E shall be calculated using:

$$\text{Correction} = 0.0 \quad \text{dB} \qquad \text{for} \quad d \le d_{h_2} \tag{22h}$$

$$= C_{10} \times \log(d / d_{h_2}) / \log(d_{10} / d_{h_2}) \quad \text{dB} \qquad \text{for}\; d_{h_2} < d < d_{10} \tag{22j}$$

where:

C_{10}: correction for the required value of h_2 at distance d_{10} using equation (22b) with R' set to 10 m

d_{10}: distance at which the path has 0.6 Fresnel clearance for $h_2 = 10$ m calculated as $D_{06}(f, h_1, 10)$ as given in § A.2.1.14 to this chapter

d_{h_2} : distance at which the path has 0.6 Fresnel clearance for the required value of h_2 calculated as $D_{06}(f, h_1, h_2)$ as given in § A.2.1.14 to this chapter.

This correction shall not be used for receiving/mobile antenna heights h_2 less than 1 m when the receiving site is on land or less than 3 m when on the sea.

A.2.1.10 Correction for terrain clearance angle

For land paths, and when the receiving/mobile antenna is on a land section of a mixed path, if greater precision is required for predicting the field strength for reception conditions in specific areas, e.g. in a small reception area a correction may be made based on a terrain clearance angle. The terrain clearance angle, θ_{tca}, is given by:

$$\theta_{tca} = \theta - \theta_r \qquad \text{degrees} \tag{23a}$$

where θ is measured relative to the line from the receiving/mobile antenna which just clears all terrain obstructions in the direction of the transmitter/base antenna over a distance of up to 16 km but not going beyond the transmitting/base antenna. It is measured relative to the horizontal at the receiving/mobile antenna, being positive if the clearance line is above the horizontal. This is shown in Fig. A.2.1-3.

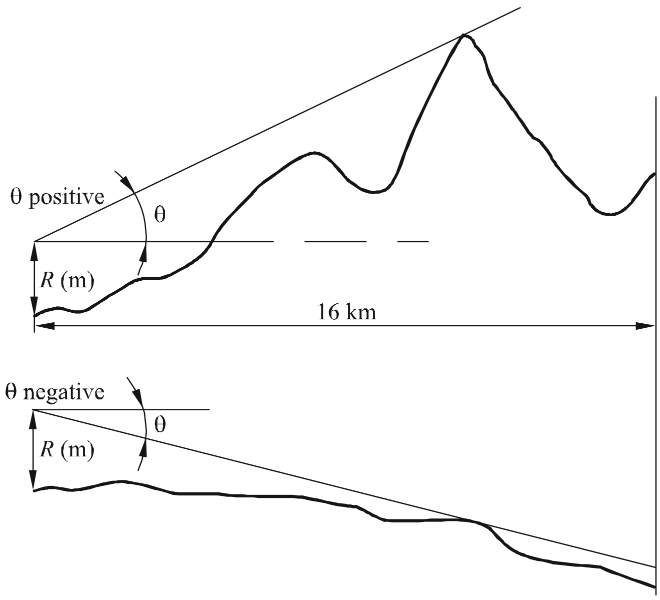
The reference angle θ_r is given by:

$$\theta_r = \arctan\left(\frac{h_{1s} - h_{2s}}{1\,000d}\right) \qquad \text{degrees} \tag{23b}$$

where h_{1s} and h_{2s} are the height of the transmitting/base and receiving/mobile antennas above sea level, respectively.

FIGURE A.2.1-3

Terrain clearance angle



Where the relevant terrain clearance angle information is available, the correction to be added to the field strength is calculated using:

$$\text{Correction} = J(\nu') - J(\nu) \quad \text{dB} \tag{23c}$$

where $J(\nu)$ is given by:

$$J(\nu) = \left[6.9 + 20\log\left(\sqrt{(\nu - 0.1)^2 + 1} + \nu - 0.1\right)\right] \tag{23d}$$

$$\nu' = 0.036\sqrt{f} \tag{23e}$$

$$\nu = 0.065\,\theta_{tca}\sqrt{f} \tag{23f}$$

θ_{tca}: terrain clearance angle (degrees)

f: nominal frequency (MHz) when the correction for negative values of transmitting antenna height is calculated; required frequency (MHz) when the terrain clearance angle correction is calculated.

The correction is valid for clearance angle, θ_{tca}, in the range +0.55° to +40°.

The correction for $\theta_{tca} < +0.55°$ is the same as for $\theta_{tca} = +0.55°$.

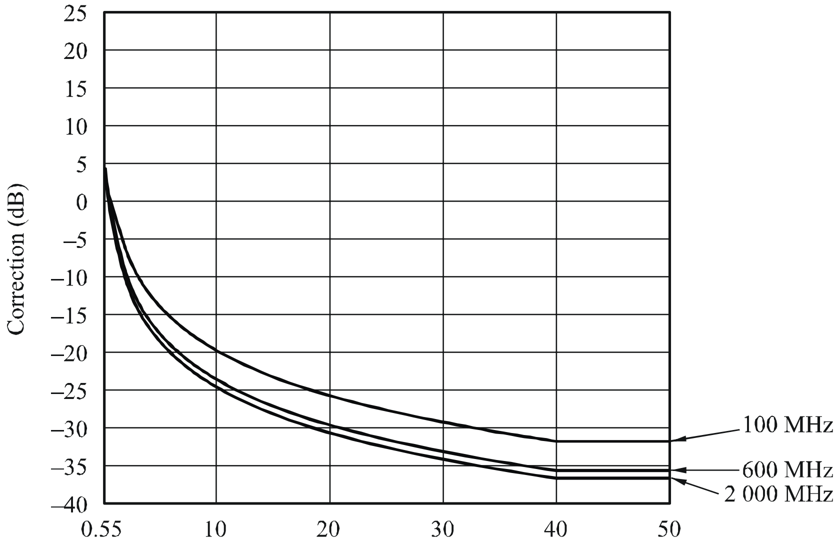
The correction for $\theta_{tca} > +40°$ is the same as for $\theta_{tca} = +40°$.

It should be noted that the land field-strength curves take account of losses due to typical shielding of the receiving/mobile antenna by gently rolling terrain. Thus, the terrain clearance angle corrections are zero at a small positive angle typical of receiving/mobile antenna positions.

Figure A.2.1-4 illustrates the terrain clearance angle correction for the nominal frequencies.

FIGURE A.2.1-4

Terrain clearance angle correction



RRC06-A2-C2-A2-1-4

A.2.1.11 Location variability in land area-coverage prediction

For receiving/mobile antenna locations on land, the field strength E which will be exceeded for q% of locations is given by:

$$E(q) = E\ (\text{median}) + Q_i(q\ /\ 100)\ \sigma_L(f) \quad \text{dB}(\mu\text{V/m}) \tag{24}$$

where:

$Q_i(x)$: inverse complementary cumulative normal distribution as a function of probability

σ_L: standard deviation of the Gaussian distribution of the local mean in the study area.

Values of standard deviation for digital systems having a bandwidth less than 1 MHz and for analogue systems are given as a function of frequency by:

$$\sigma_L = K + 1.6 \log(f) \qquad \text{dB} \tag{25}$$

where:

K = 2.1 for mobile systems in urban locations
= 3.8 for mobile systems in suburban locations or amongst rolling hills
= 5.1 for analogue broadcasting systems
f: required frequency (MHz).

For digital systems having a bandwidth of 1 MHz or greater, a standard deviation of 5.5 dB shall be used at all frequencies.

The percentage of locations q can vary between 1% and 99%. This propagation prediction method shall not be used for percentage locations less than 1% or greater than 99%.

The location variability correction is not to be applied when the receiver/mobile location is on the sea.

A.2.1.12 An approximation to the inverse complementary cumulative normal distribution function

The following approximation to the inverse complementary cumulative normal distribution function, $Q_i(x)$, is valid for $0.01 \le x \le 0.99$:

$$Q_i(x) = T(x) - \xi(x) \qquad \text{if } x \le 0.5 \tag{26a}$$

$$Q_i(x) = -\{ T(1-x) - \xi(1-x) \} \qquad \text{if } x > 0.5 \tag{26b}$$

where:

$$T(x) = \sqrt{[-2 \ln(x)]} \tag{26c}$$

$$\xi(x) = \frac{[(C_2 \cdot T(x) + C_1) \cdot T(x)] + C_0}{[(D_3 \cdot T(x) + D_2) \cdot T(x) + D_1] \cdot T(x) + 1} \tag{26d}$$

$C_0 = 2.515517$

$C_1 = 0.802853$

$C_2 = 0.010328$

$D_1 = 1.432788$

$D_2 = 0.189269$

$D_3 = 0.001308$

Values given by the above equations are given in Table A.2.1-2.

TABLE A.2.1-2

Approximate inverse complementary cumulative normal distribution values

q%	$Q_i(q/100)$	q%	$Q_i(q/100)$	q%	$Q_i(q/100)$	q%	$Q_i(q/100)$
1	2.327	26	0.643	51	–0.025	76	–0.706
2	2.054	27	0.612	52	–0.050	77	–0.739
3	1.881	28	0.582	53	–0.075	78	–0.772
4	1.751	29	0.553	54	–0.100	79	–0.806
5	1.645	30	0.524	55	–0.125	80	–0.841
6	1.555	31	0.495	56	–0.151	81	–0.878
7	1.476	32	0.467	57	–0.176	82	–0.915
8	1.405	33	0.439	58	–0.202	83	–0.954
9	1.341	34	0.412	59	–0.227	84	–0.994
10	1.282	35	0.385	60	–0.253	85	–1.036
11	1.227	36	0.358	61	–0.279	86	–1.080
12	1.175	37	0.331	62	–0.305	87	–1.126
13	1.126	38	0.305	63	–0.331	88	–1.175
14	1.080	39	0.279	64	–0.358	89	–1.227
15	1.036	40	0.253	65	–0.385	90	–1.282
16	0.994	41	0.227	66	–0.412	91	–1.341
17	0.954	42	0.202	67	–0.439	92	–1.405
18	0.915	43	0.176	68	–0.467	93	–1.476
19	0.878	44	0.151	69	–0.495	94	–1.555
20	0.841	45	0.125	70	–0.524	95	–1.645
21	0.806	46	0.100	71	–0.553	96	–1.751
22	0.772	47	0.075	72	–0.582	97	–1.881
23	0.739	48	0.050	73	–0.612	98	–2.054
24	0.706	49	0.025	74	–0.643	99	–2.327
25	0.674	50	0.000	75	–0.674		

A.2.1.13 Equivalent basic transmission loss

When required, the equivalent basic transmission loss for a given field strength is given by:

$$L_b = 139 - E + 20 \log f \qquad \text{dB} \tag{27}$$

where:

L_b: equivalent basic transmission loss (dB)

E: field strength (dB(μV/m)) for 1 kW e.r.p. (dB(μV/m))

f: required frequency (MHz).

A.2.1.14 Approximation of the 0.6 Fresnel clearance path length

The path length which achieves a clearance of 0.6 of the radius of the first Fresnel zone over a smooth curved Earth, for a given frequency and antenna heights h_1 and h_2, is given approximately by:

$$D_{06}(f, h_1, h_2) = \frac{D_f \cdot D_h}{D_f + D_h} \quad \text{km} \tag{28}$$

where:

D_f: frequency-dependent term

$$= 0.0000389\, f\, h_1 h_2 \quad \text{km} \tag{28a}$$

D_h: asymptotic term defined by horizon distances

$$= 4.1(\sqrt{h_1} + \sqrt{h_2}) \quad \text{km} \tag{28b}$$

f: nominal frequency (MHz)

h_1, h_2: antenna heights above smooth Earth (m).

In the above equations, the value of h_1 must be limited, if necessary, such that it is not less than zero. Moreover, the resulting value of D_{06} must be limited, if necessary, such that it is not less than 0.001 km.

A.2.1.15 Procedure for the application of this propagation prediction method

The step-by-step procedure given below is intended to be applied to values derived from the field strength versus distance tables (see Annex 2.2 to this chapter). It may, however, also be applied to values obtained from the curves, in which case the distance interpolation procedure of Step 8.1.5 is not needed.

Step 1: Determine the type of the propagation path as land, cold sea or warm sea. If the path is mixed, then determine two path types which are regarded as first and second propagation types. If the path can be represented by a single type, then this is regarded as the first propagation type and the mixed-path method given in Step 11 is not required.

Step 2: For any given percentage of time (in the range 1% to 50%), determine two nominal time percentages as follows:

– if the required percentage of the time is > 1% and < 10%, the lower and higher nominal percentages are 1% and 10%, respectively;

– if the required percentage of the time > 10% and < 50%, the lower and higher nominal percentages are 10% and 50%, respectively.

If the required percentage of time is equal to 1% or 10% or 50%, this value shall be regarded as the lower nominal percentage time and the interpolation process of Step 10 is not required.

Step 3: For any required frequency between 174 and 862 MHz, determine two nominal frequencies as follows:

– where the required frequency < 600 MHz, the lower and higher nominal frequencies are 100 and 600 MHz, respectively;

– where the required frequency > 600 MHz, the lower and higher nominal frequencies are 600 and 2 000 MHz, respectively.

If the required frequency equals 100 or 600 MHz, this value shall be regarded as the lower nominal frequency and the interpolation process of Step 9 is not required.

Step 4: Determine the lower and higher nominal distances from Table A.2.1-1 closest to the required distance. If the required distance coincides with a value in Table A.2.1-1, this shall be regarded as the lower nominal distance and the interpolation process of Step 8.1.5 is not required.

Step 5: For the first propagation type, follow Steps 6 to 10.

Step 6: For the lower nominal time percentage follow, Steps 7 to 9.

Step 7: For the lower nominal frequency follow, Step 8.

Step 8: Obtain the field strength exceeded at 50% locations for a receiving/mobile antenna at the height above ground, R, representative of the surrounding terrain clutter, for the required distance and transmitting/base antenna height, as follows:

> *Step 8.1:* For a transmitting/base antenna height h_1 equal to or greater than 10 m, follow Steps 8.1.1 to 8.1.5:
>
> *Step 8.1.1:* Determine the lower and higher nominal h_1 values using the method given in § A.2.1.4.1 to this chapter. If h_1 coincides with one of the nominal values 10, 20, 37.5, 75, 150, 300, 600 or 1 200 m, this shall be regarded as the lower nominal value of h_1 and the interpolation process of Step 8.1.6 is not required.
>
> *Step 8.1.2:* For the lower nominal value of h_1, follow Steps 8.1.3 to 8.1.5.
>
> *Step 8.1.3:* For the lower nominal value of distance, follow Step 8.1.4.
>
> *Step 8.1.4:* Obtain the field strength exceeded at 50% locations for a receiving/mobile antenna at height, R, representative of the surrounding terrain clutter, for the required values of distance, d, and transmitting/base antenna height, h_1.
>
> *Step 8.1.5:* If the required distance does not coincide with the lower nominal distance, repeat Step 8.1.4 for the higher nominal distance and interpolate the two field strengths for the required distance using the method given in § A.2.1.5 to this chapter.
>
> *Step 8.1.6:* If the required transmitting/base antenna height, h_1, does not coincide with one of the nominal values, repeat Steps 8.1.3 to 8.1.5 and interpolate/extrapolate for h_1 using the method given in § A.2.1.4.1 to this chapter. If necessary, limit the result to the maximum value given in § A.2.1.2 to this chapter.
>
> *Step 8.2:* For a transmitting/base antenna height h_1 less than 10 m, determine the field strength for the required height and distance using the method given in § A.2.1.4.2 to this chapter. If h_1 is less than zero, the method given in § A.2.1.4.3 to this chaptershall also be used.

Step 9: If the required frequency does not coincide with the lower nominal frequency, repeat Step 8 for the higher nominal frequency and interpolate the two field strengths using the method given in § A.2.1.6 to this chapter. If necessary, limit the result to the maximum field strength as given in § A.2.1.2 to this chapter.

Step 10: If the required percentage of time does not coincide with the lower nominal time percentage, repeat Steps 7 to 9 for the higher nominal percentage of time and interpolate the two field strengths using the method given in § A.2.1.7 to this chapter.

Step 11: If the prediction is for a mixed path, follow the procedure given in § A.2.1.8 to this chapter.

Step 12: Correct the field strength for receiving/mobile antenna height h_2 using the method given in § A.2.1.9 to this chapter.

Step 13: If information on the terrain clearance angle at a receiving/mobile antenna location on land is available, correct the field strength for the terrain clearance angle at the receiver/mobile using the method given in § A.2.1.10 to this chapter.

Step 14: If it is necessary to know the field strength at a receiving/mobile antenna location on land that is exceeded at a percentage of locations other than 50%, correct the field strength for the required percentage of locations using the method given in § A.2.1.11 to this chapter.

Step 15: If necessary, limit the resulting field strength to the maximum given in § A.2.1.2 to this chapter.

Step 16: If required, convert field strength to equivalent basic transmission loss for the path using the method given in § A.2.1.13 to this chapter.

ANNEX 2.2

Tabulated values of field strength

Values of field strength (dB(µV/m)) against distance (km), corresponding to the family of propagation curves given in Annex 2.3 to this chapter, are provided in the following tables:

Table A.2.2.2

FS_curves_RRC_04.txt

The detailed instructions for interpolation of these tabulated values are provided in § A.2.1.5, A.2.1.6 and A.2.1.7 of Annex 2.1 to this chapter.

ANNEX 2.3

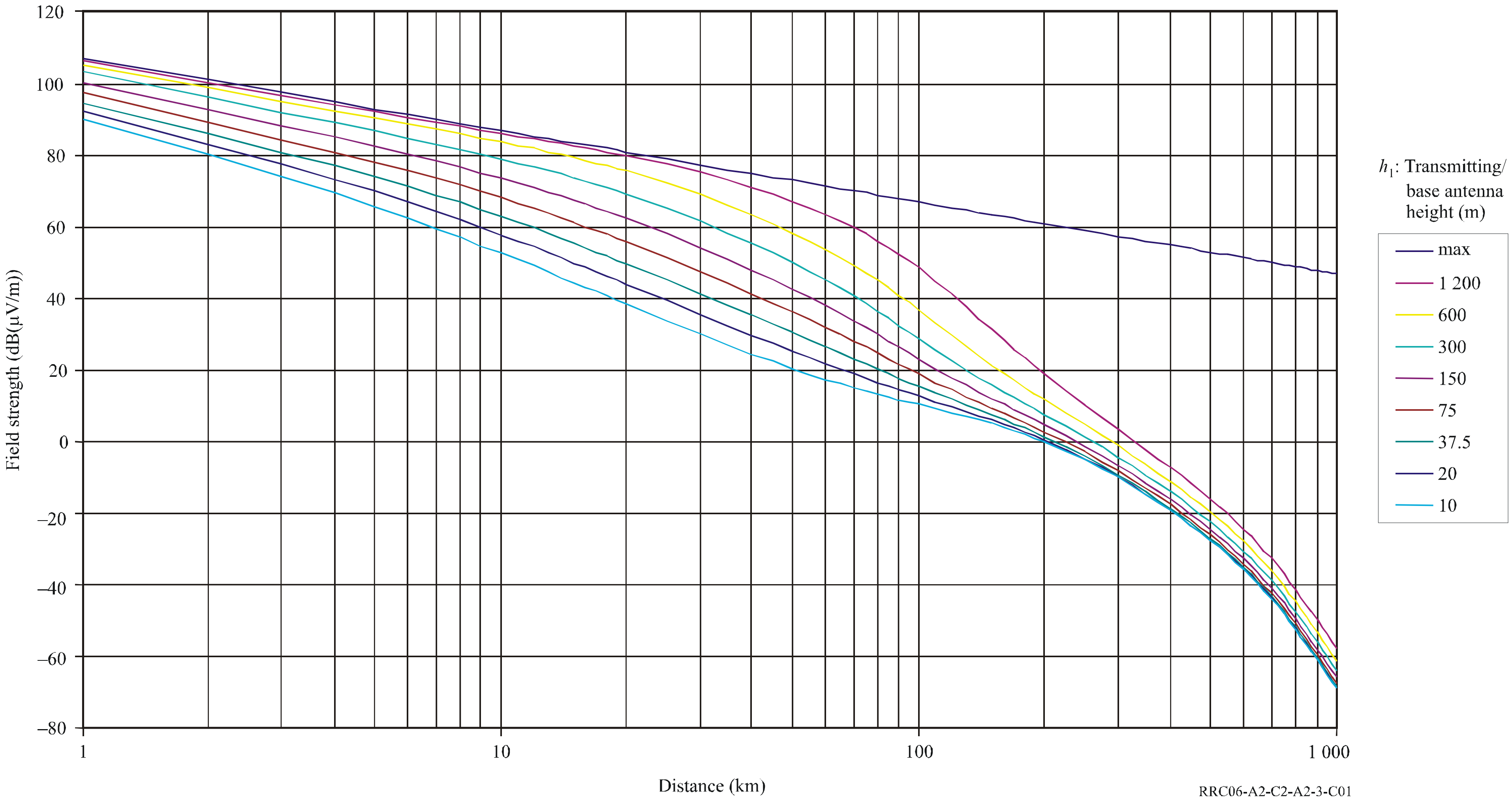
Propagation curves

The propagation curves shown in the figures are used, together with the map shown in § 2.2.2 of Chapter 2 to Annex 2 to this Chapter, for the planning of the broadcasting service. They give, on the basis of statistics derived from measurement results, and also of theoretical considerations, the field-strength value exceeded for 50% of locations for time percentages of 50%, 10% and 1%.

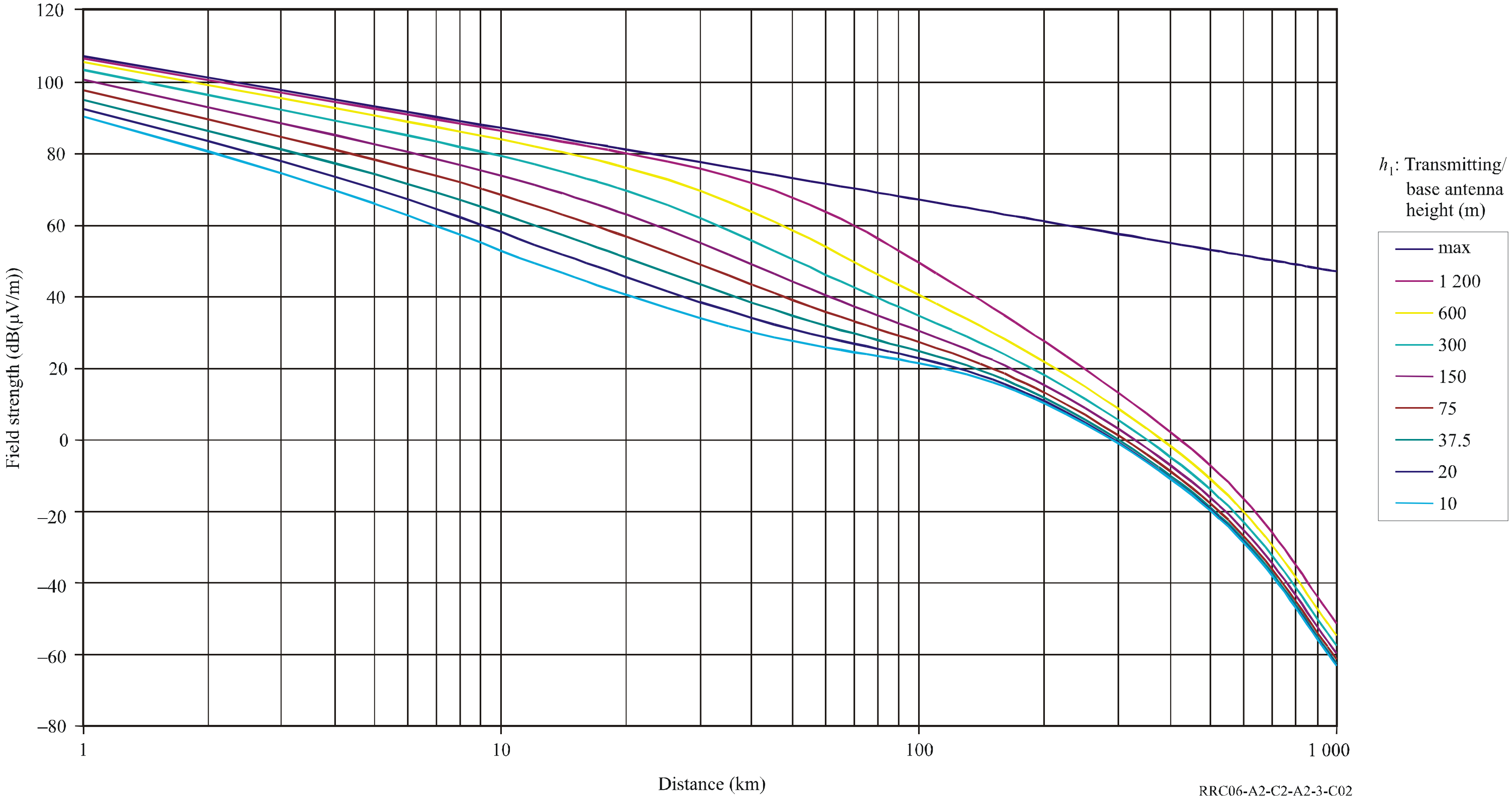
The values obtained correspond to a receiving antenna height of 10 m over neighbouring ground in open area. The values are expressed in decibels relative to 1 μV/m (dB(μV/m)) for an e.r.p. of 1 kW in the direction of the reception point. The curves give the values of the field strength exceeded at 50% of locations and each figure corresponds to time percentages of 50%, 10% and 1% for each of the geographical zones.

The data are given for various types of areas and climates (see § 2.2.2 of Chapter 2 to Annex 2).

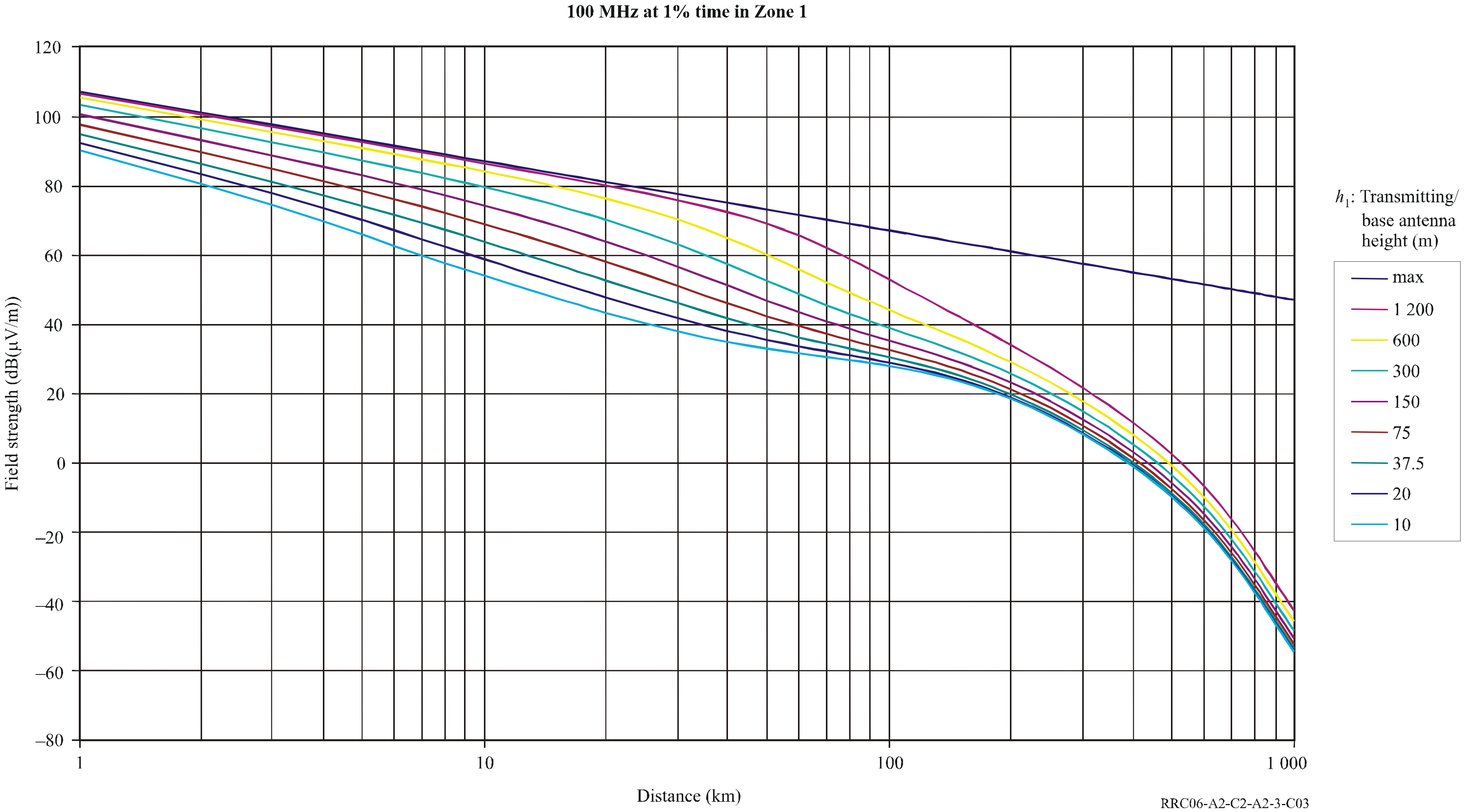
100 MHz at 50% time in Zone 1



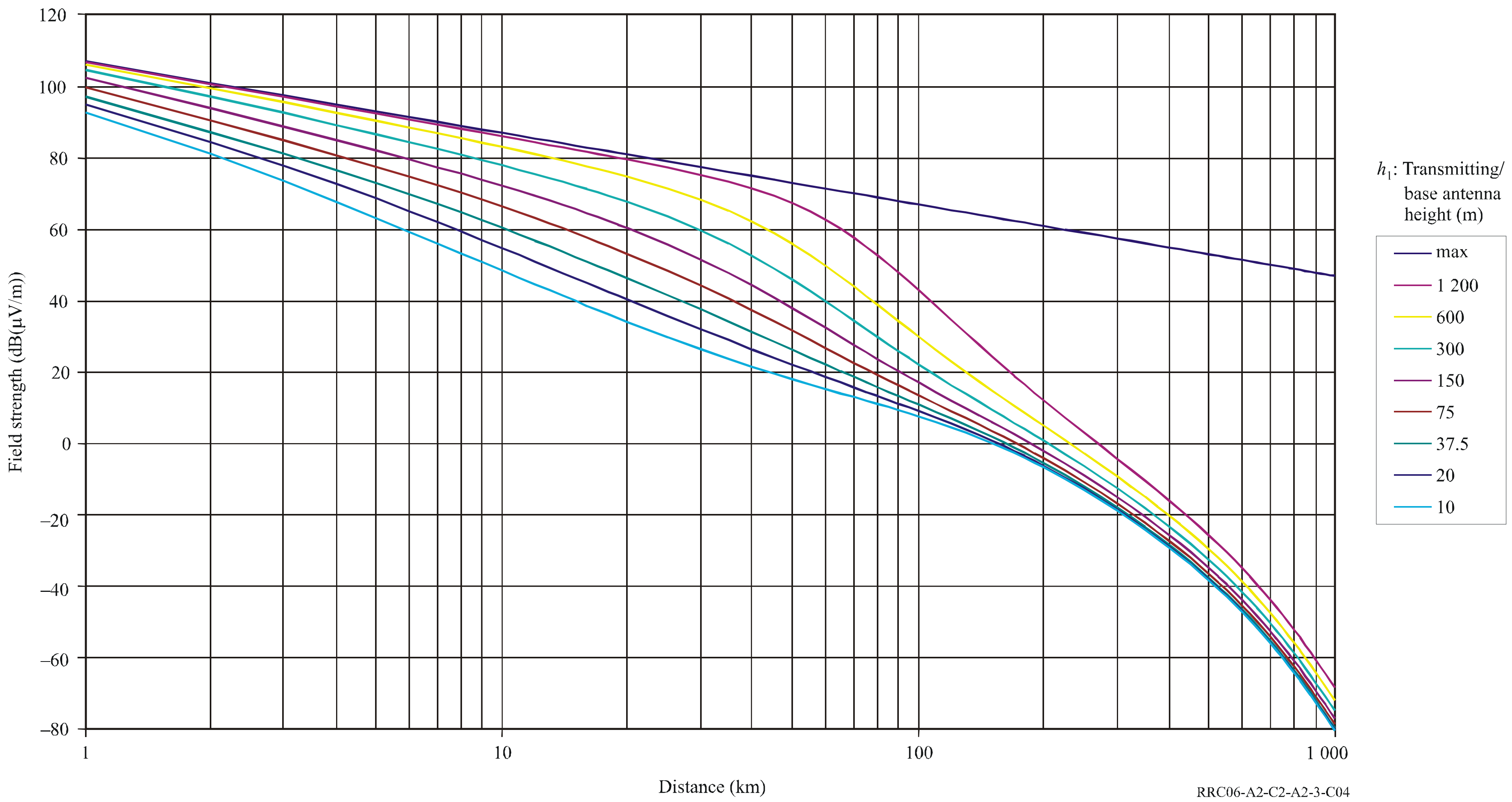
100 MHz at 10% time in Zone 1



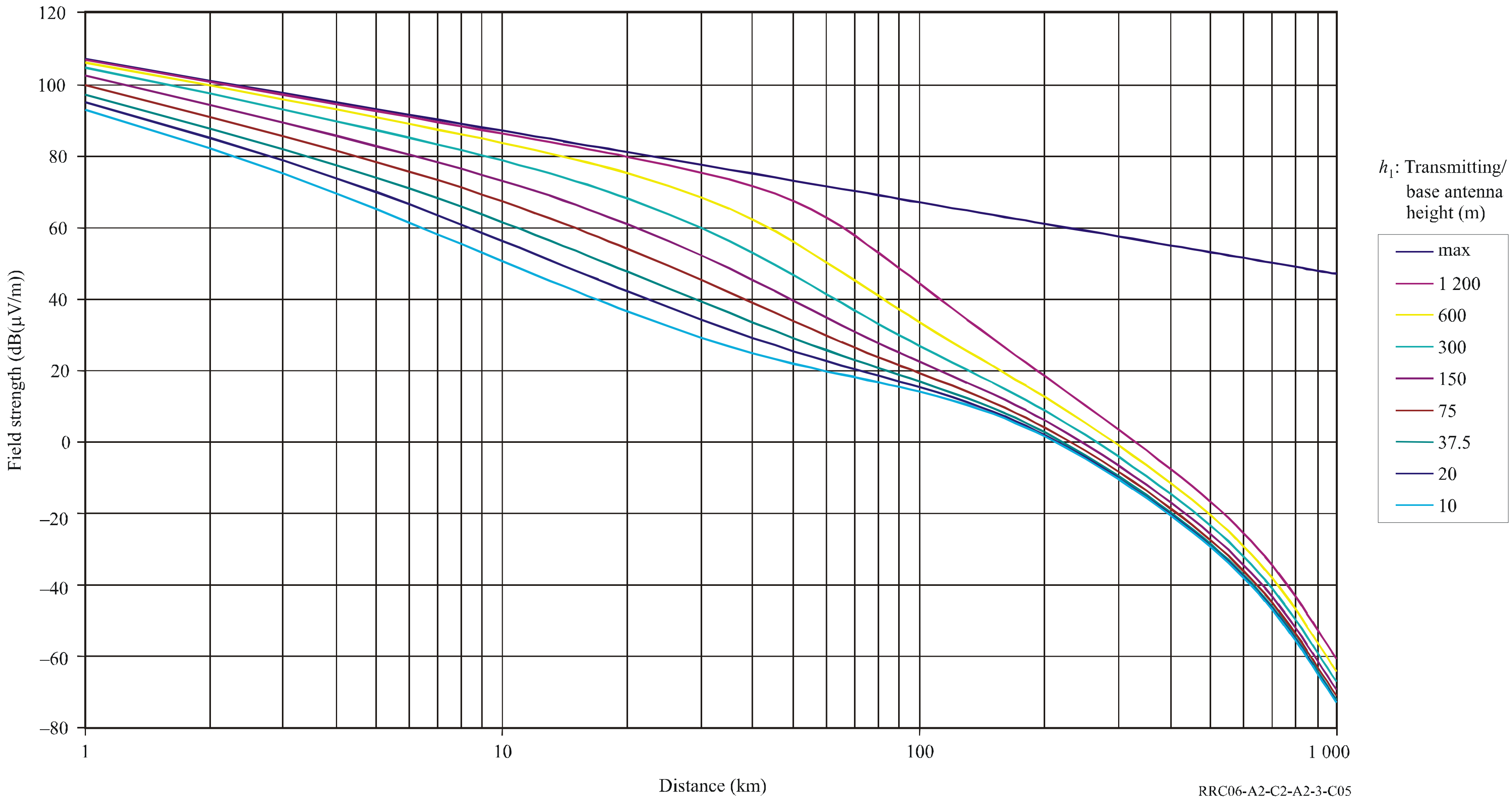
RRC06-A2-C2-A2-3-C02


100 MHz at 1% time in Zone 1
120
100
80
60
40
20
0
–20
–40
–60
–80
Field strength (dB(μV/m))
1
10
100
1 000
Distance (km)
h_1: Transmitting/ base antenna height (m)
max
1 200
600
300
150
75
37.5
20
10
RRC06-A2-C2-A2-3-C03

600 MHz at 50% time in Zone 1

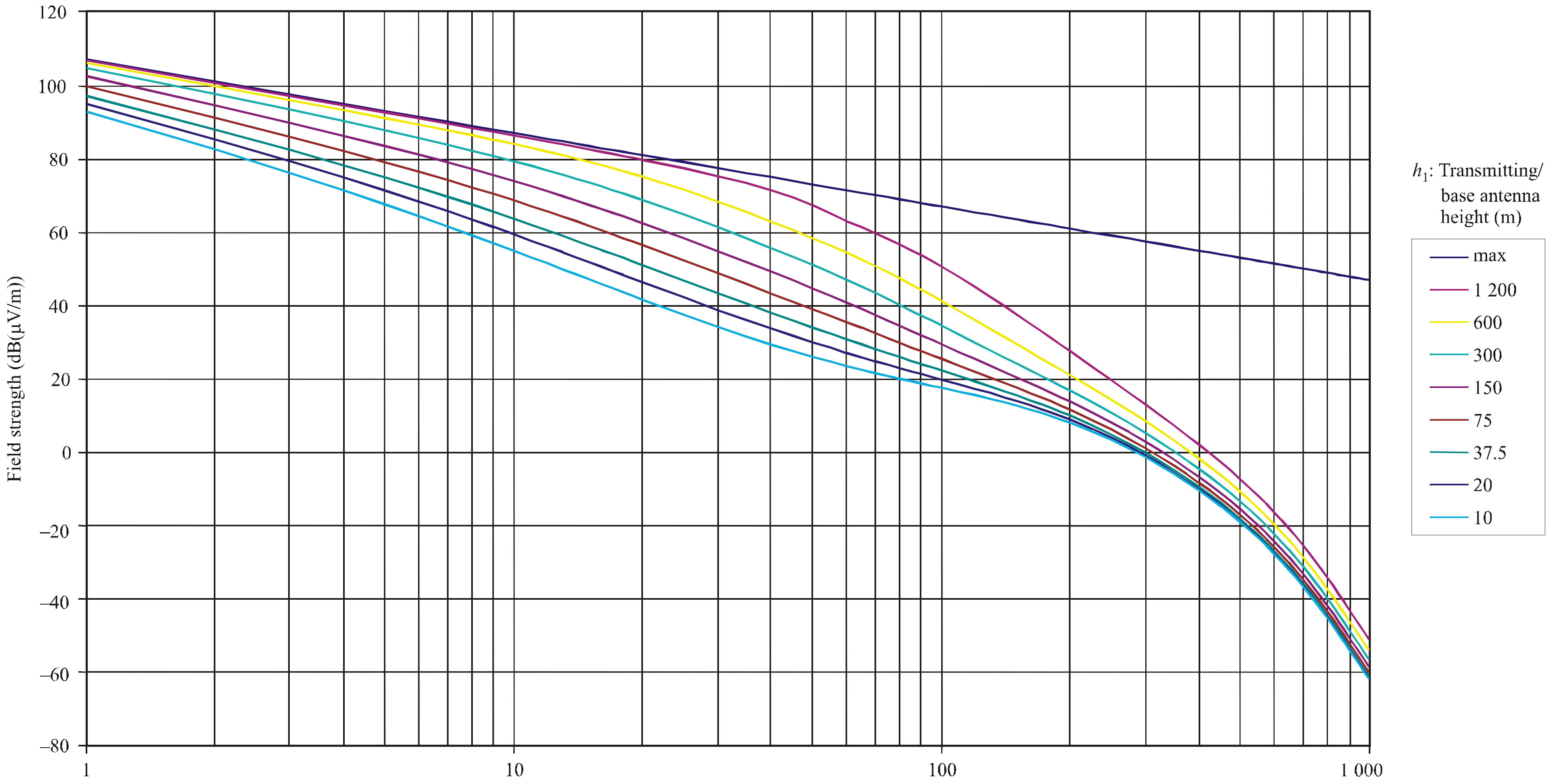


600 MHz at 10% time in Zone 1



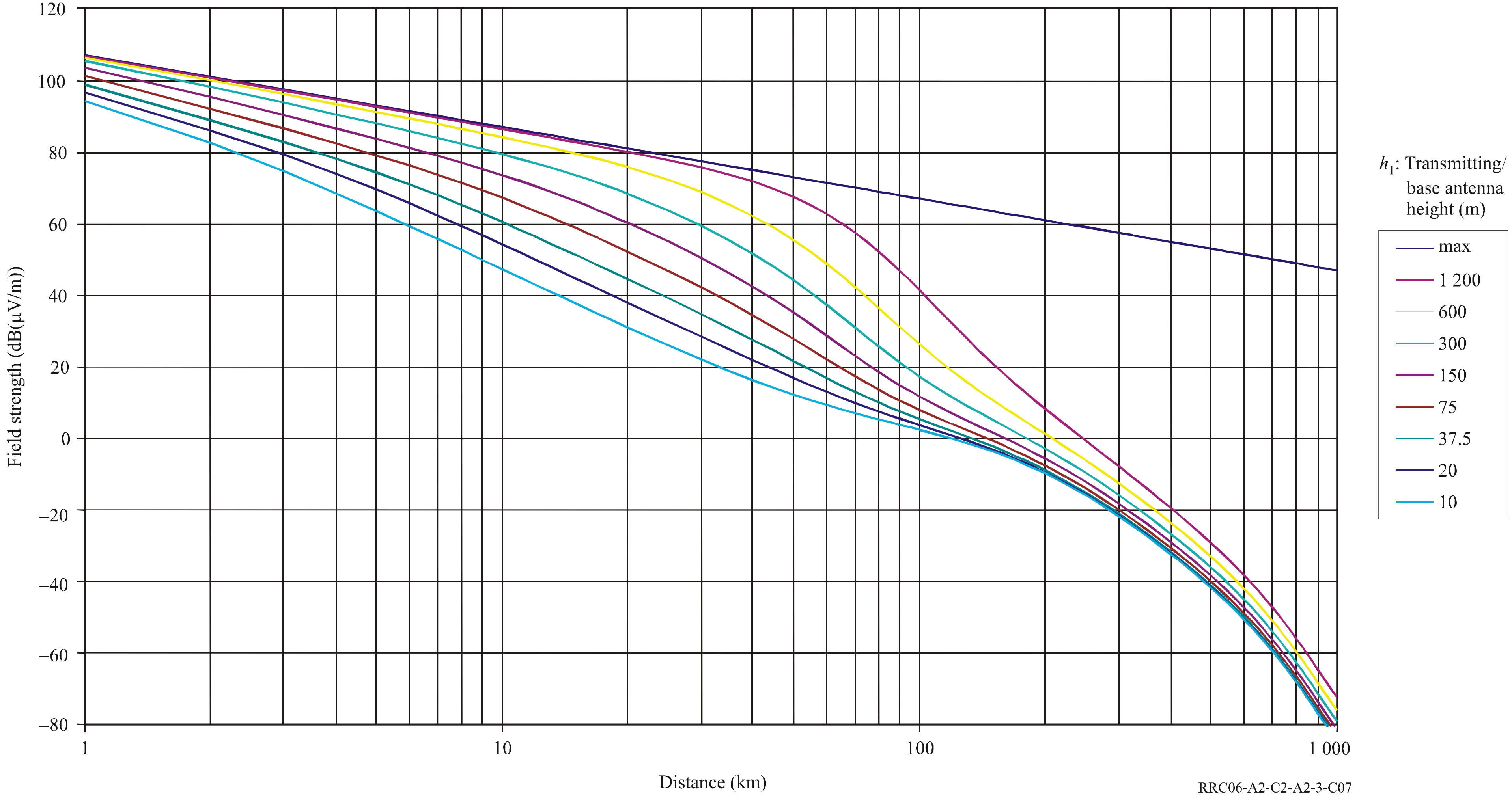
RRC06-A2-C2-A2-3-C05

600 MHz at 1% time in Zone 1



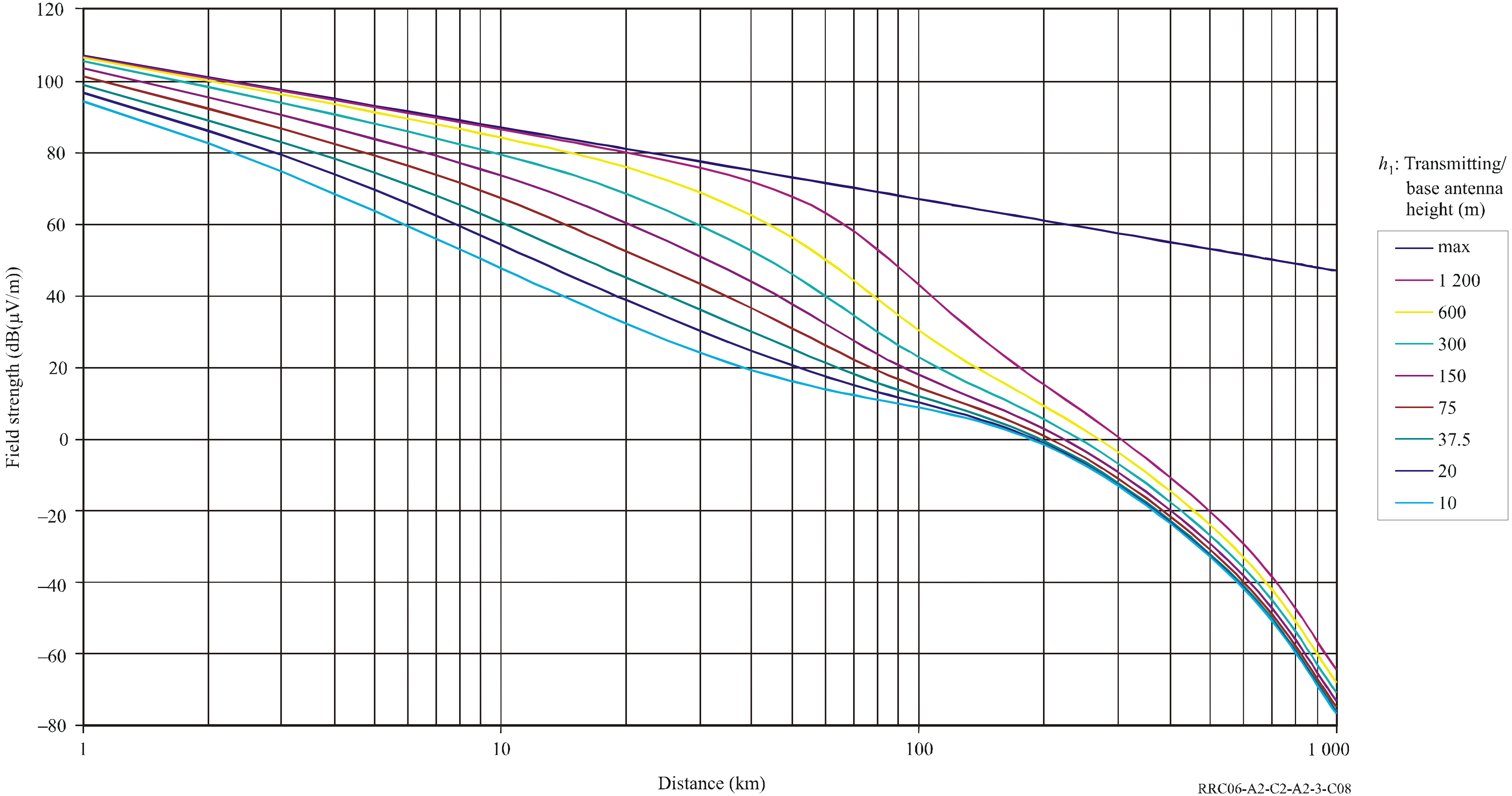
RRC06-A2-C2-A2-3-C06

2 000 MHz at 50% time in Zone 1



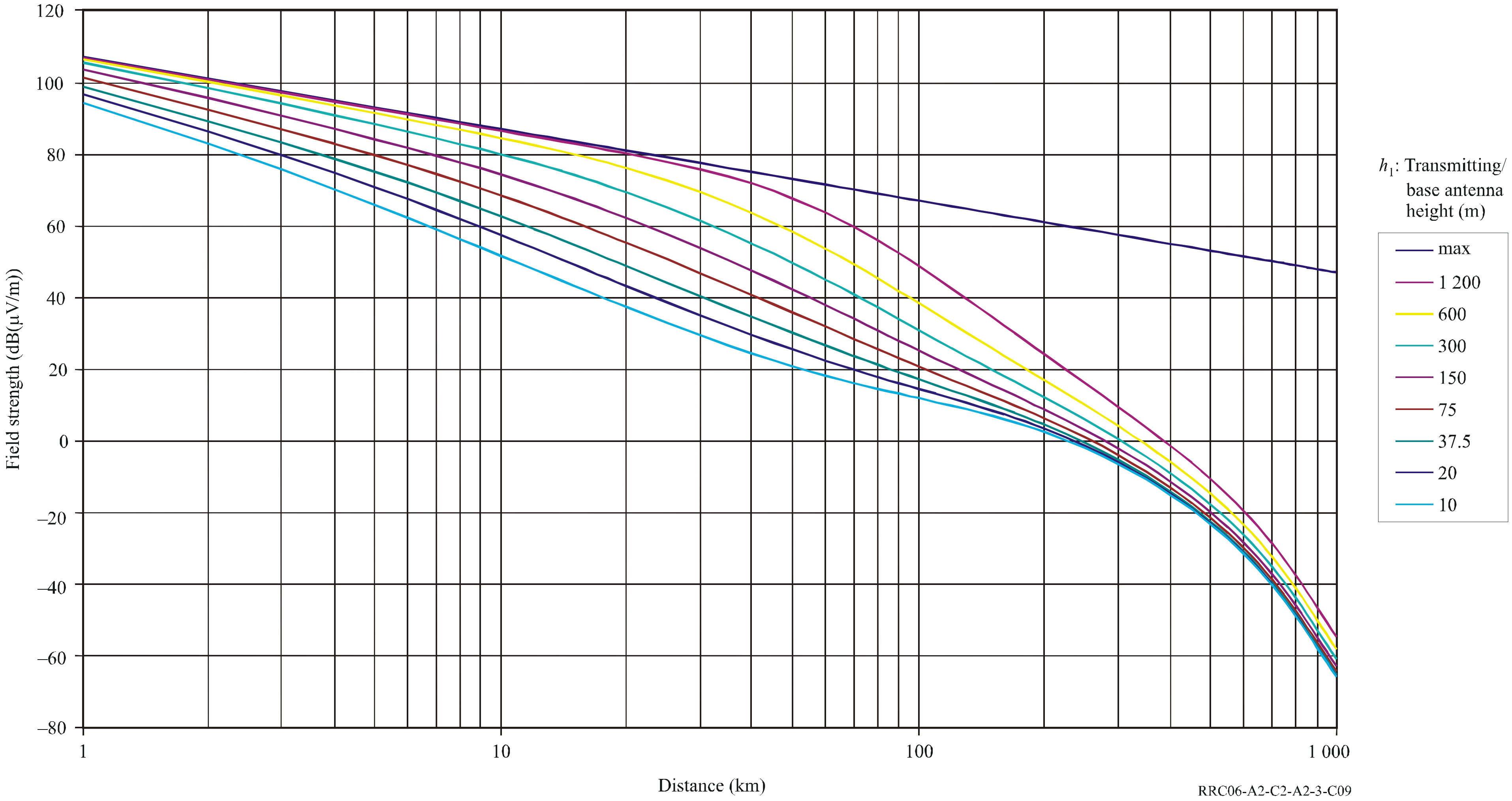
RRC06-A2-C2-A2-3-C07

2 000 MHz at 10% time in Zone 1

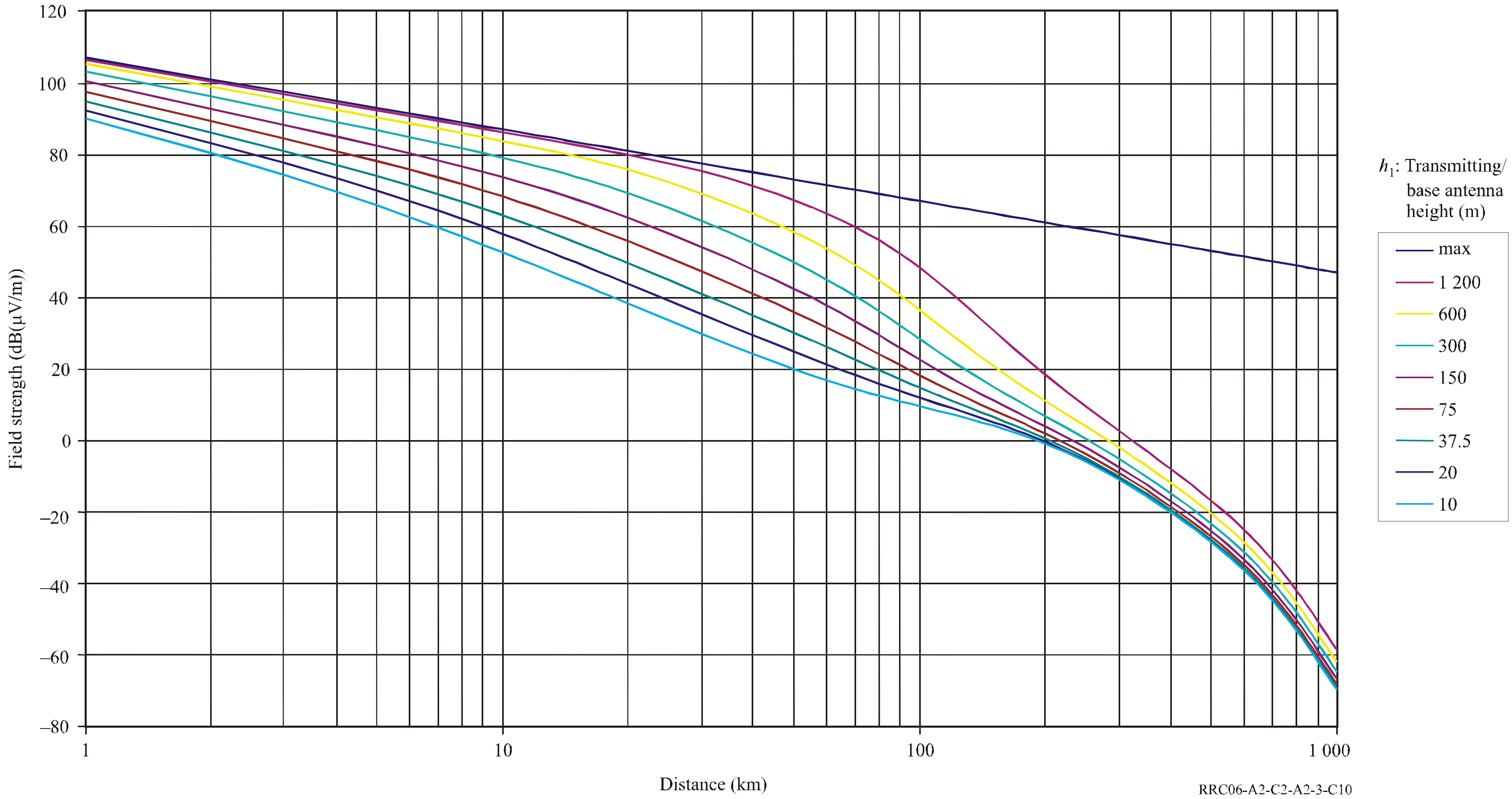


RRC06-A2-C2-A2-3-C08

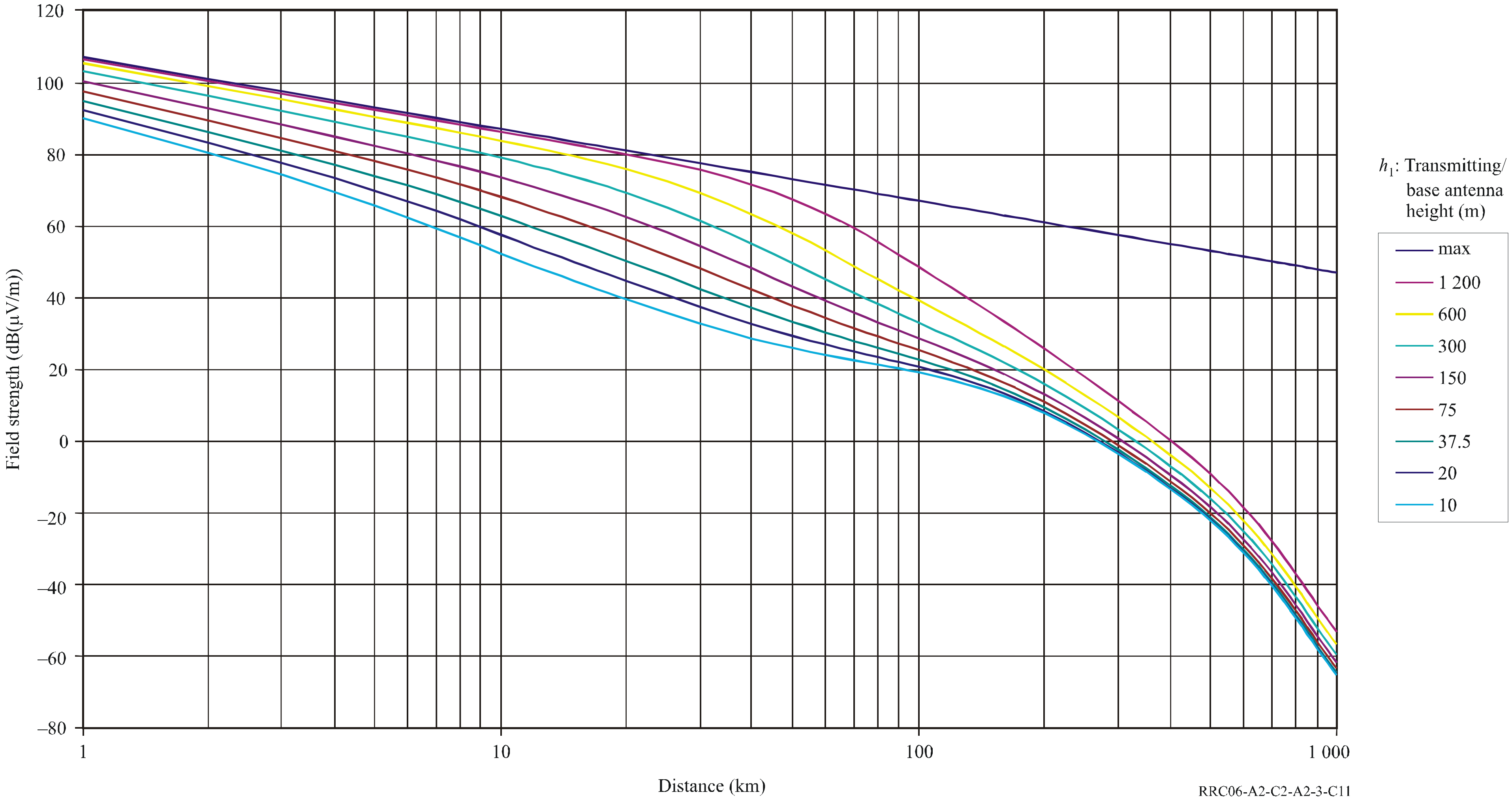
2 000 MHz at 1% time in Zone 1



100 MHz at 50% time in Zone 2

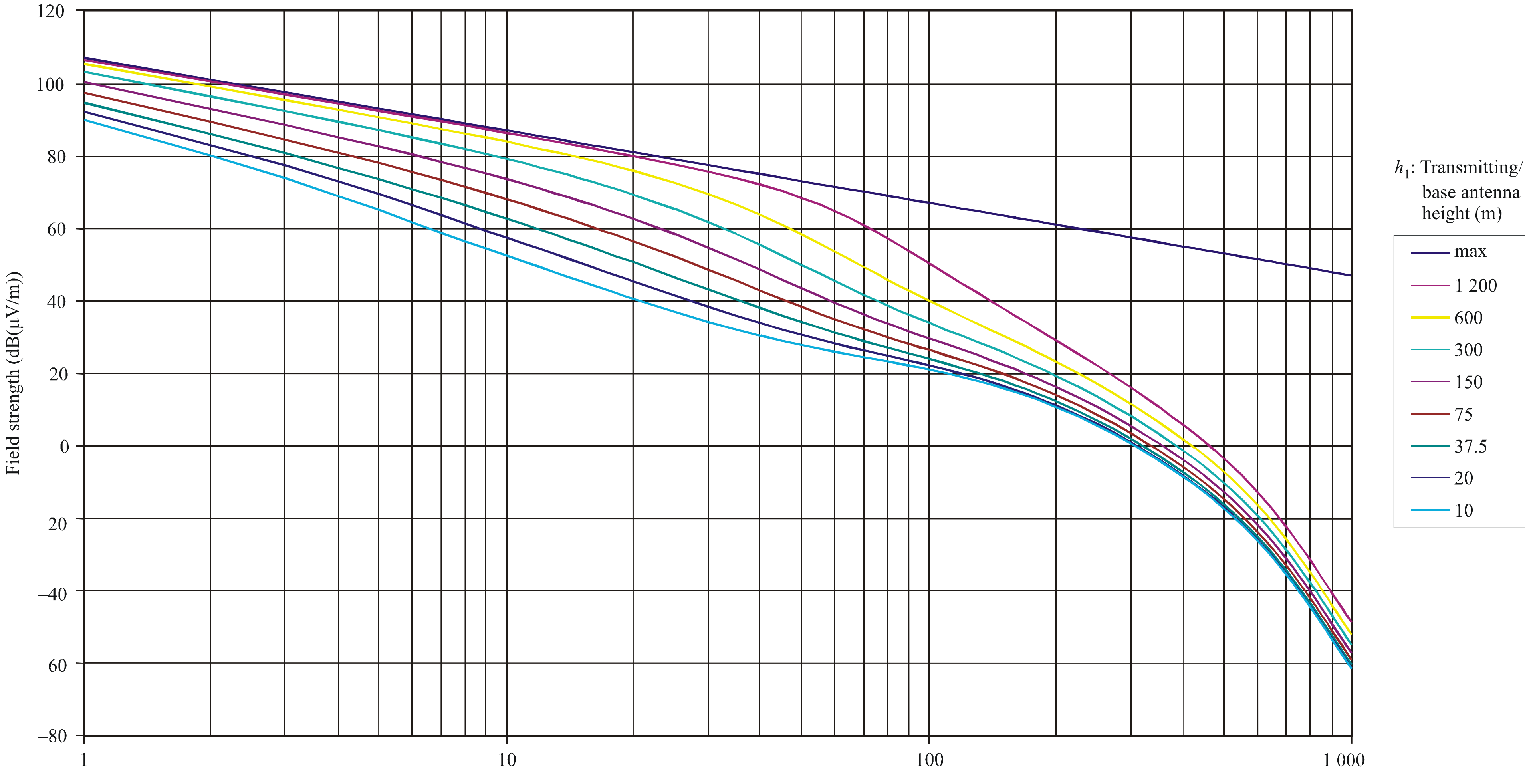


100 MHz at 10% time in Zone 2

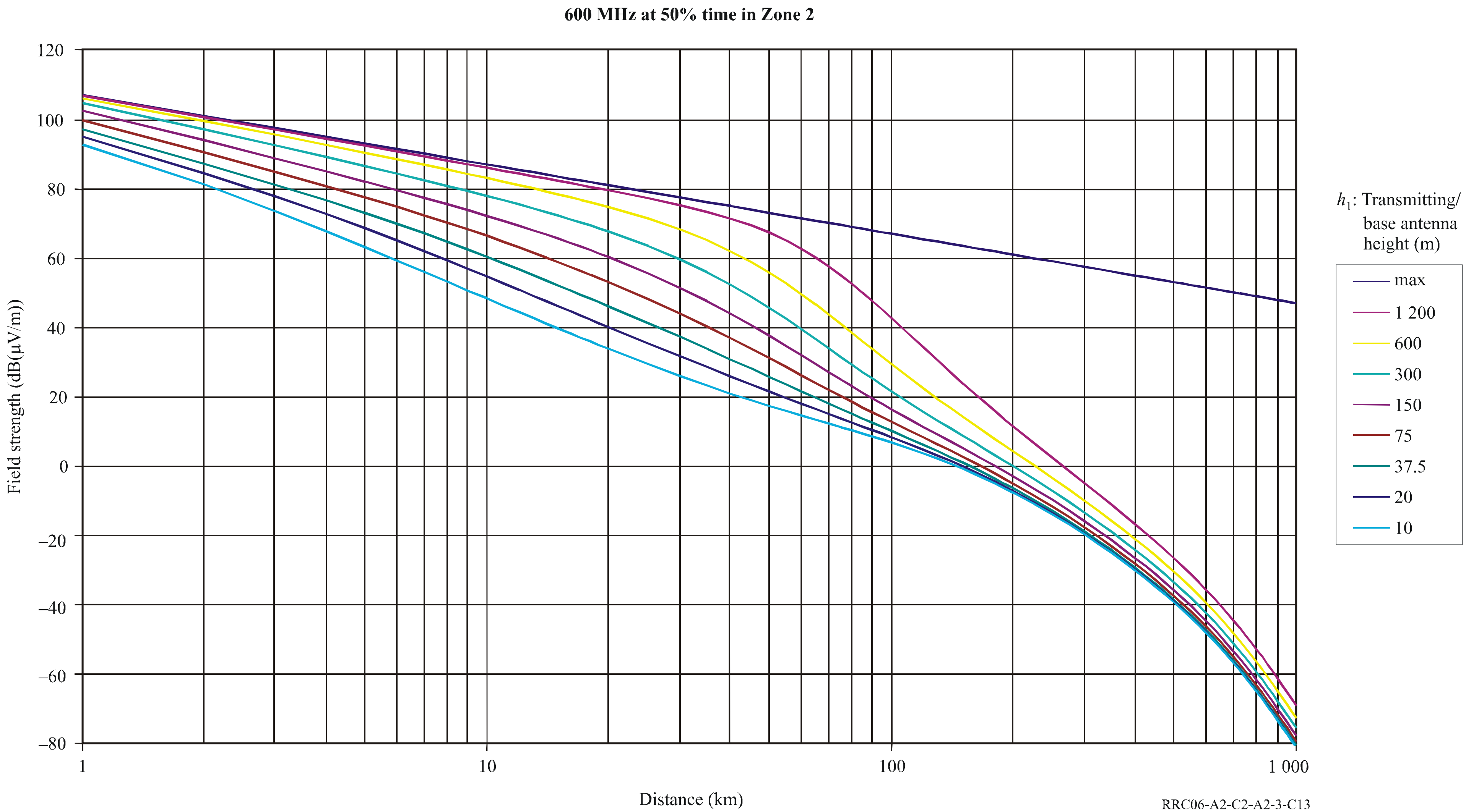


RRC06-A2-C2-A2-3-C11

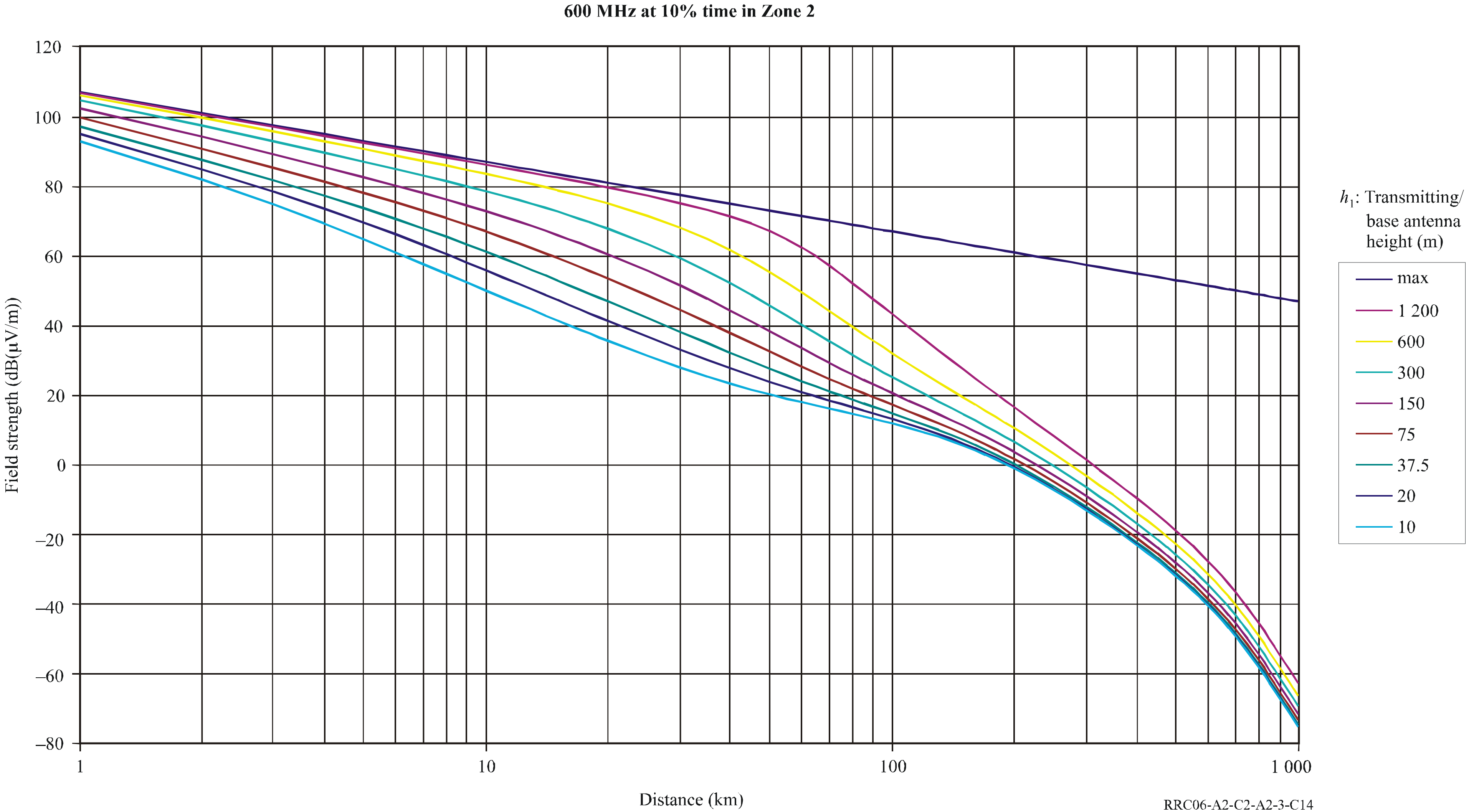
100 MHz at 1% time in Zone 2



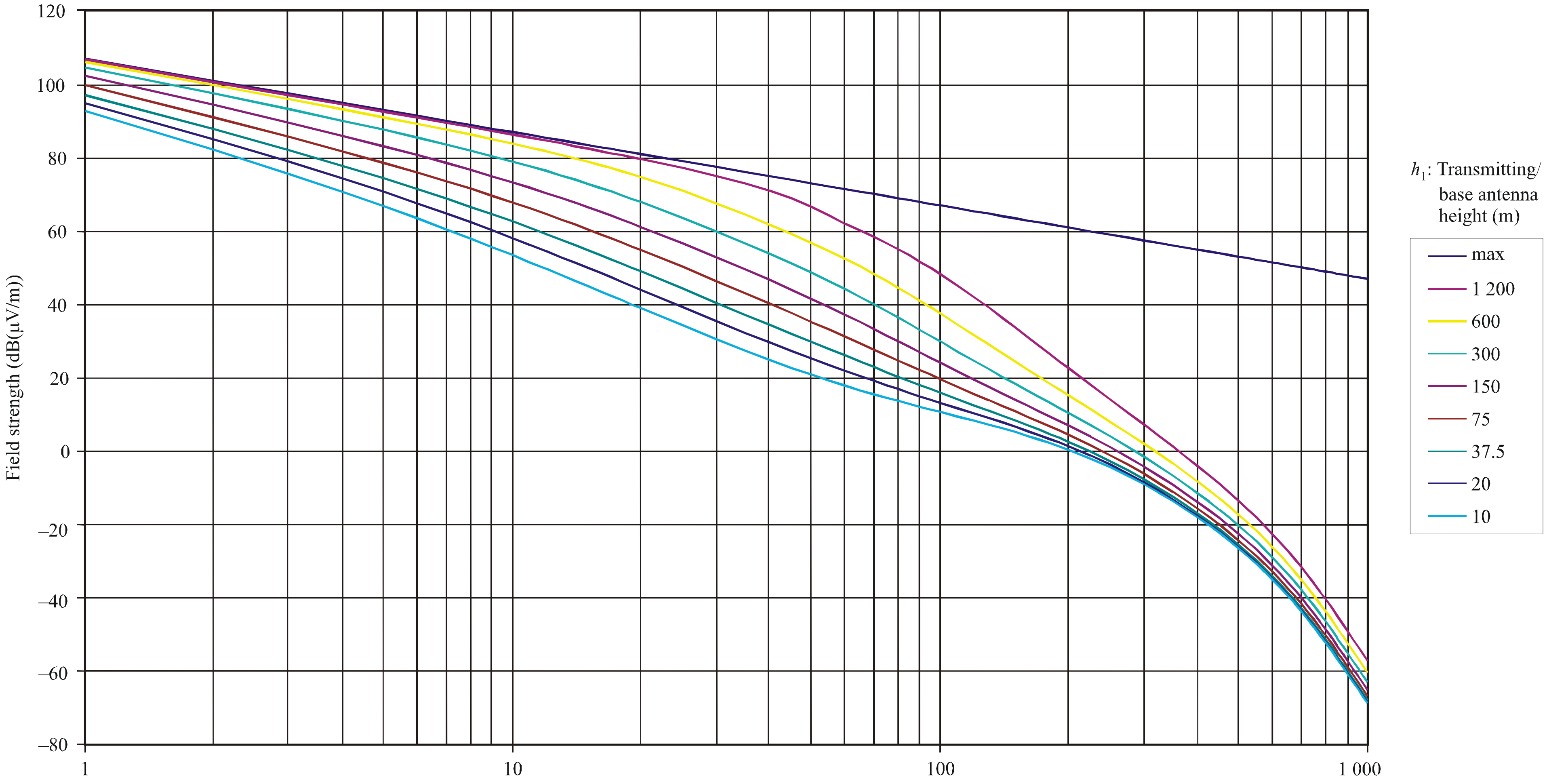
RRC06-A2-C2-A2-3-C12



600 MHz at 50% time in Zone 2
Field strength (dB(μV/m))
120
100
80
60
40
20
0
–20
–40
–60
–80
1
10
100
1 000
Distance (km)
h1: Transmitting/ base antenna height (m)
max
1 200
600
300
150
75
37.5
20
10
RRC06-A2-C2-A2-3-C13

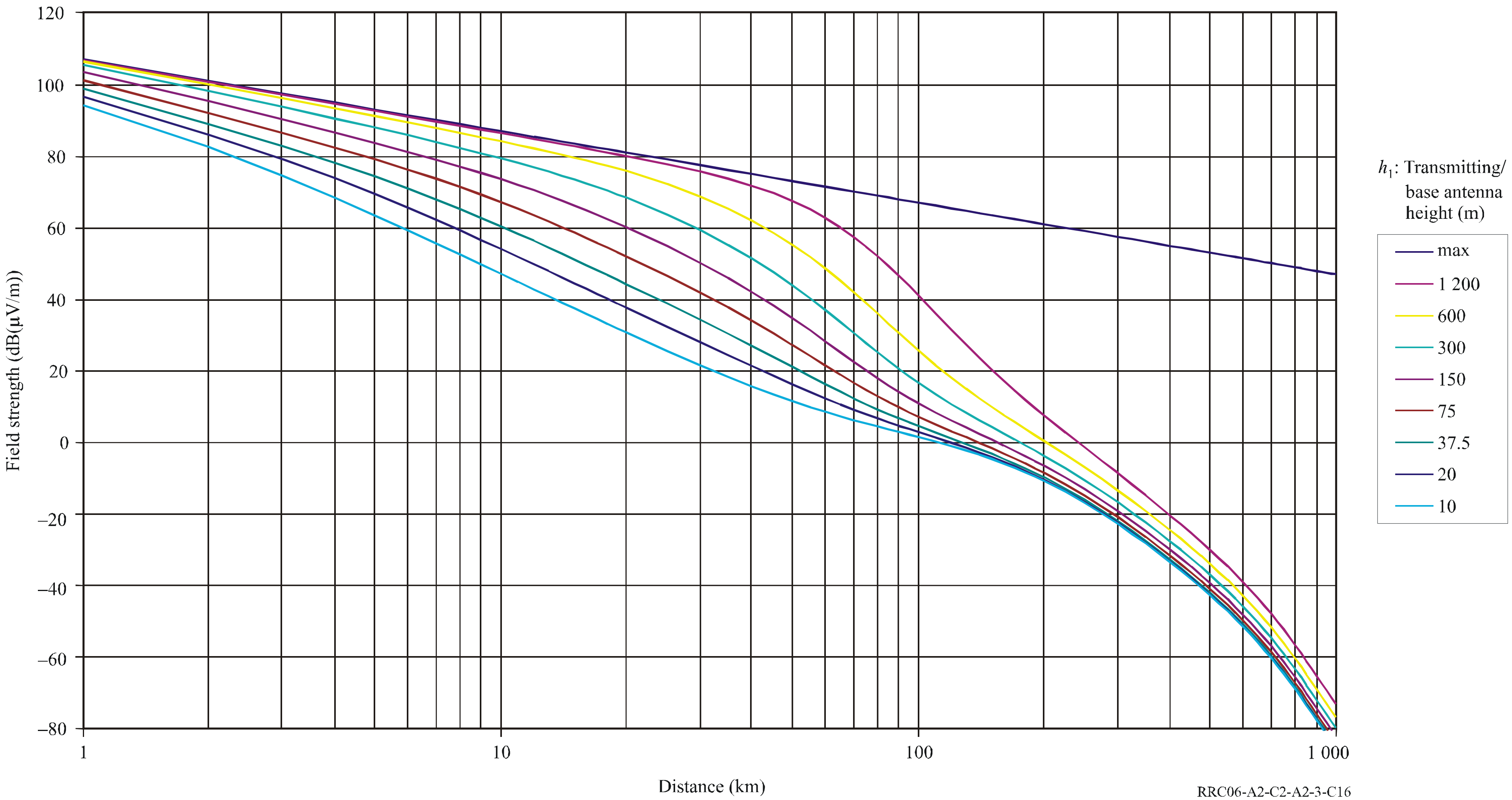

600 MHz at 10% time in Zone 2
120
100
80
60
40
20
0
–20
–40
–60
–80
Field strength (dB(μV/m))
1
10
100
1 000
Distance (km)
h1: Transmitting/ base antenna height (m)
max
1 200
600
300
150
75
37.5
20
10
RRC06-A2-C2-A2-3-C14

600 MHz at 1% time in Zone 2



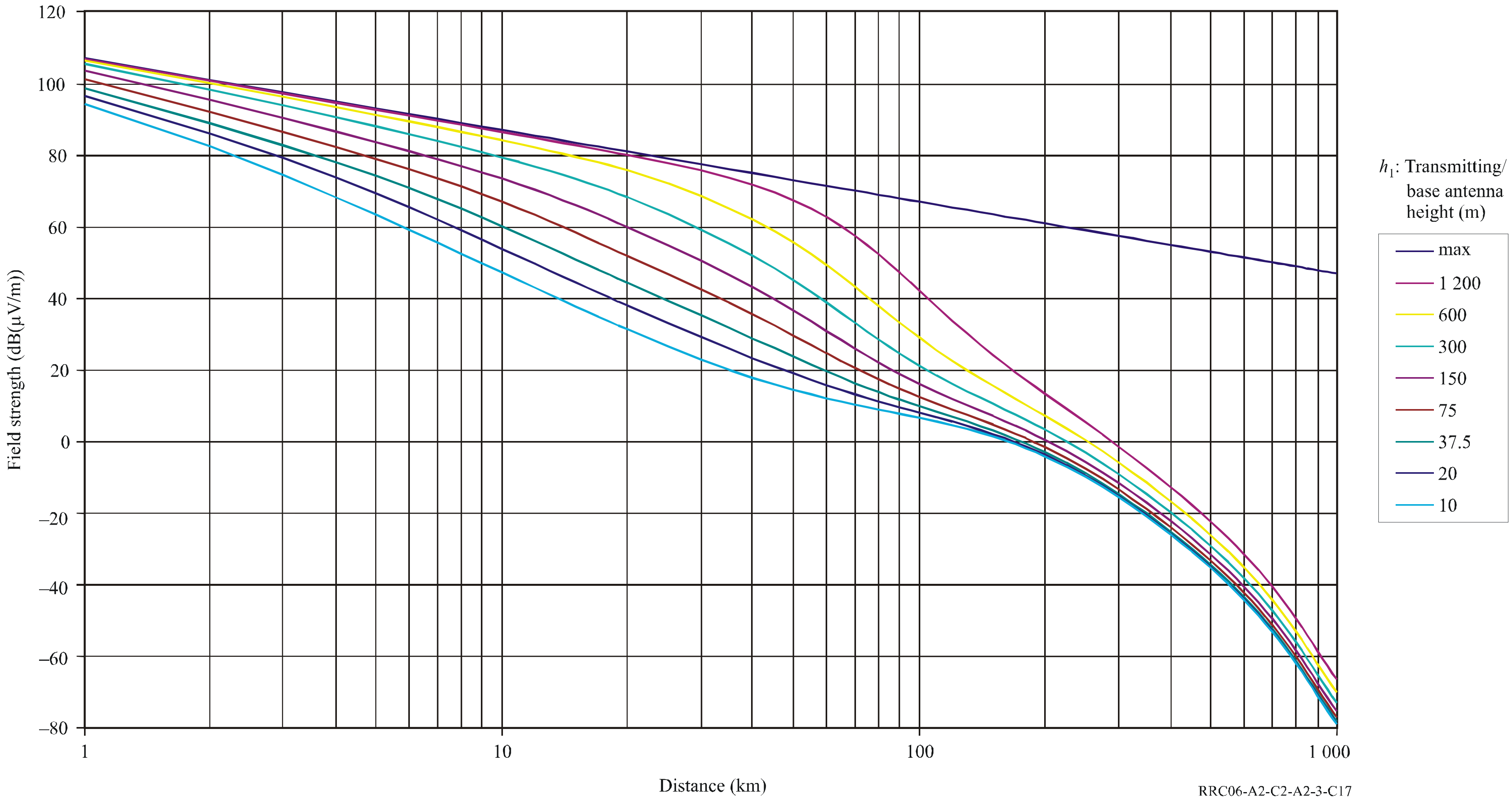
RRC06-A2-C2-A2-3-C15

2 000 MHz at 50% time in Zone 2

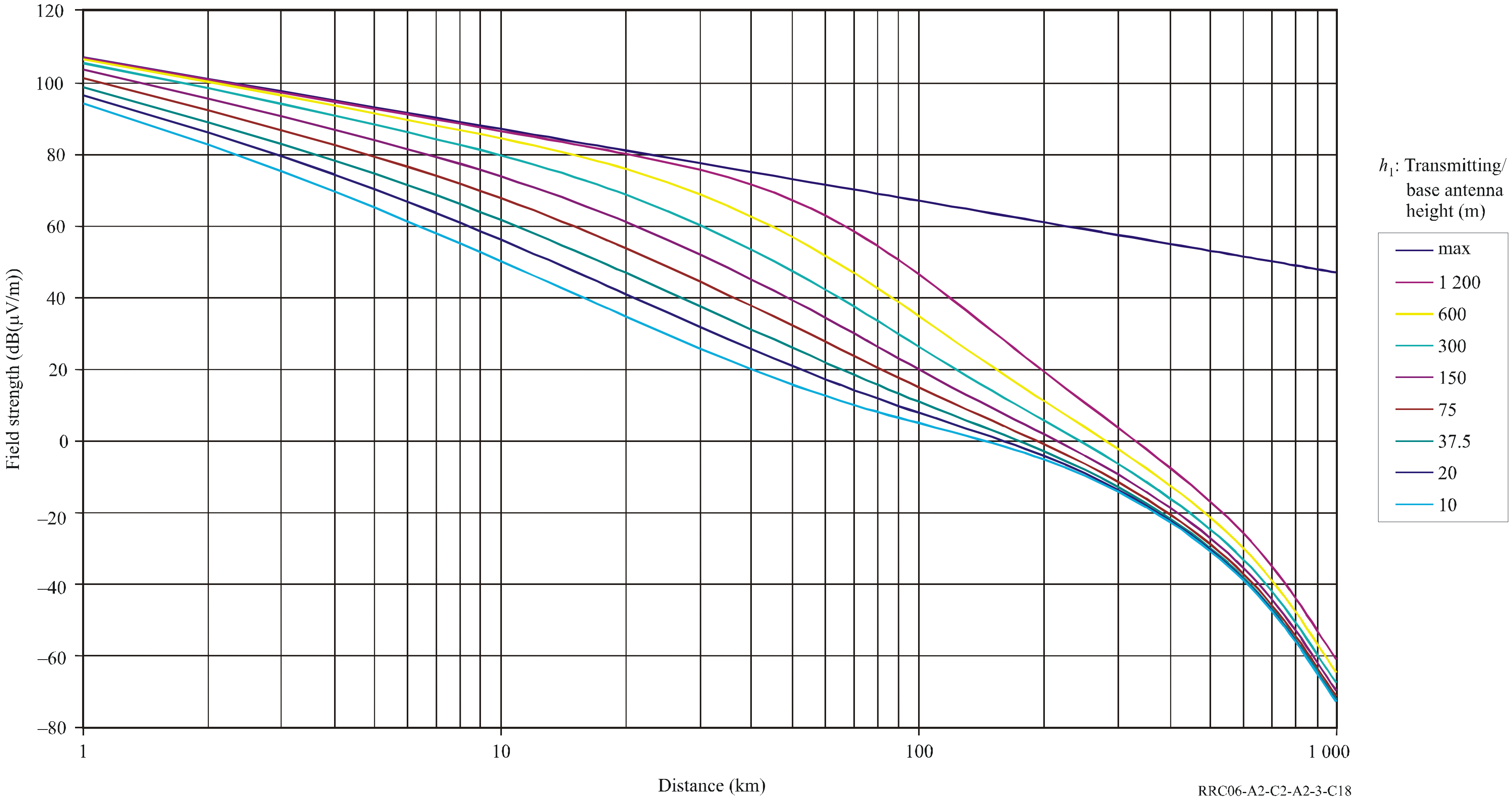


RRC06-A2-C2-A2-3-C16

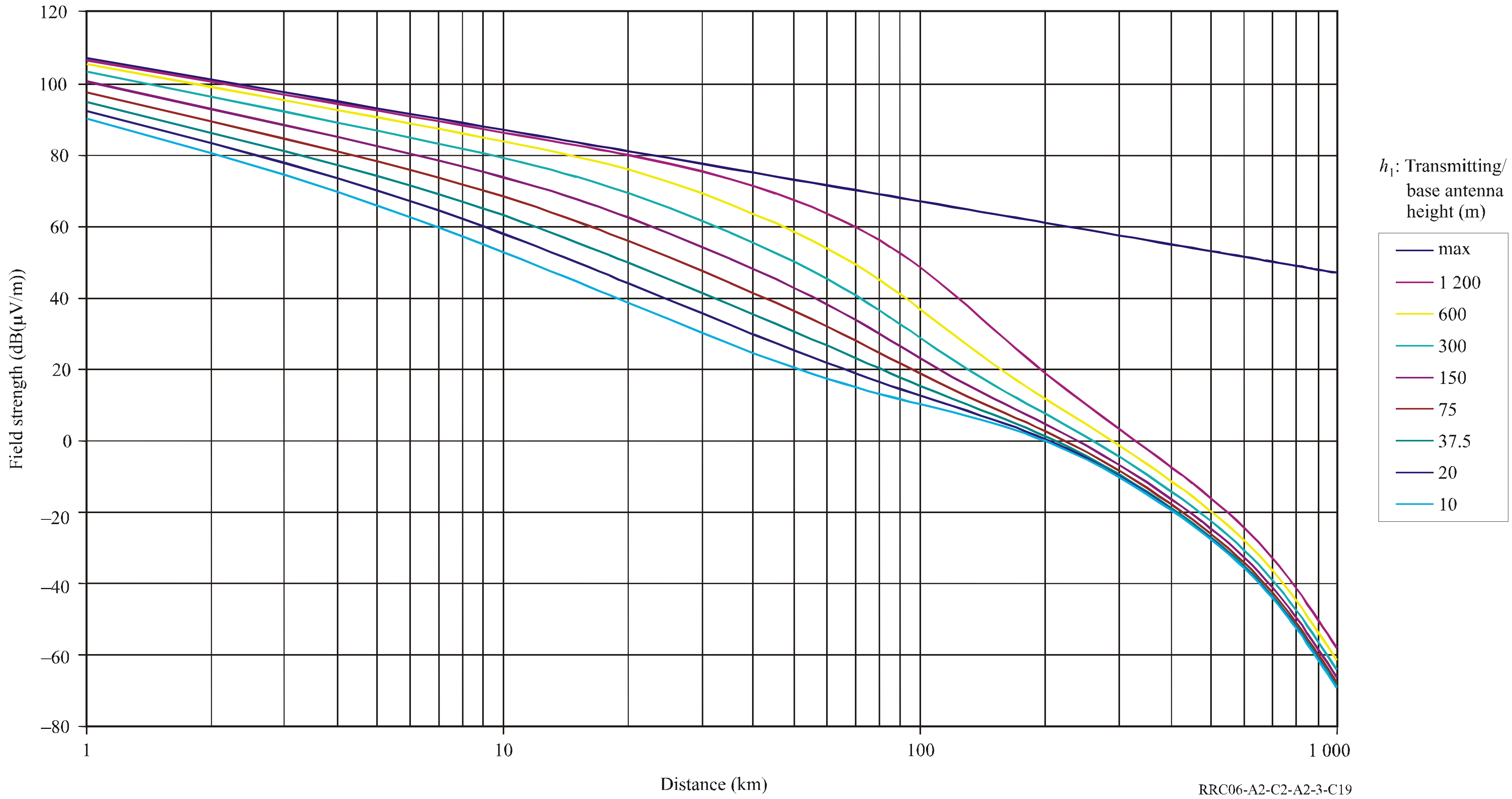
2 000 MHz at 10% time in Zone 2



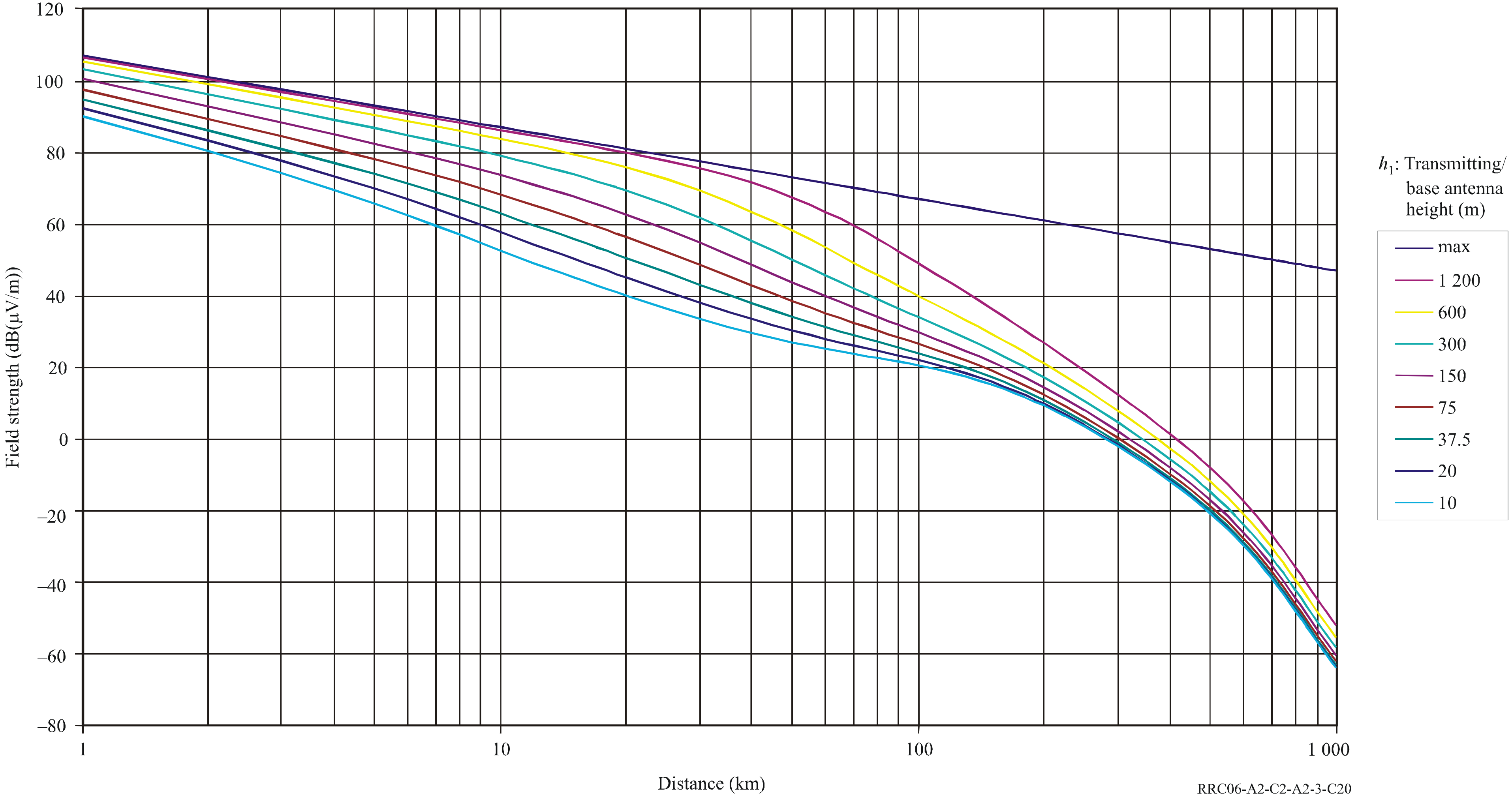
2 000 MHz at 1% time in Zone 2



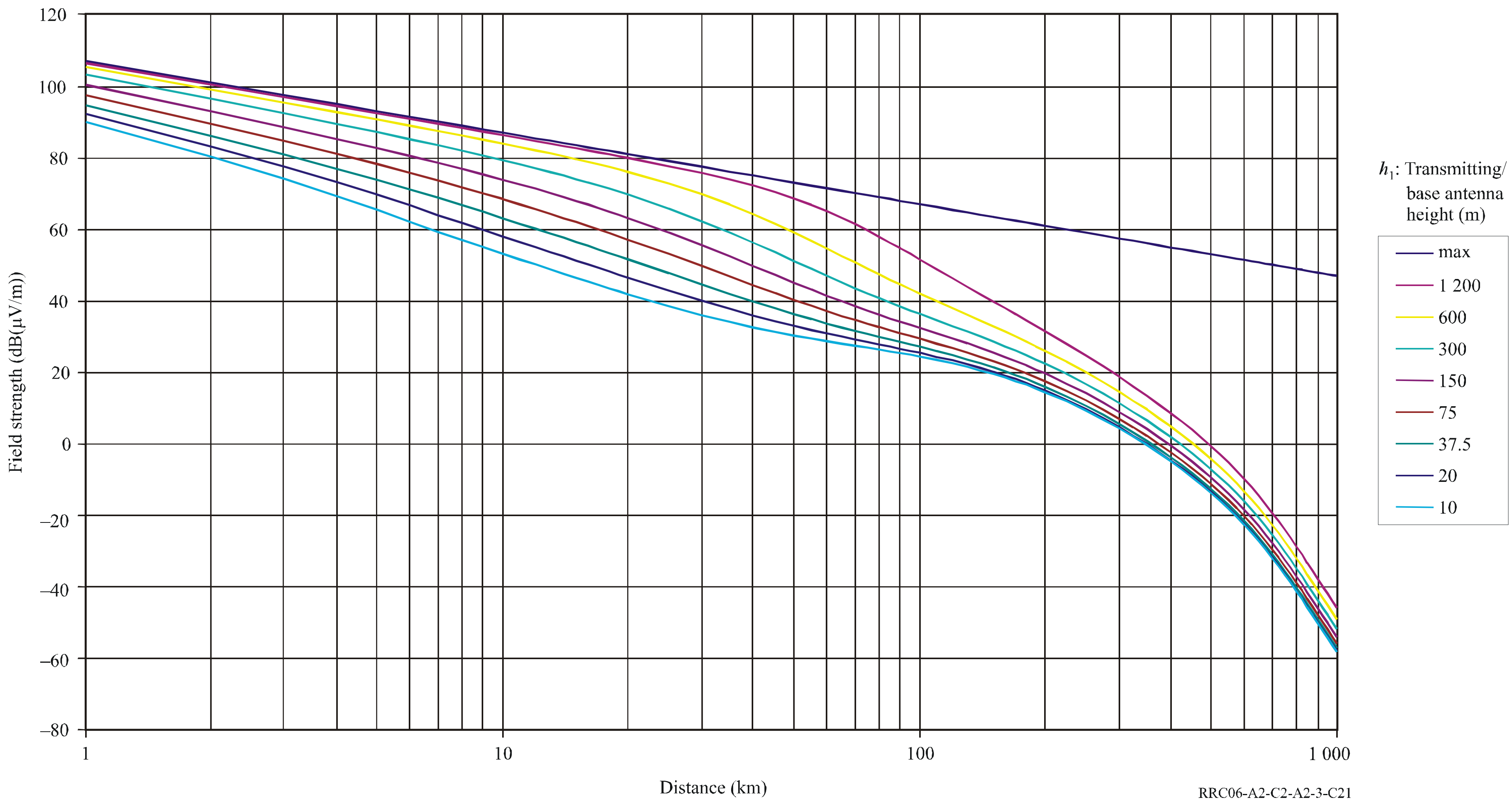
100 MHz at 50% time in Zone 3



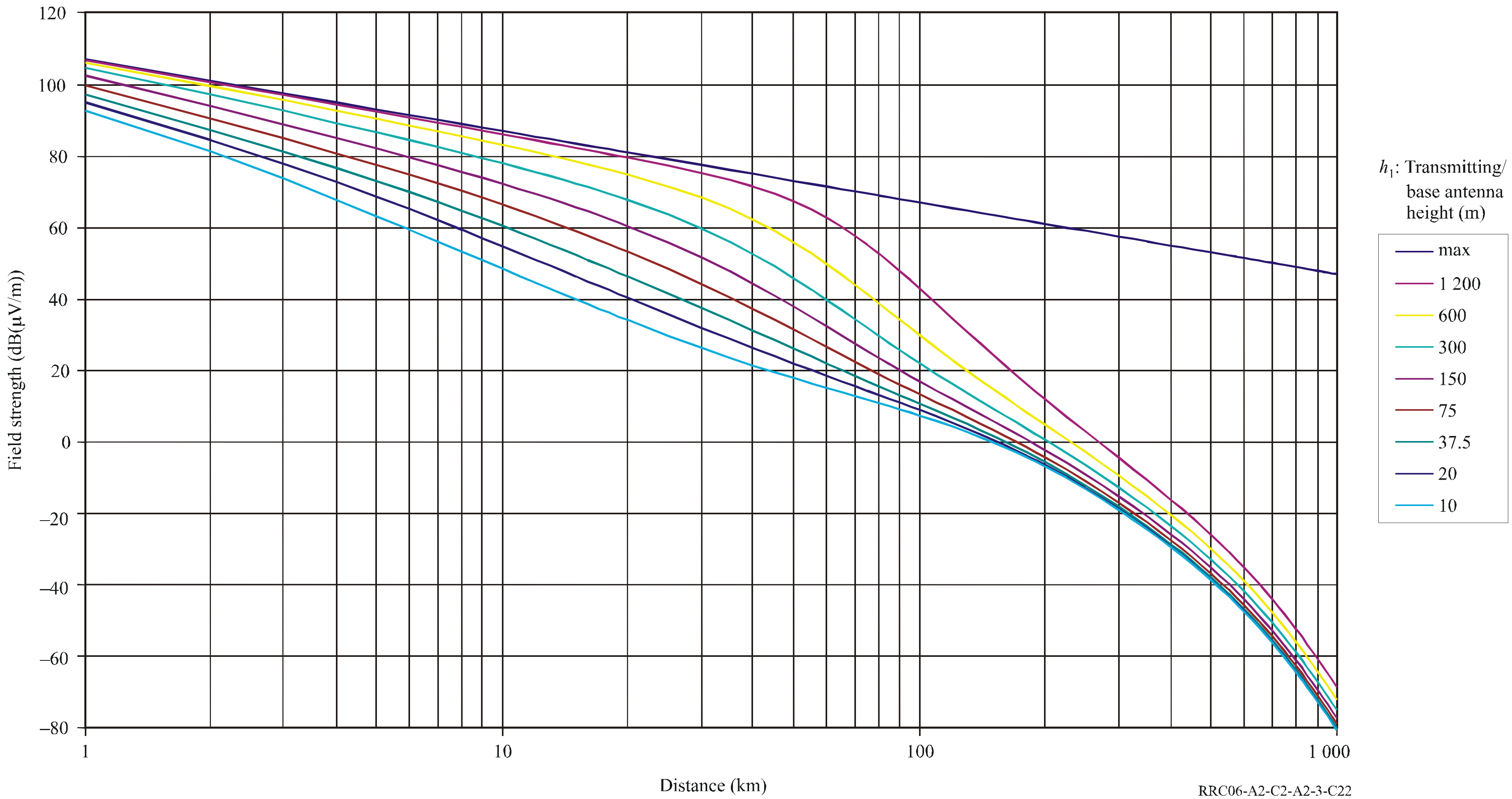
100 MHz at 10% time in Zone 3



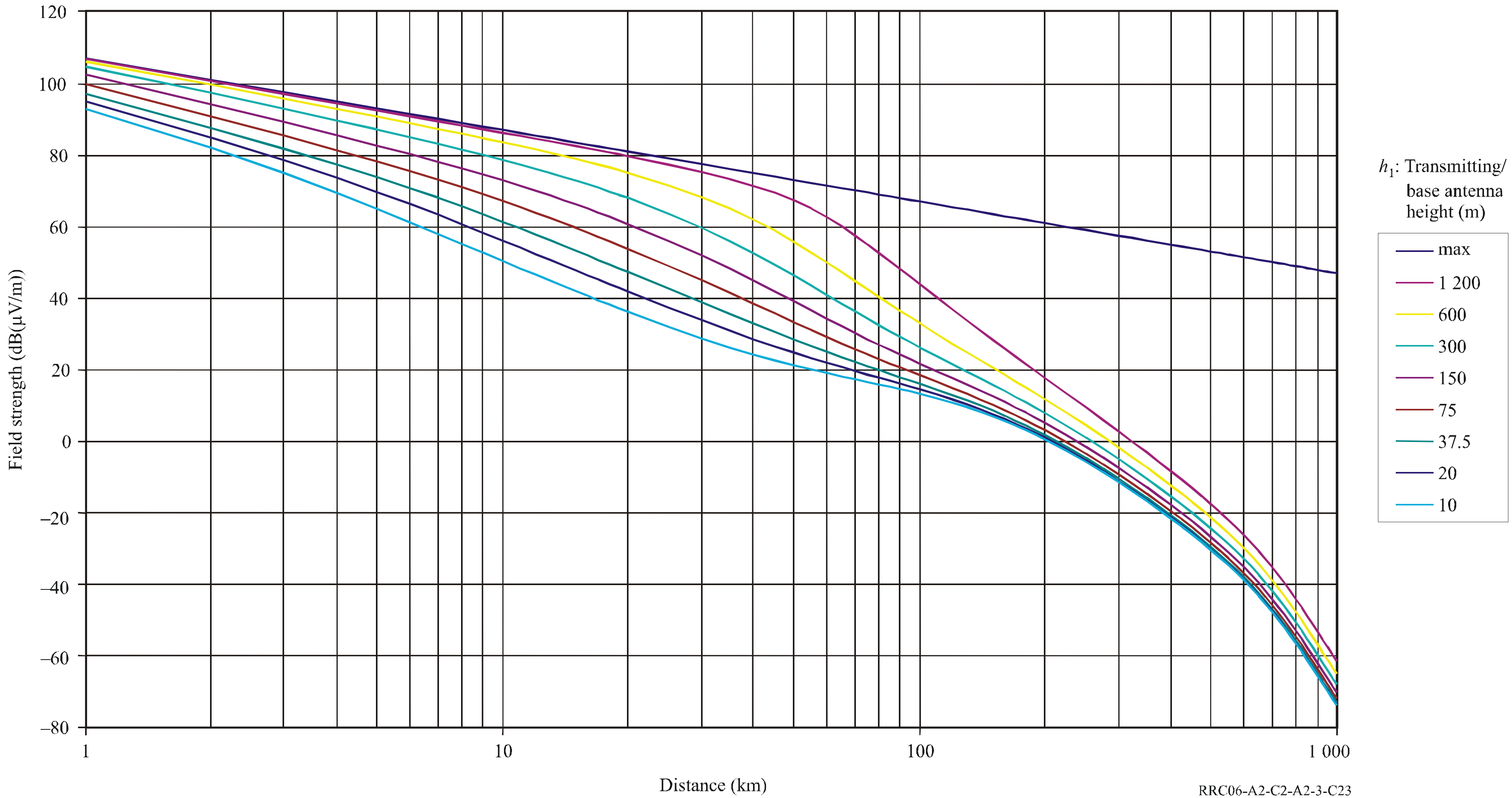
100 MHz at 1% time in Zone 3



600 MHz at 50% time in Zone 3

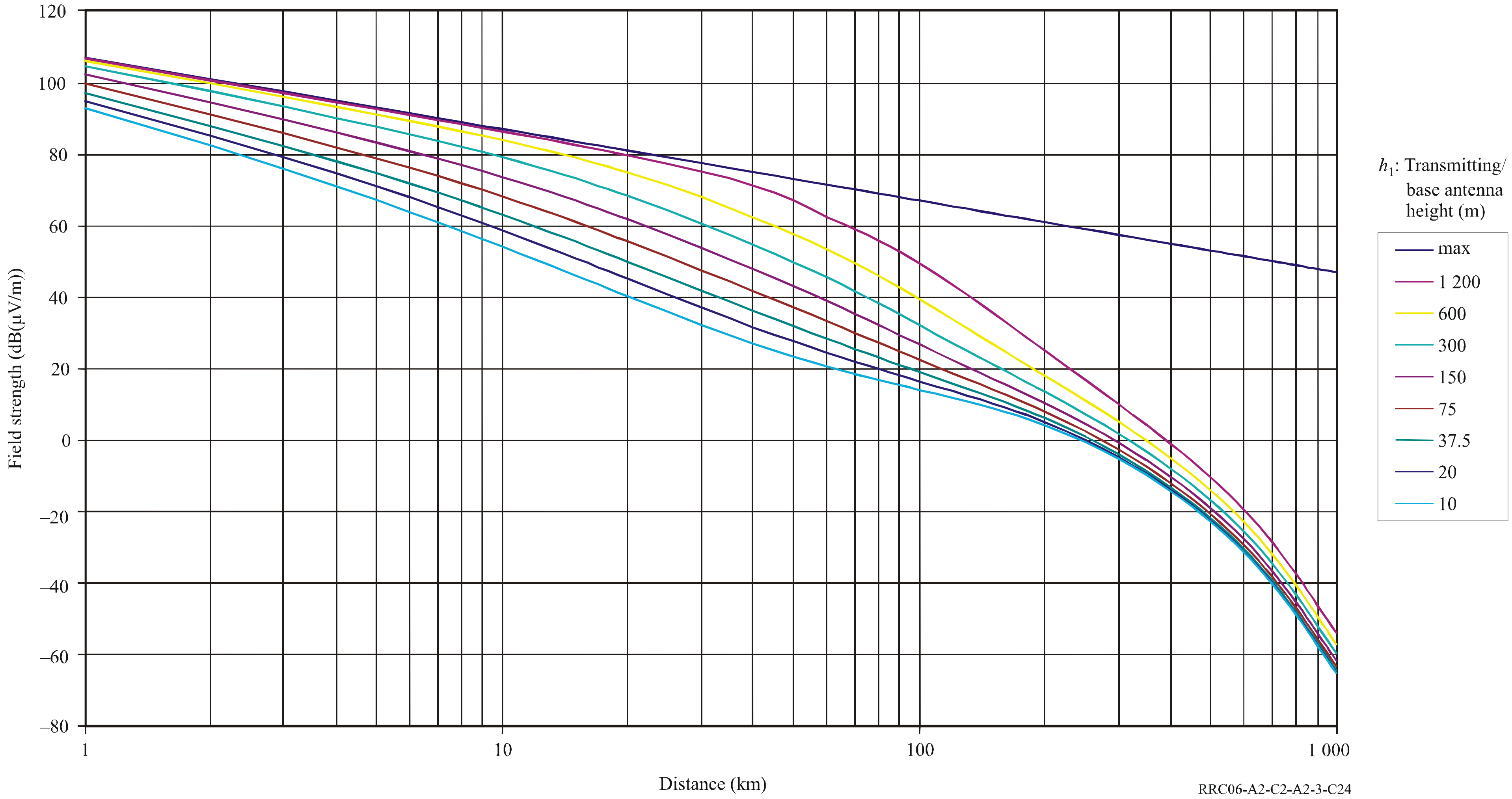


600 MHz at 10% time in Zone 3



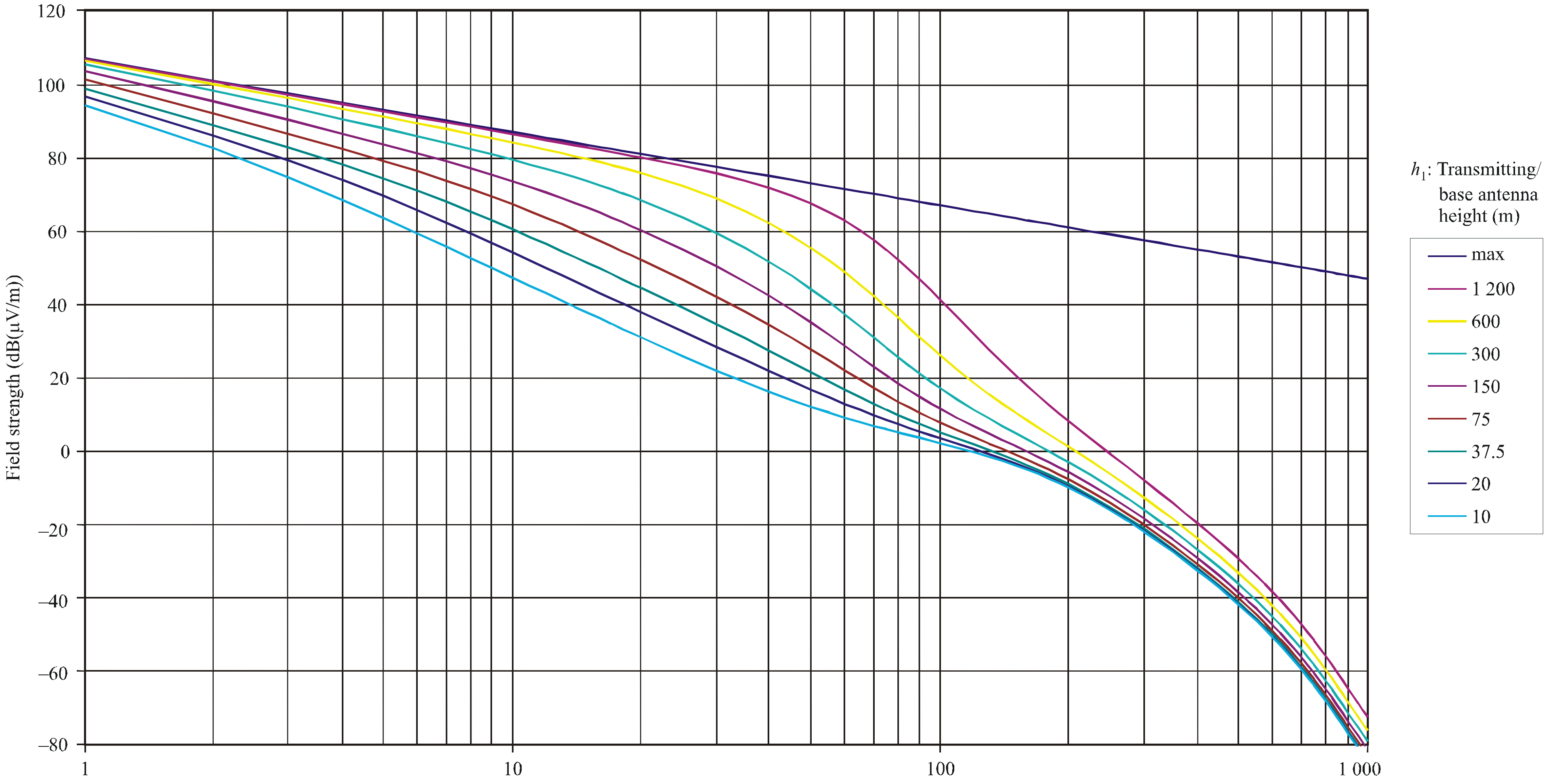
RRC06-A2-C2-A2-3-C23

600 MHz at 1% time in Zone 3



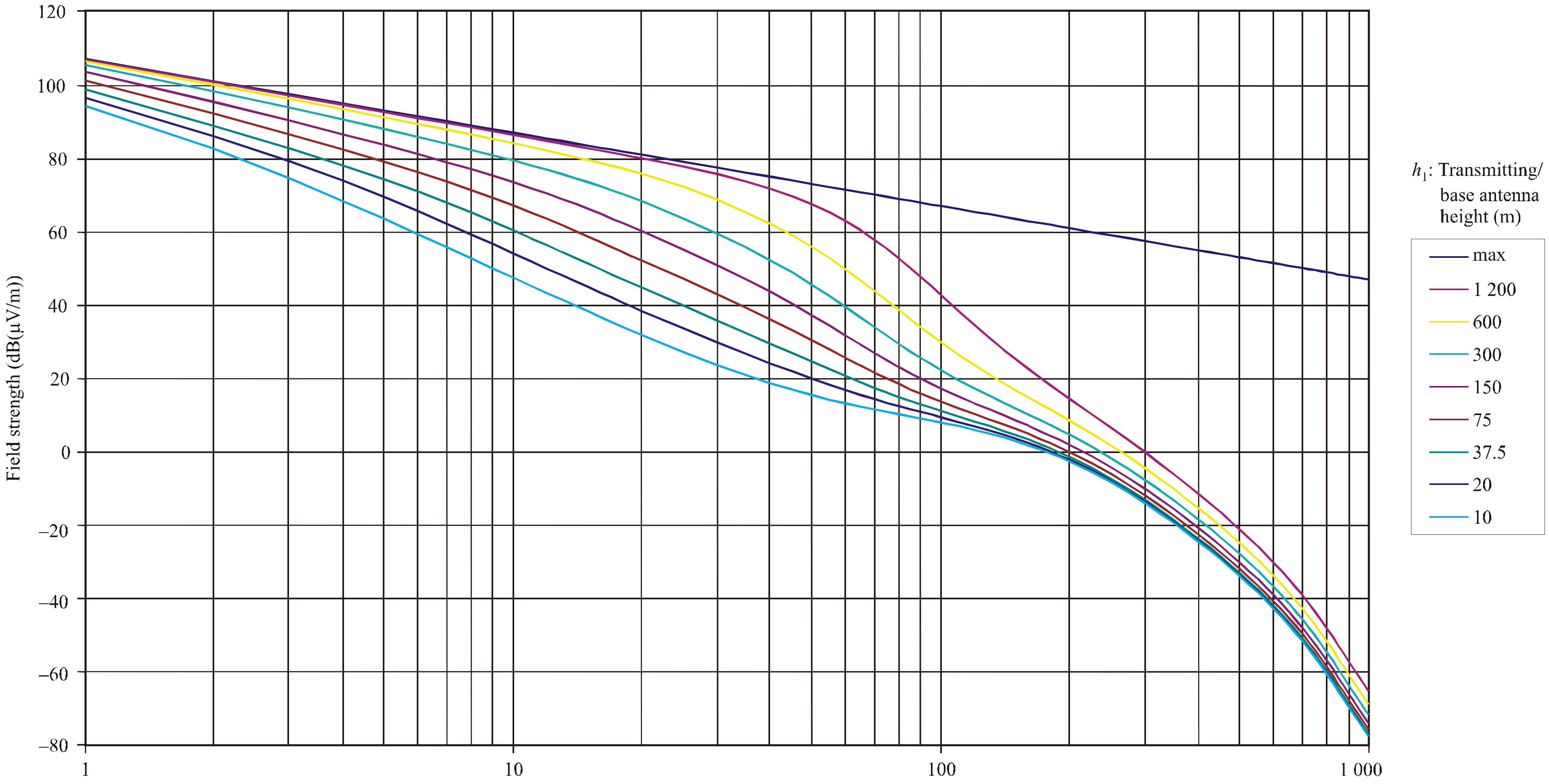
RRC06-A2-C2-A2-3-C24

2 000 MHz at 50% time in Zone 3



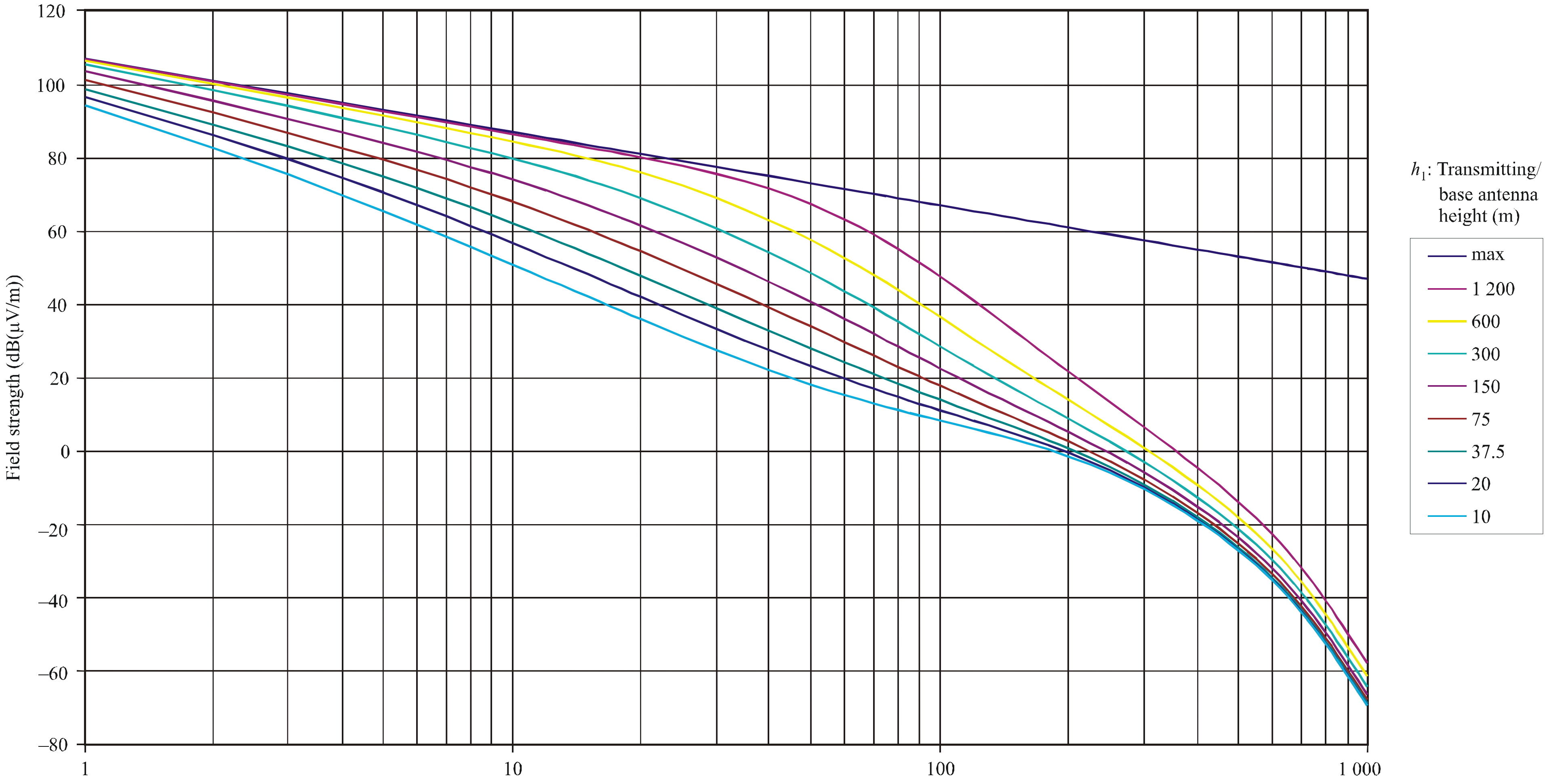
RRC06-A2-C2-A2-3-C25

2 000 MHz at 10% time in Zone 3



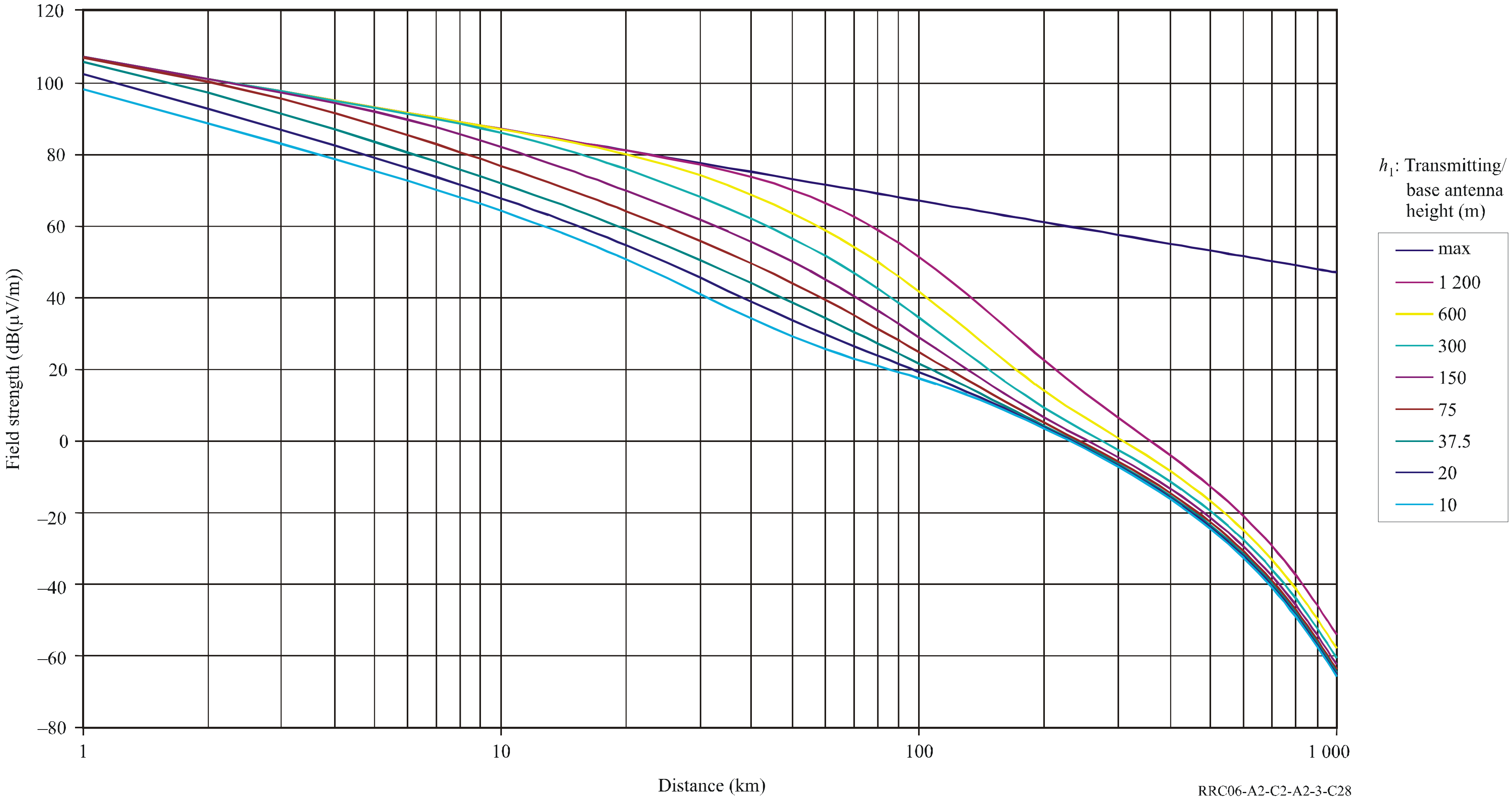
RRC06-A2-C2-A2-3-C26

2 000 MHz at 1% time in Zone 3

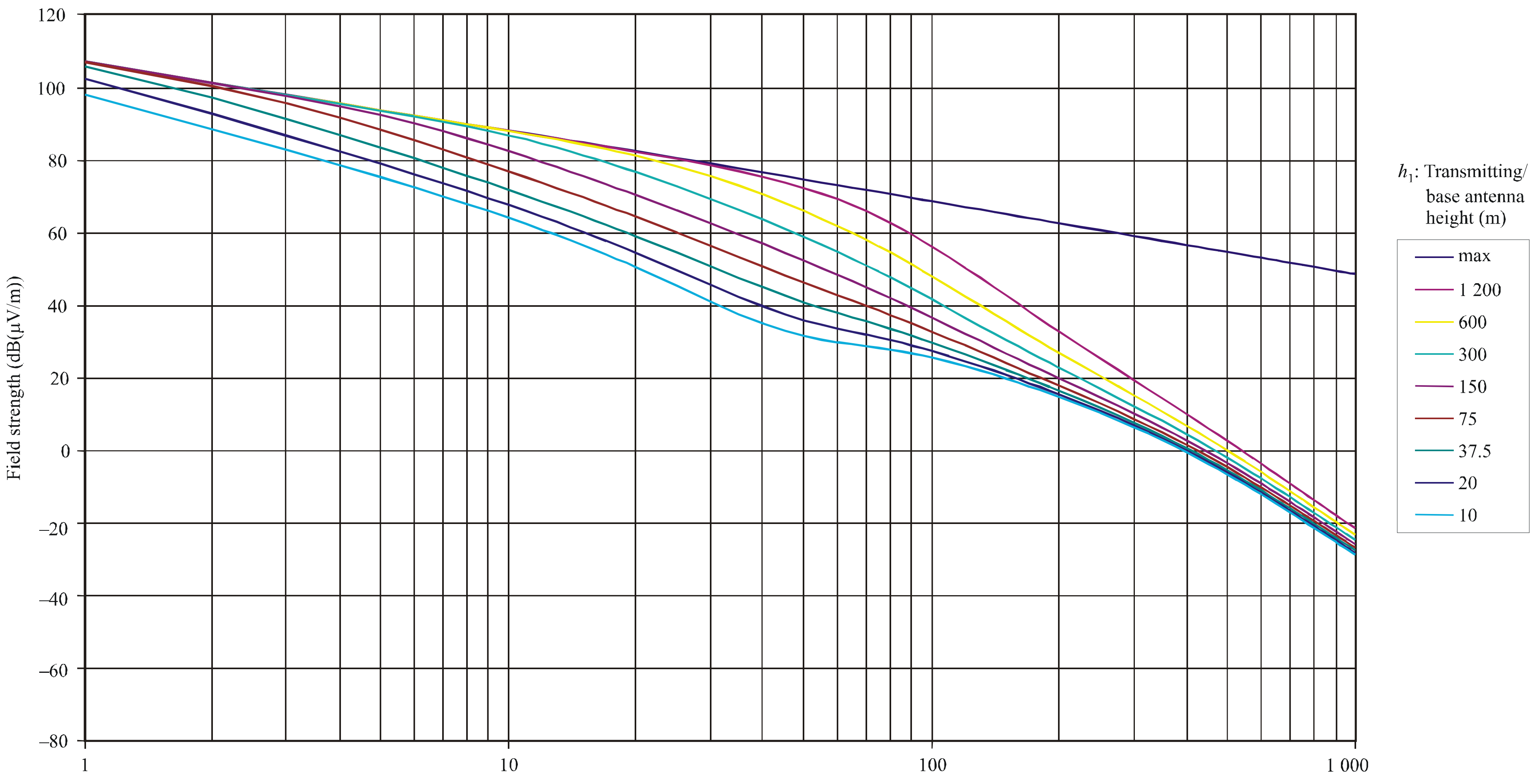


RRC06-A2-C2-A2-3-C27

100 MHz at 50% time in Zone 4

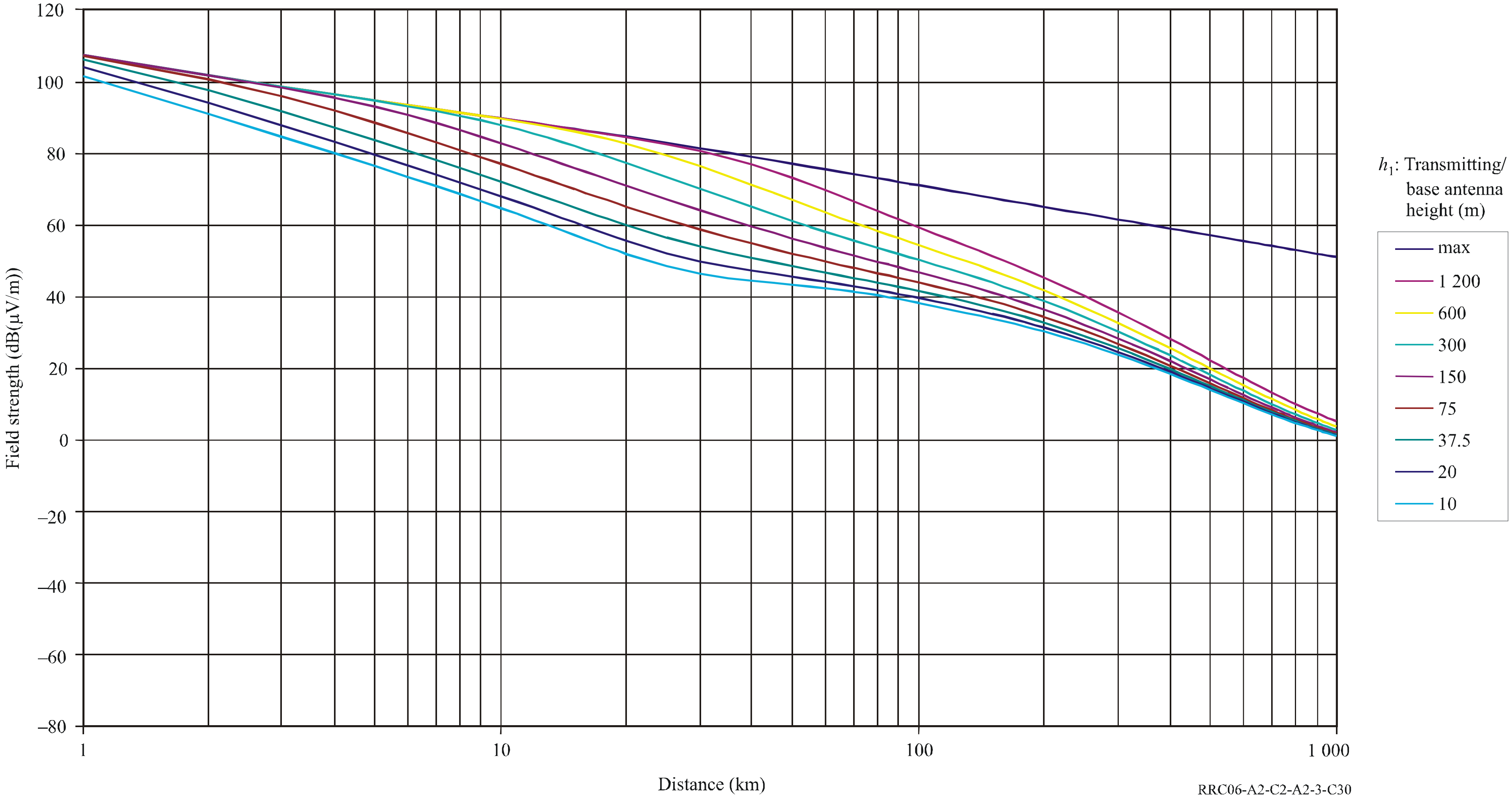


100 MHz at 10% time in Zone 4



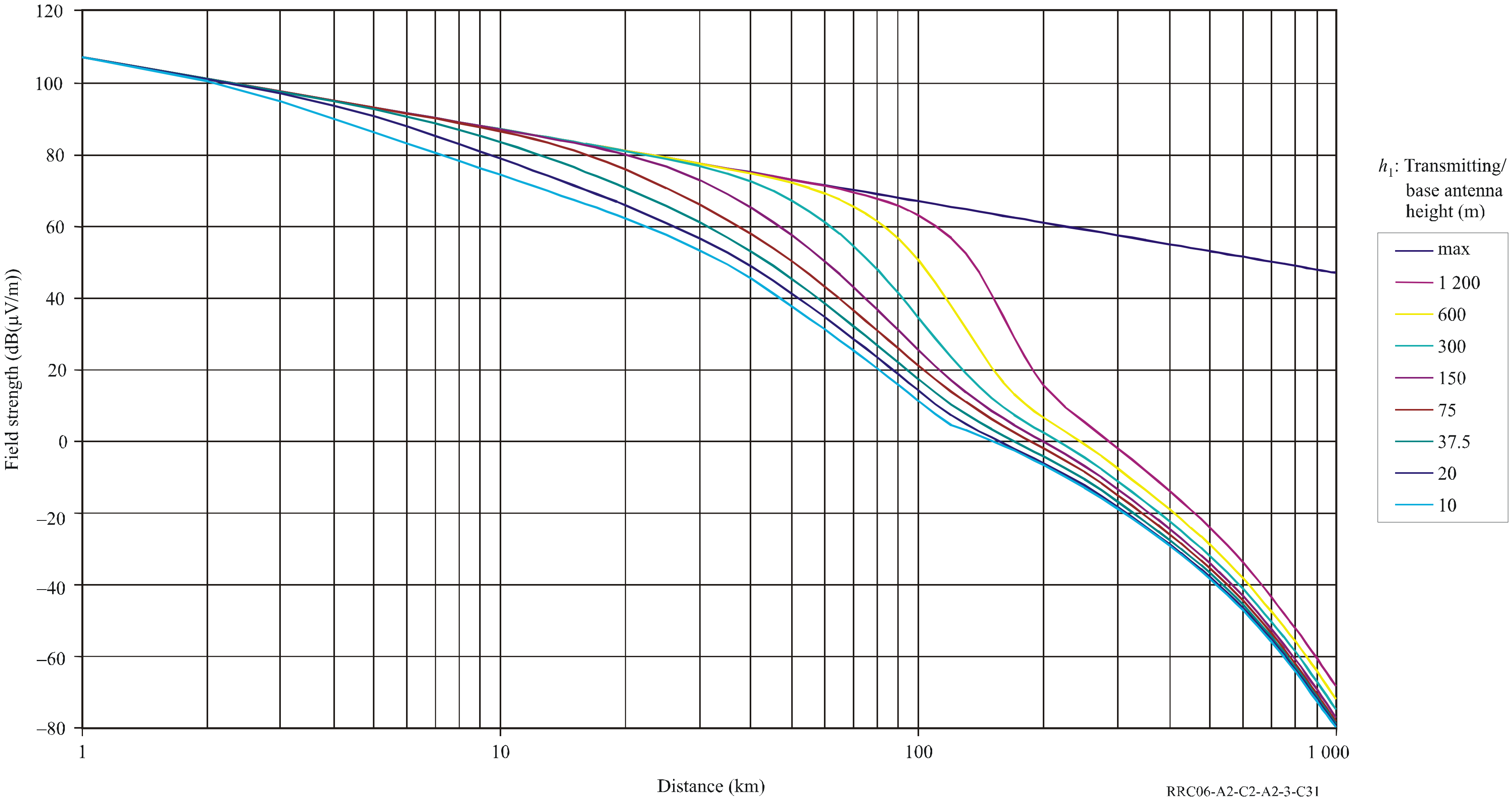
RRC06-A2-C2-A2-3-C29

100 MHz at 1% time in Zone 4

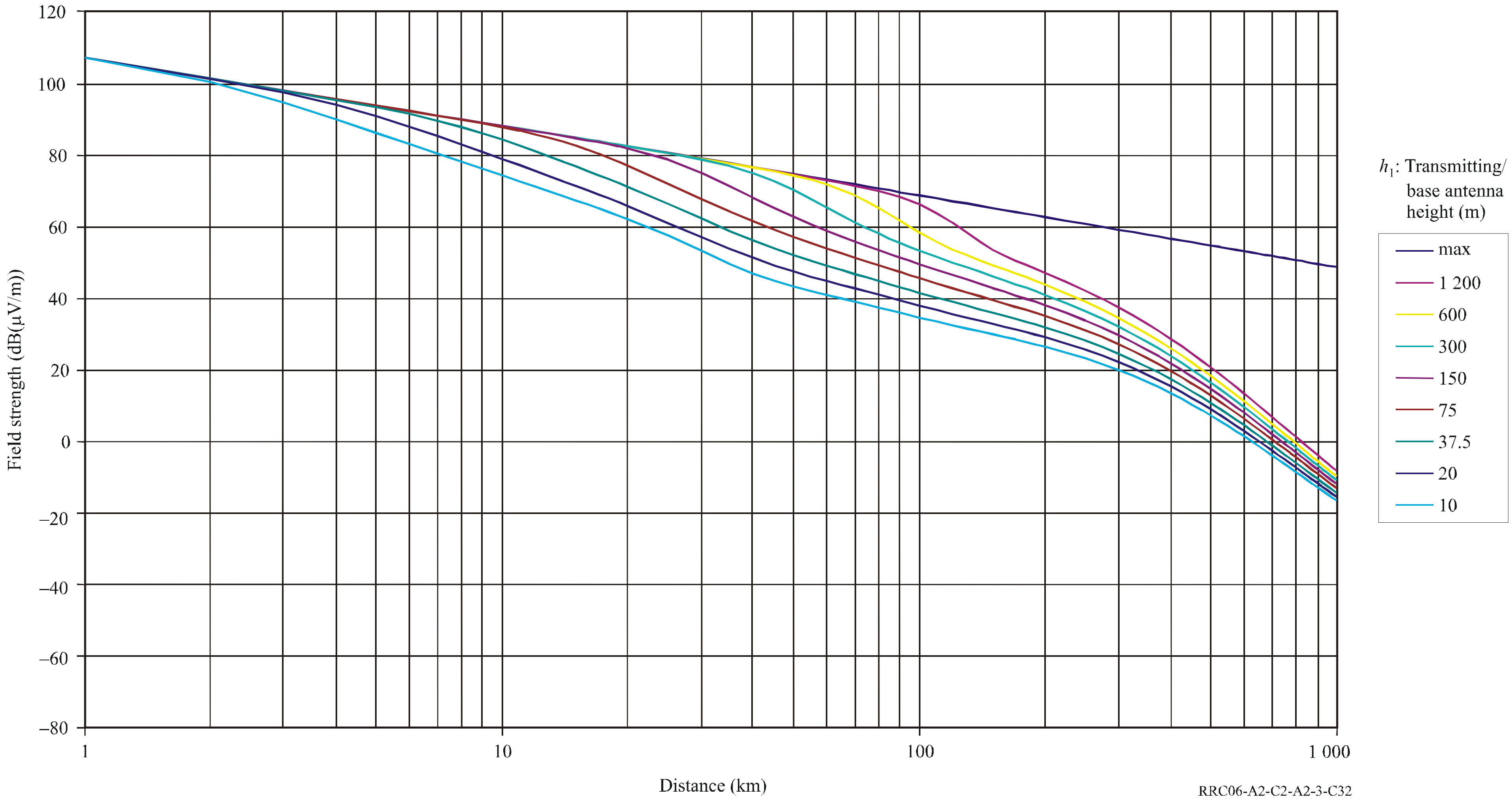


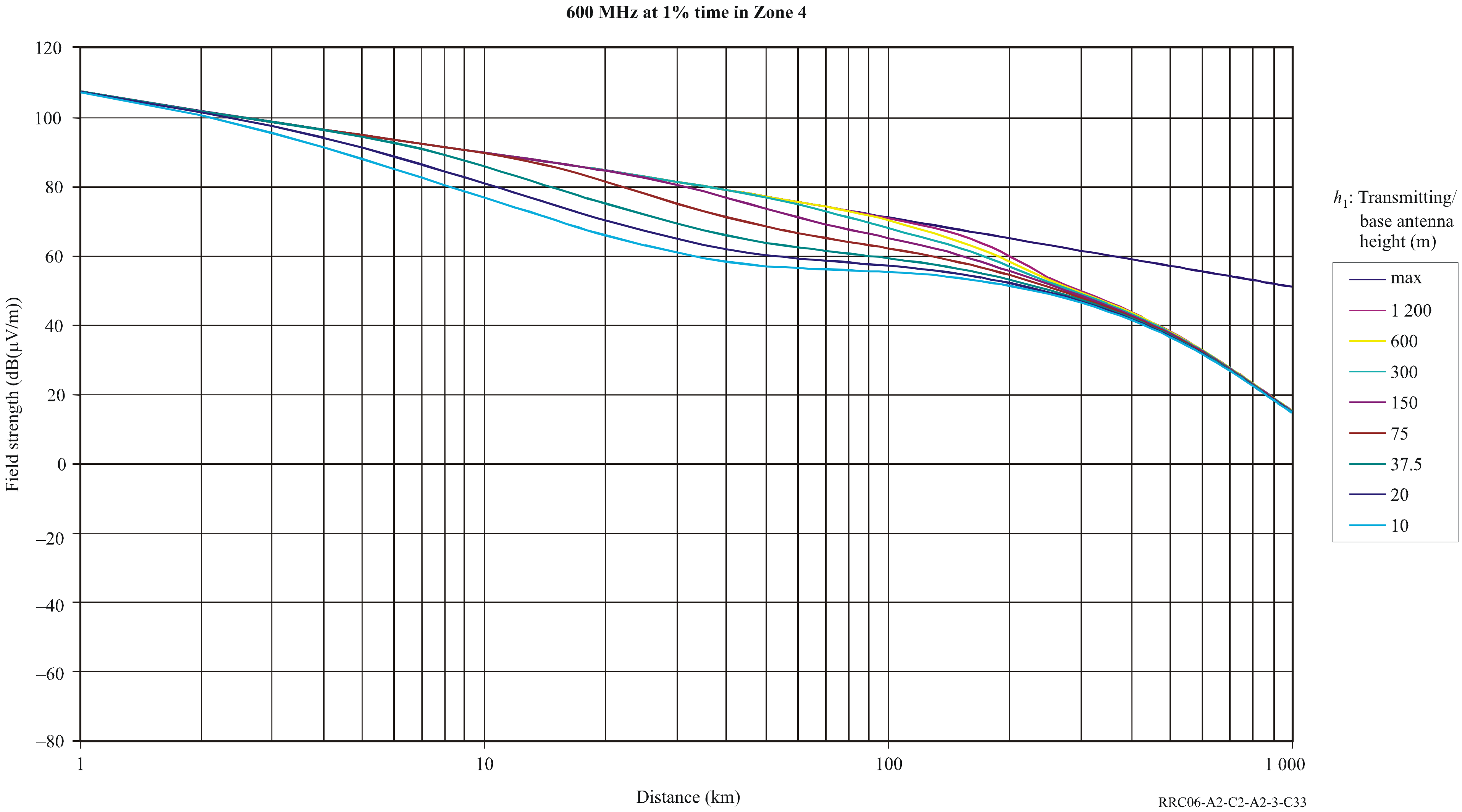
RRC06-A2-C2-A2-3-C30

600 MHz at 50% time in Zone 4

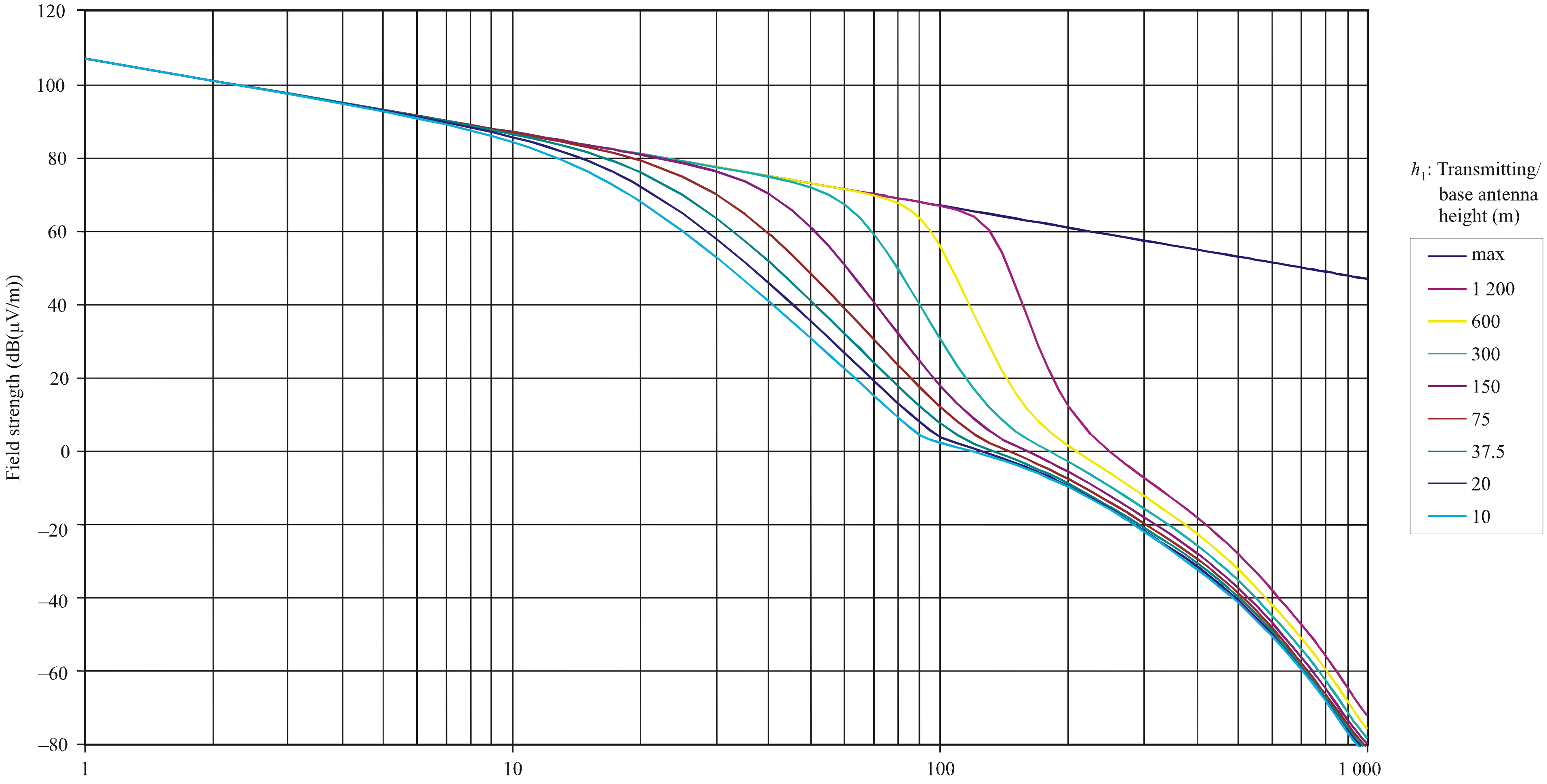


600 MHz at 10% time in Zone 4



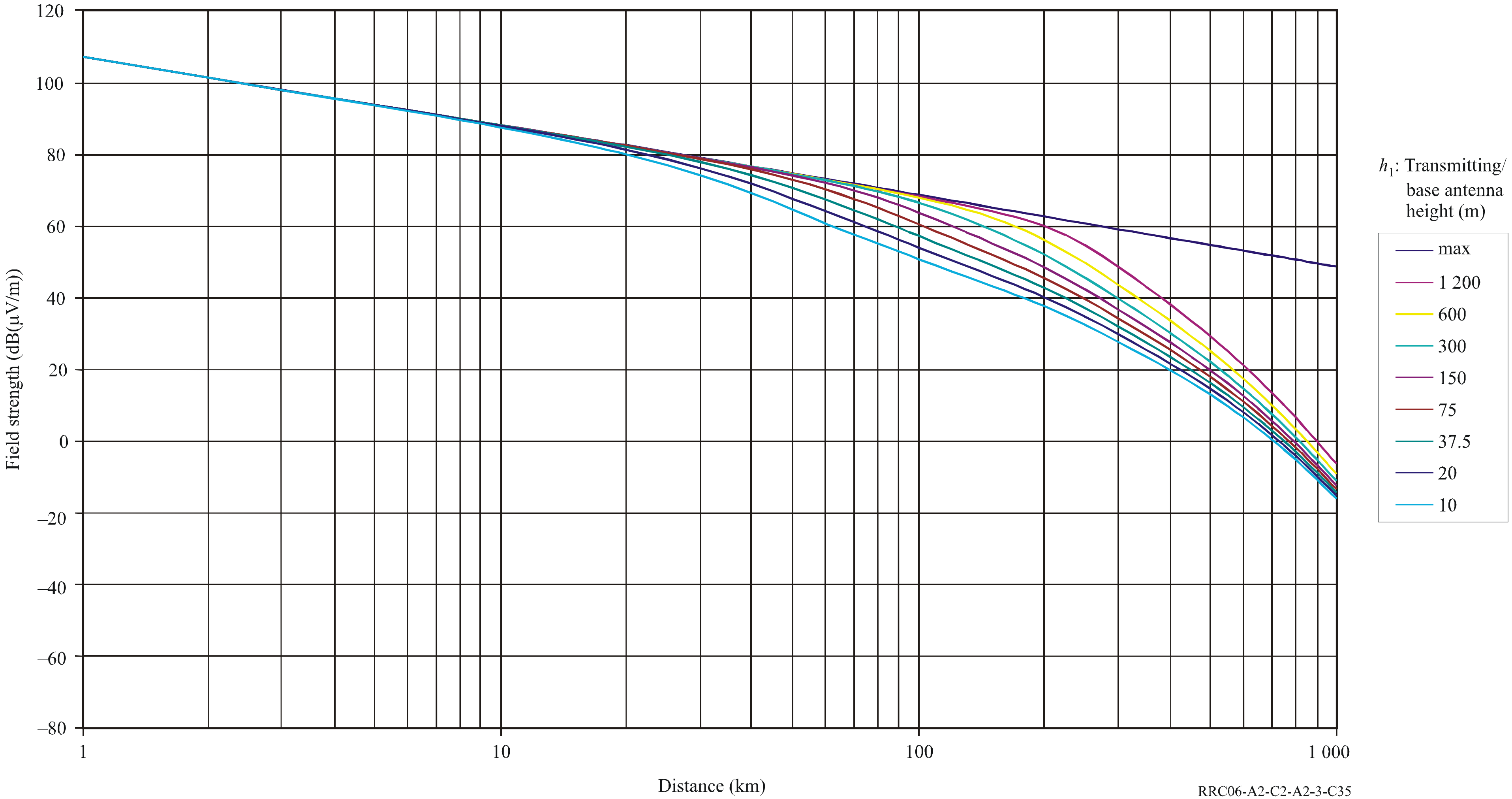

600 MHz at 1% time in Zone 4
120
100
80
60
40
20
0
–20
–40
–60
–80
Field strength (dB(μV/m))
1
10
100
1 000
Distance (km)
h_1: Transmitting/ base antenna height (m)
max
1 200
600
300
150
75
37.5
20
10
RRC06-A2-C2-A2-3-C33

2 000 MHz at 50% time in Zone 4



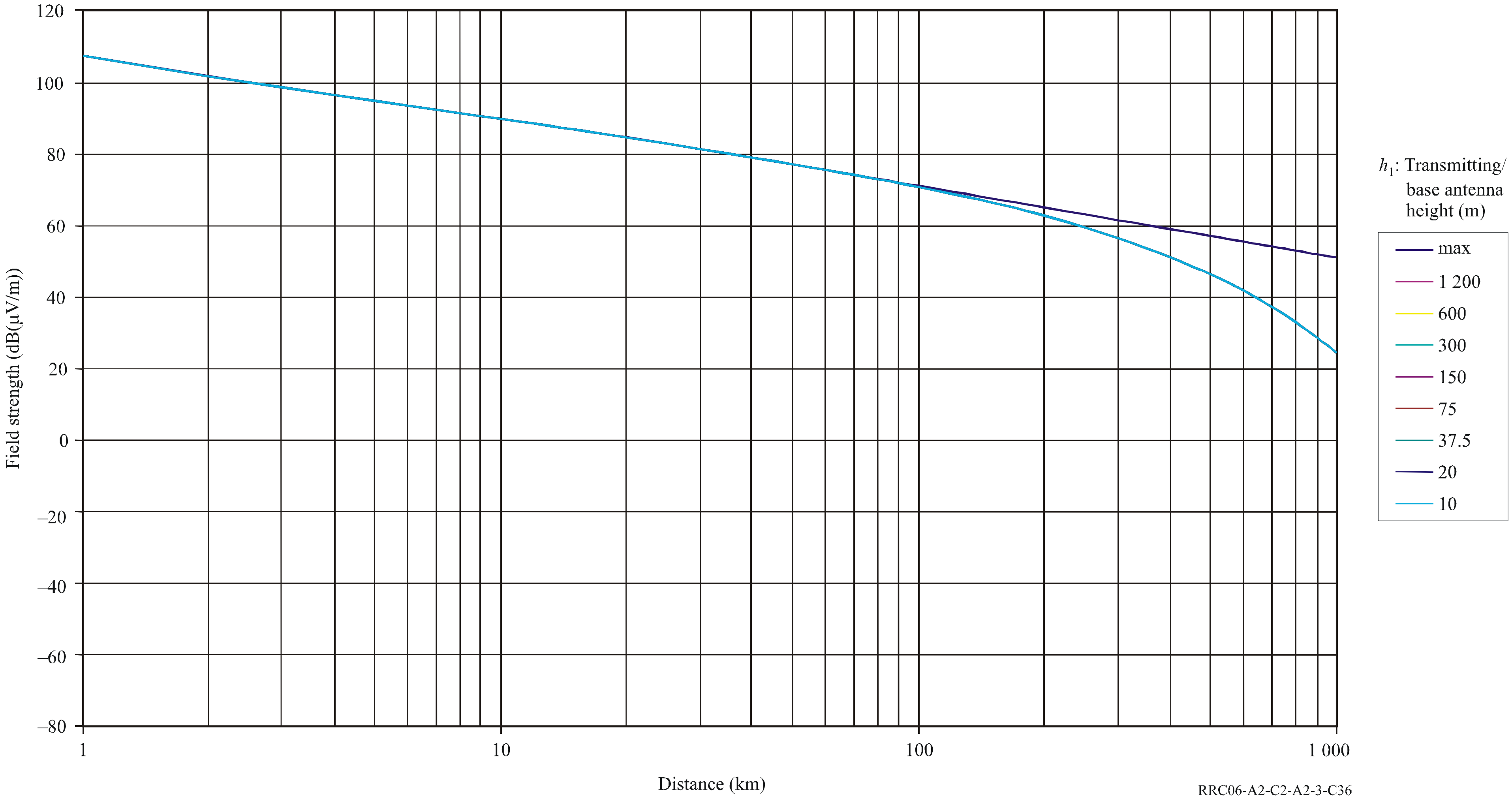
RRC06-A2-C2-A2-3-C34

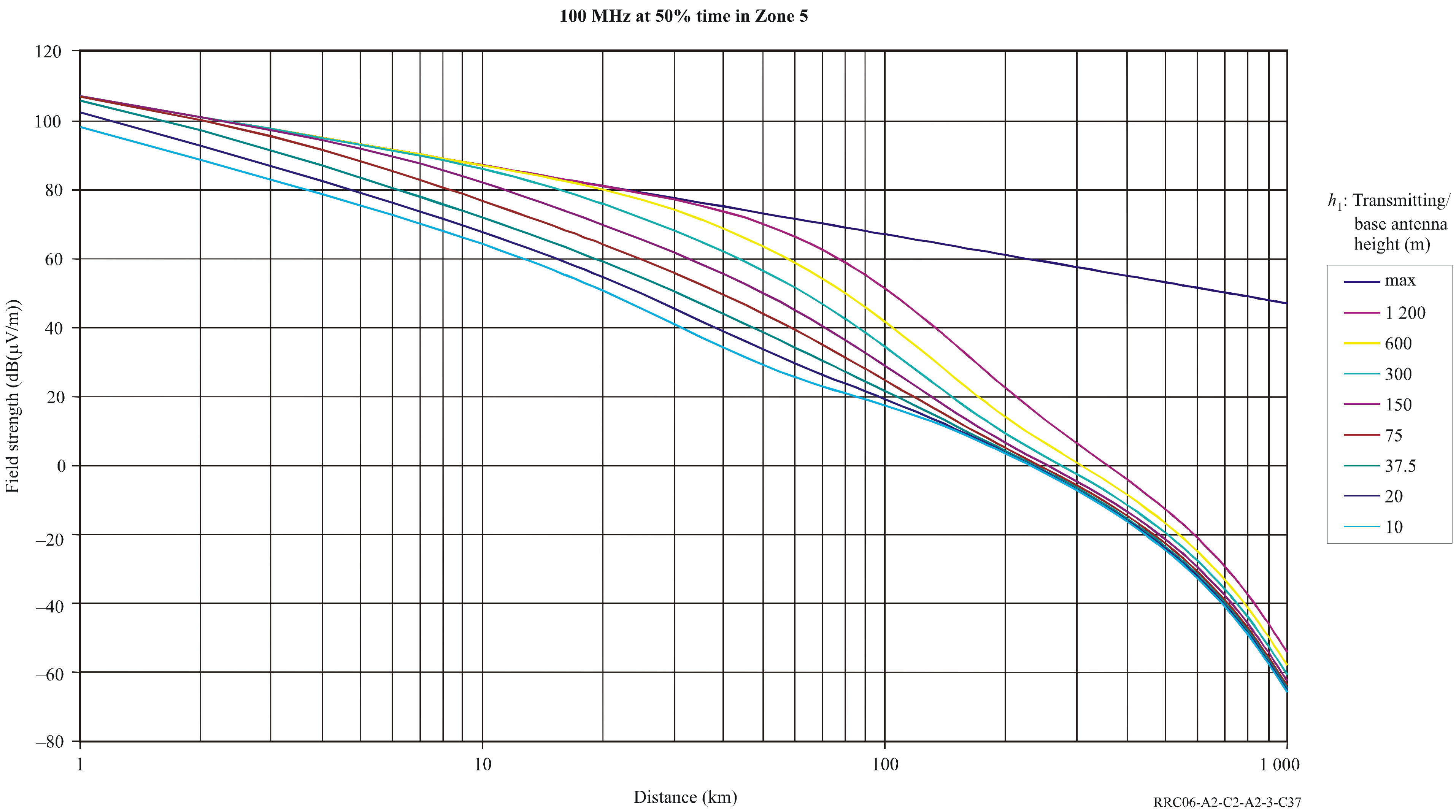
2 000 MHz at 10% time in Zone 4



RRC06-A2-C2-A2-3-C35

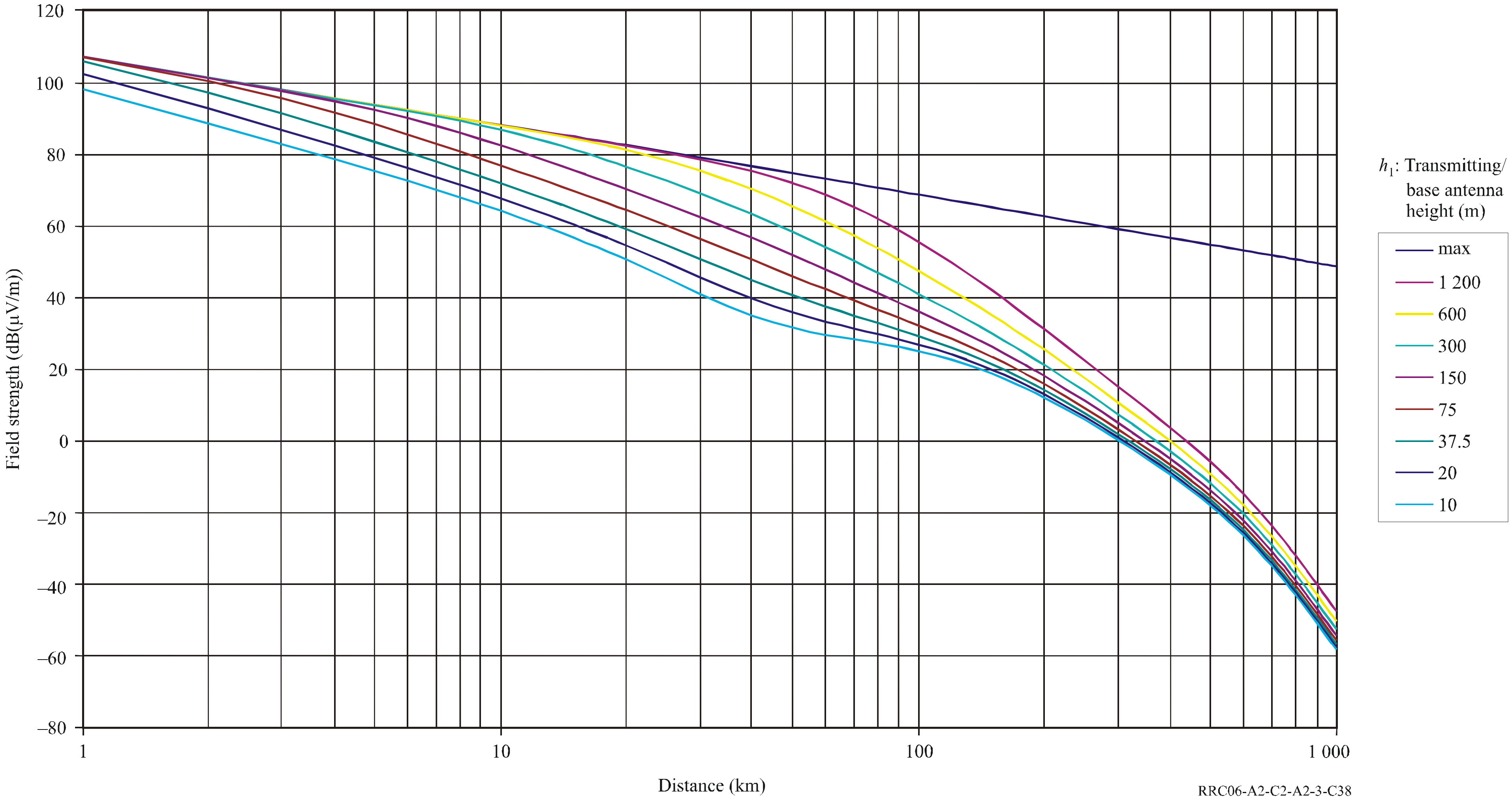
2 000 MHz at 1% time in Zone 4



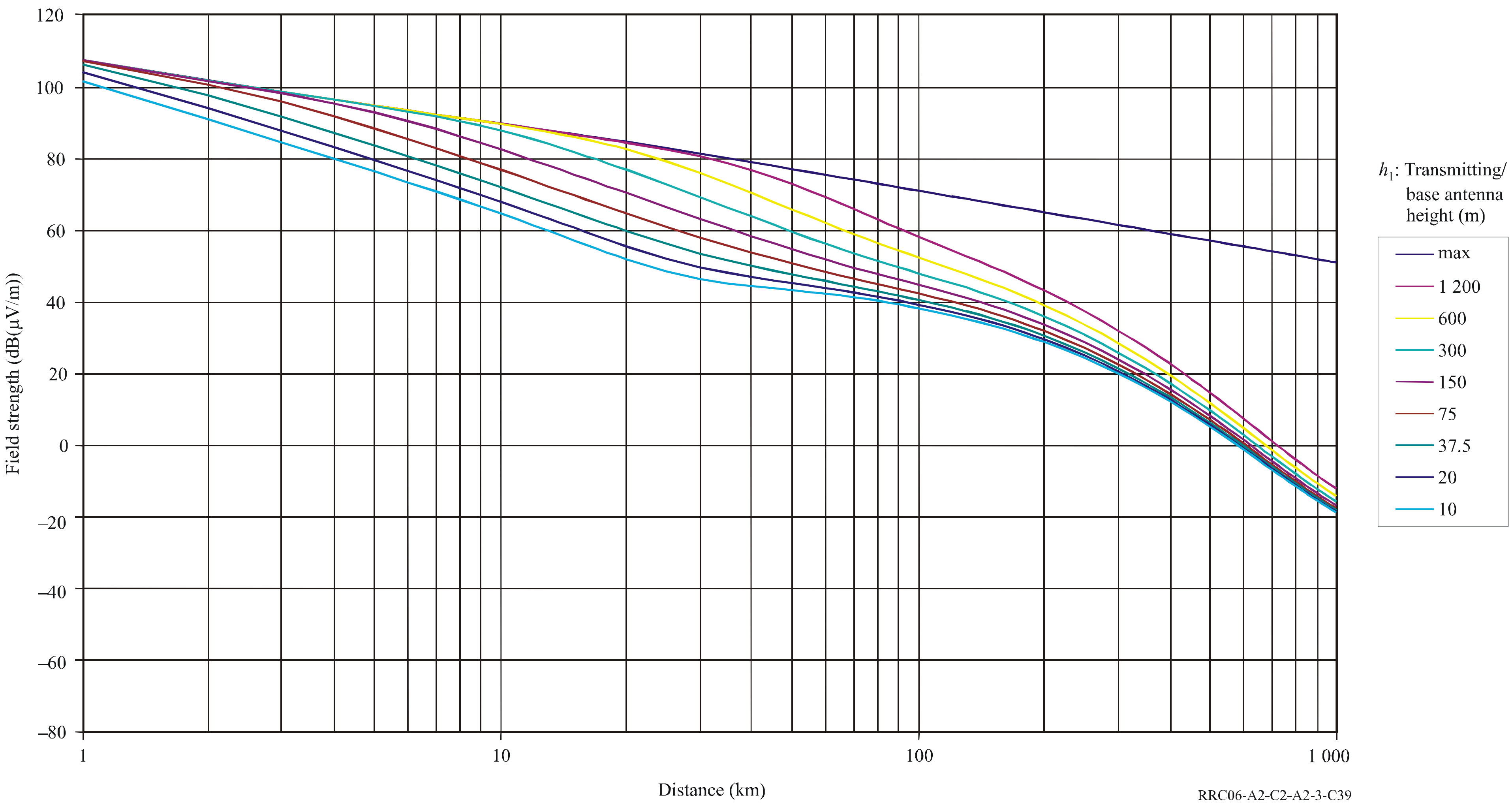


100 MHz at 50% time in Zone 5
Field strength (dB(μV/m))
120
100
80
60
40
20
0
–20
–40
–60
–80
1
10
100
1 000
Distance (km)
h1: Transmitting/ base antenna height (m)
max
1 200
600
300
150
75
37.5
20
10
RRC06-A2-C2-A2-3-C37

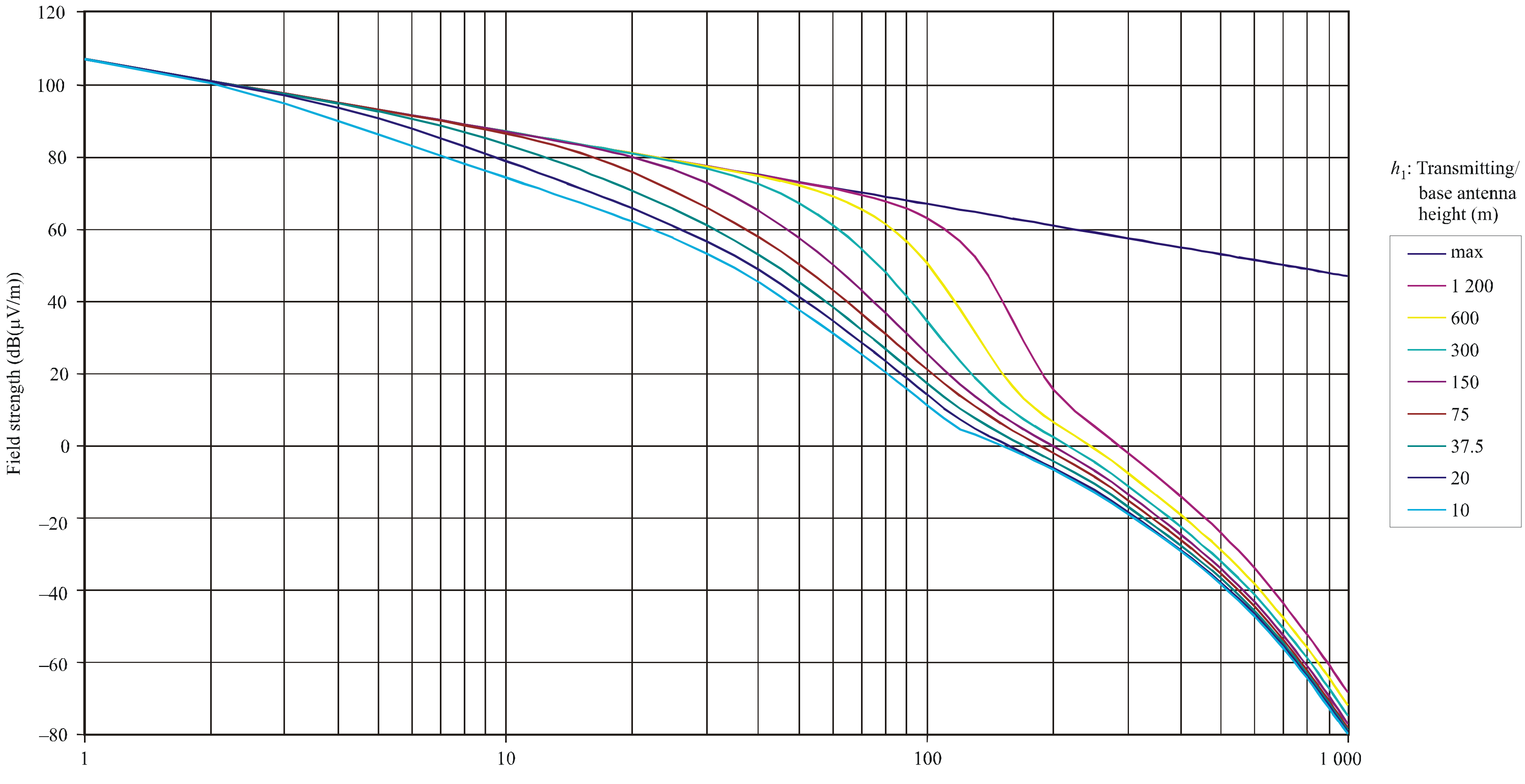
100 MHz at 10% time in Zone 5



100 MHz at 1% time in Zone 5

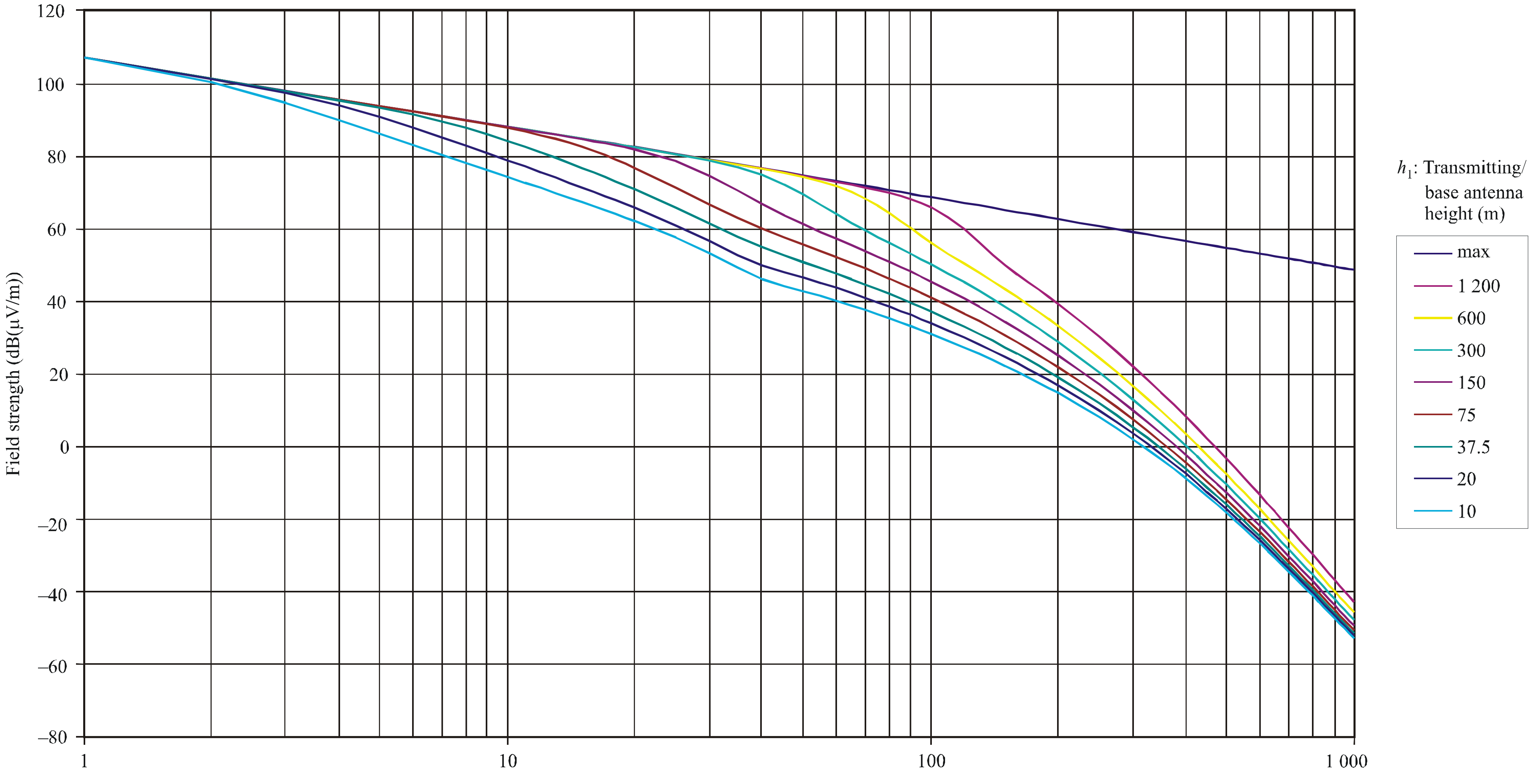


600 MHz at 50% time in Zone 5



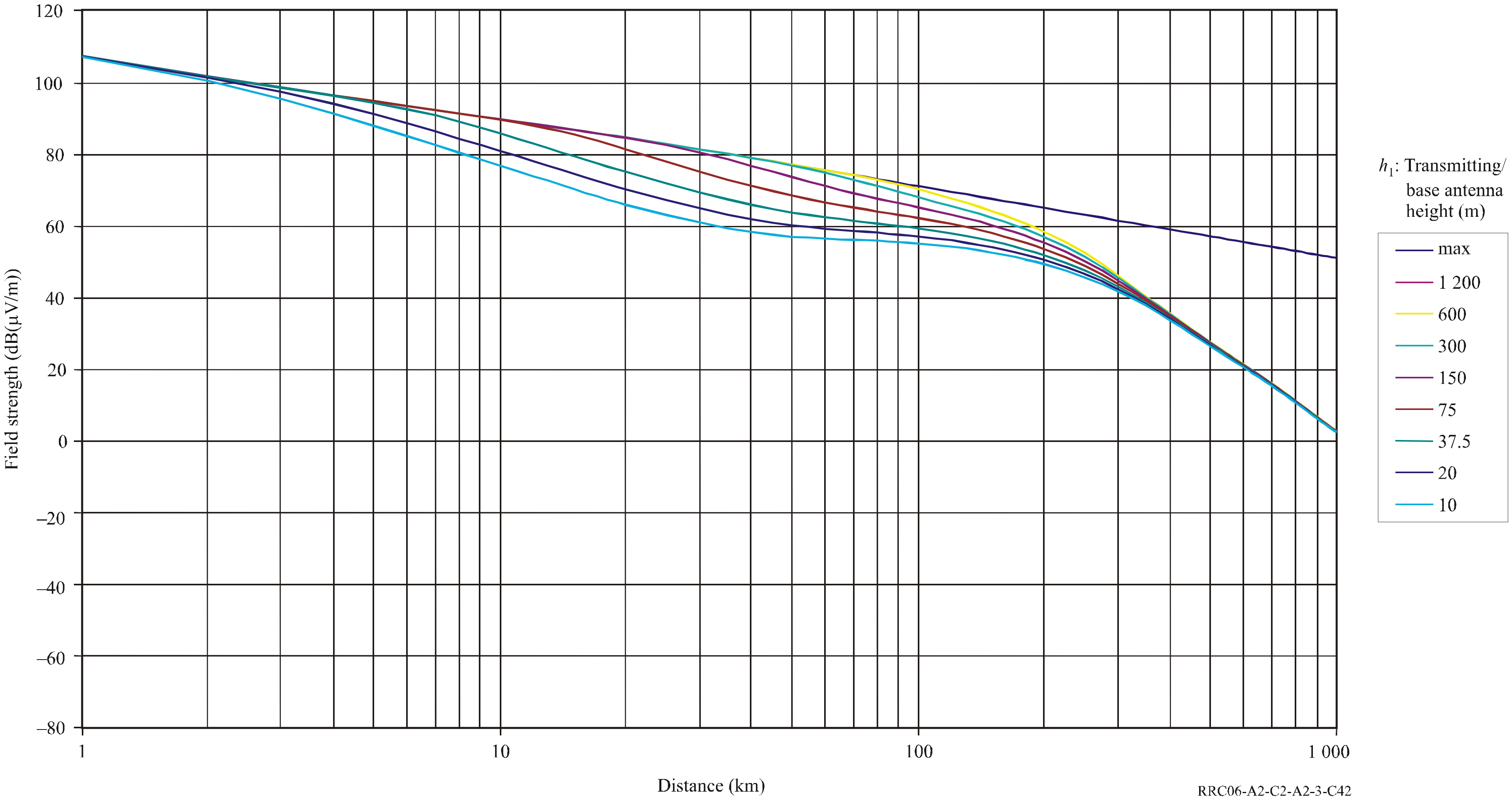
RRC06-A2-C2-A2-3-C40

600 MHz at 10% time in Zone 5

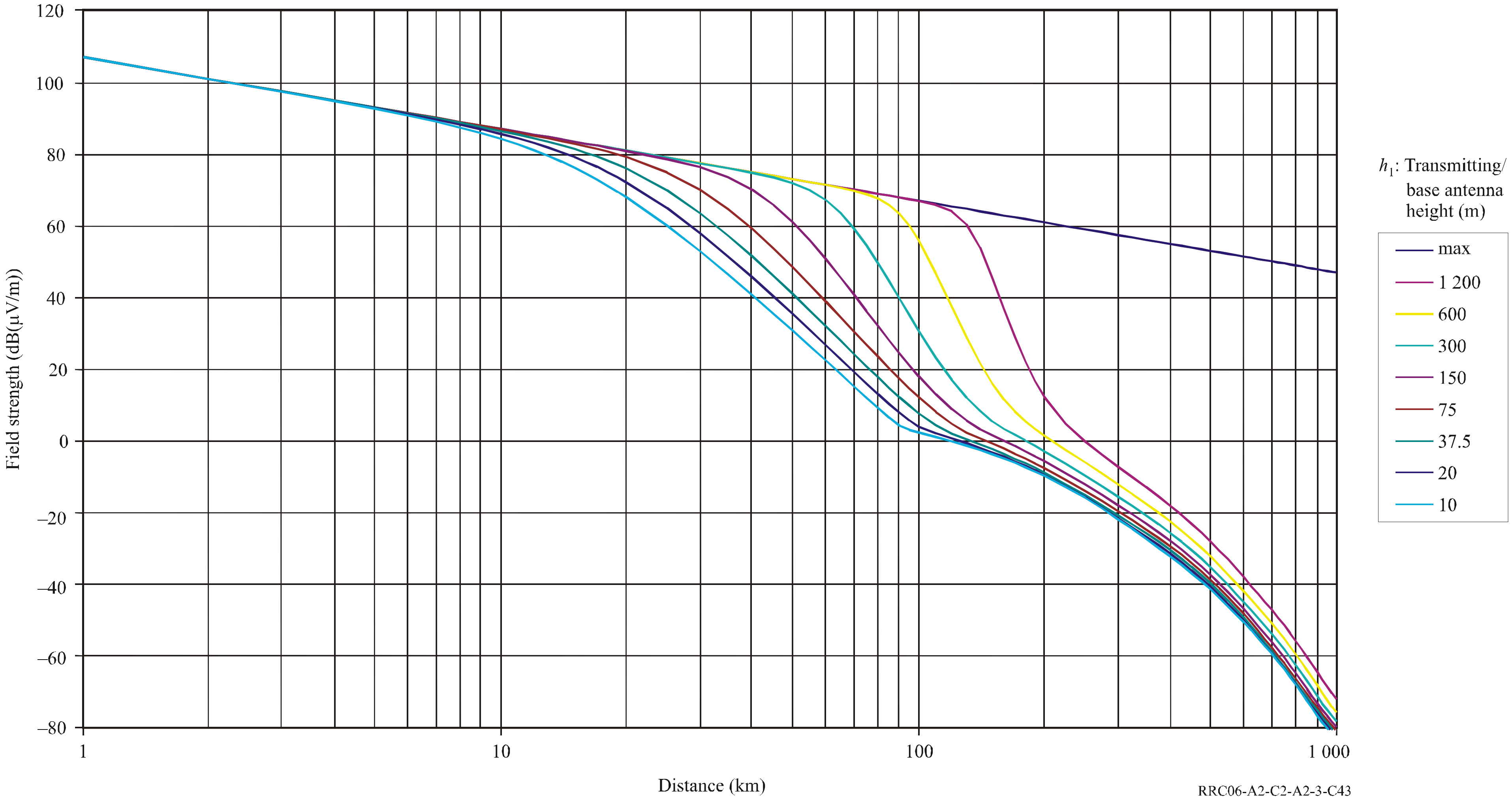


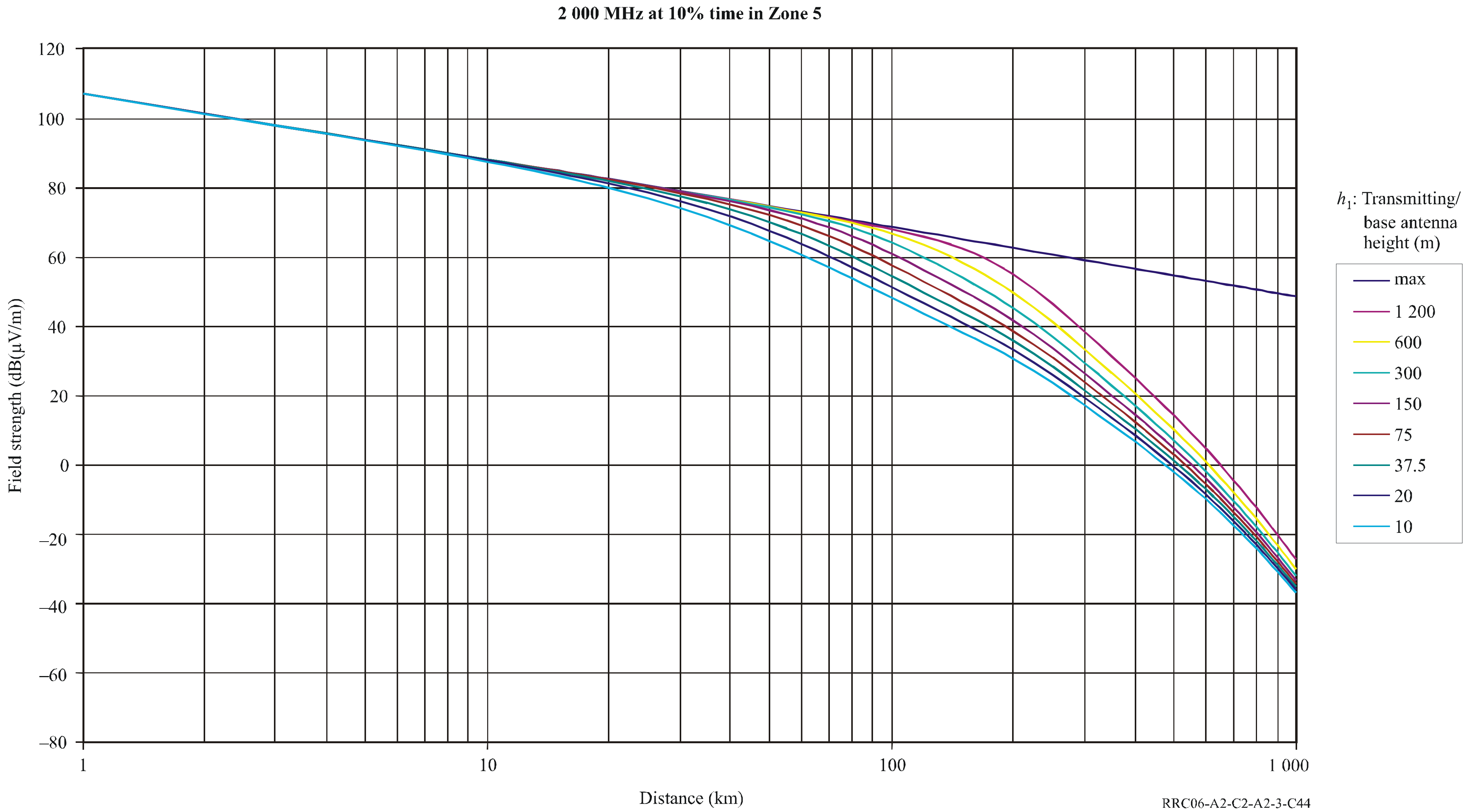
RRC06-A2-C2-A2-3-C41

600 MHz at 1% time in Zone 5

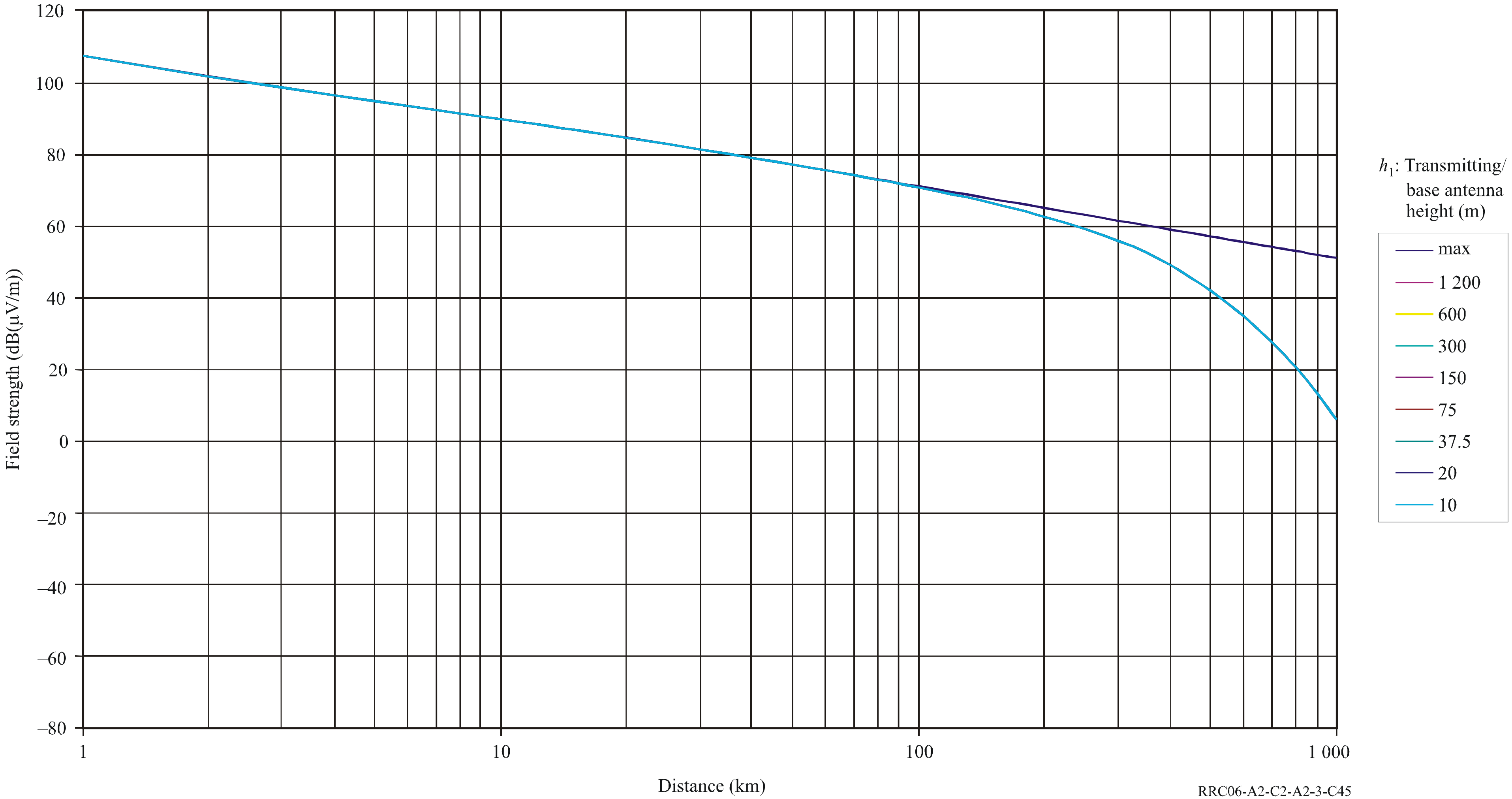


2 000 MHz at 50% time in Zone 5



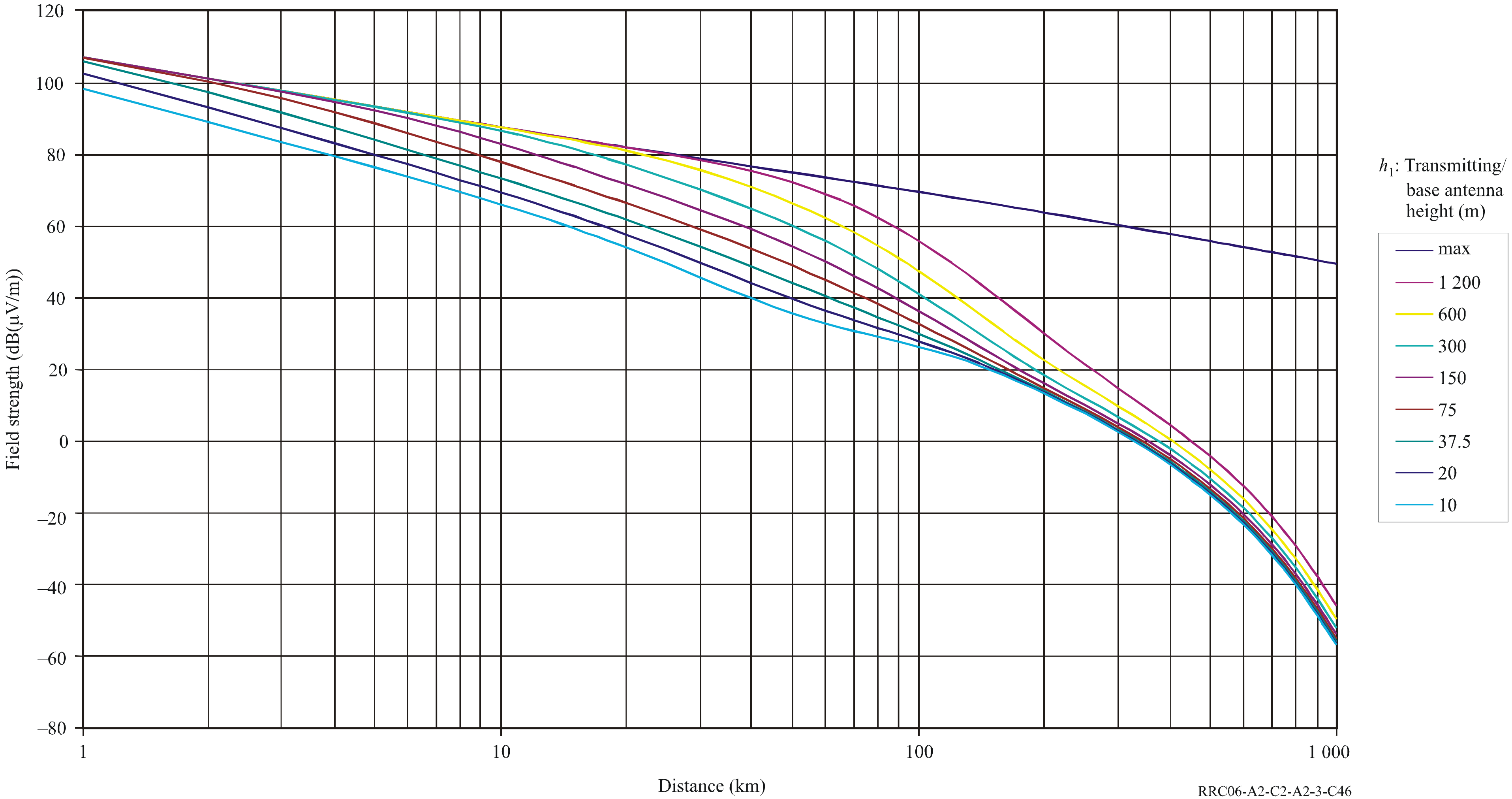

2 000 MHz at 10% time in Zone 5
120
100
80
60
40
20
0
–20
–40
–60
–80
Field strength (dB(μV/m))
1
10
100
1 000
Distance (km)
h1: Transmitting/ base antenna height (m)
max
1 200
600
300
150
75
37.5
20
10
RRC06-A2-C2-A2-3-C44

2 000 MHz at 1% time in Zone 5



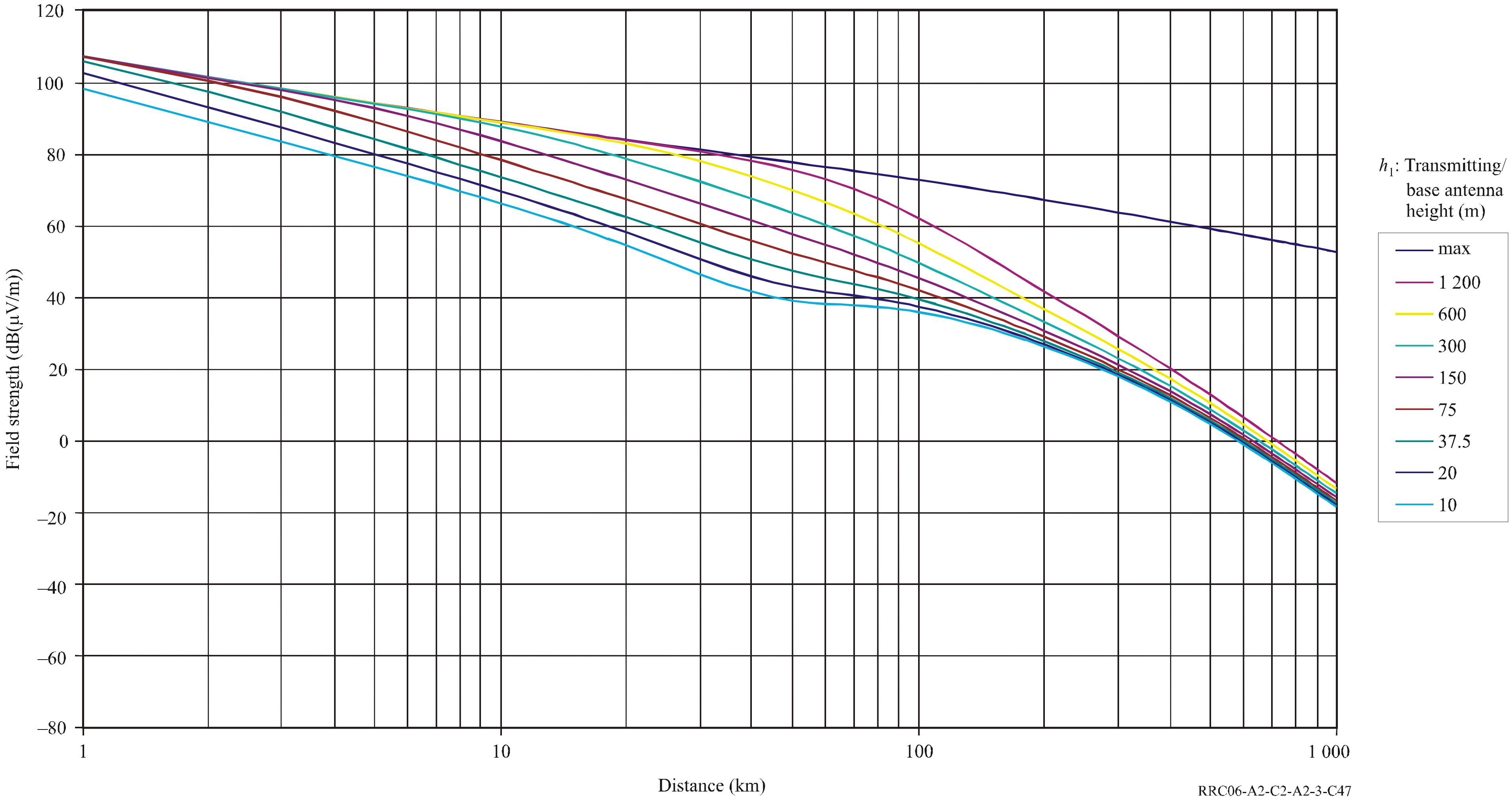
RRC06-A2-C2-A2-3-C45

100 MHz at 50% time in Zone A

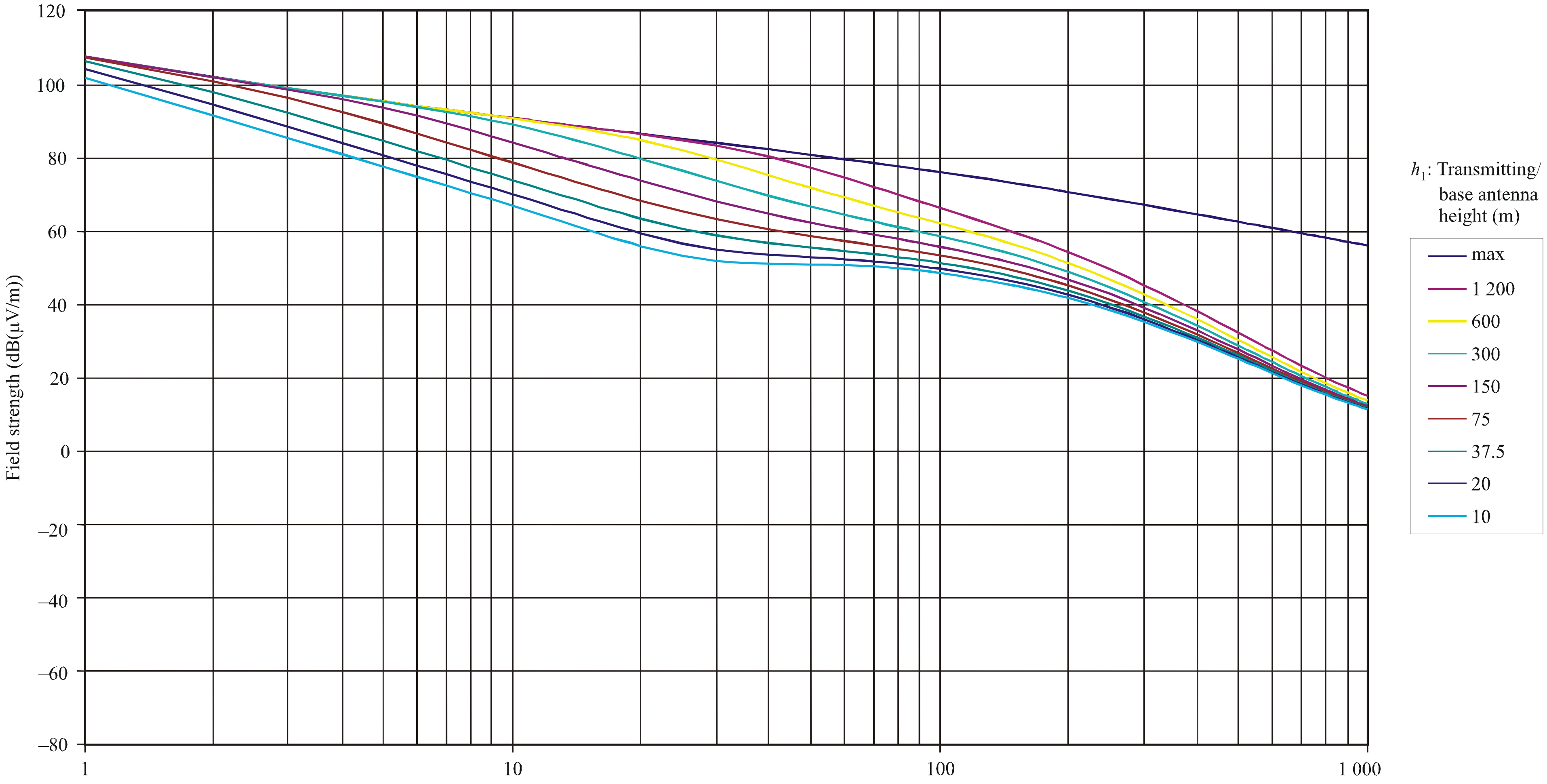


RRC06-A2-C2-A2-3-C46

100 MHz at 10% time in Zone A

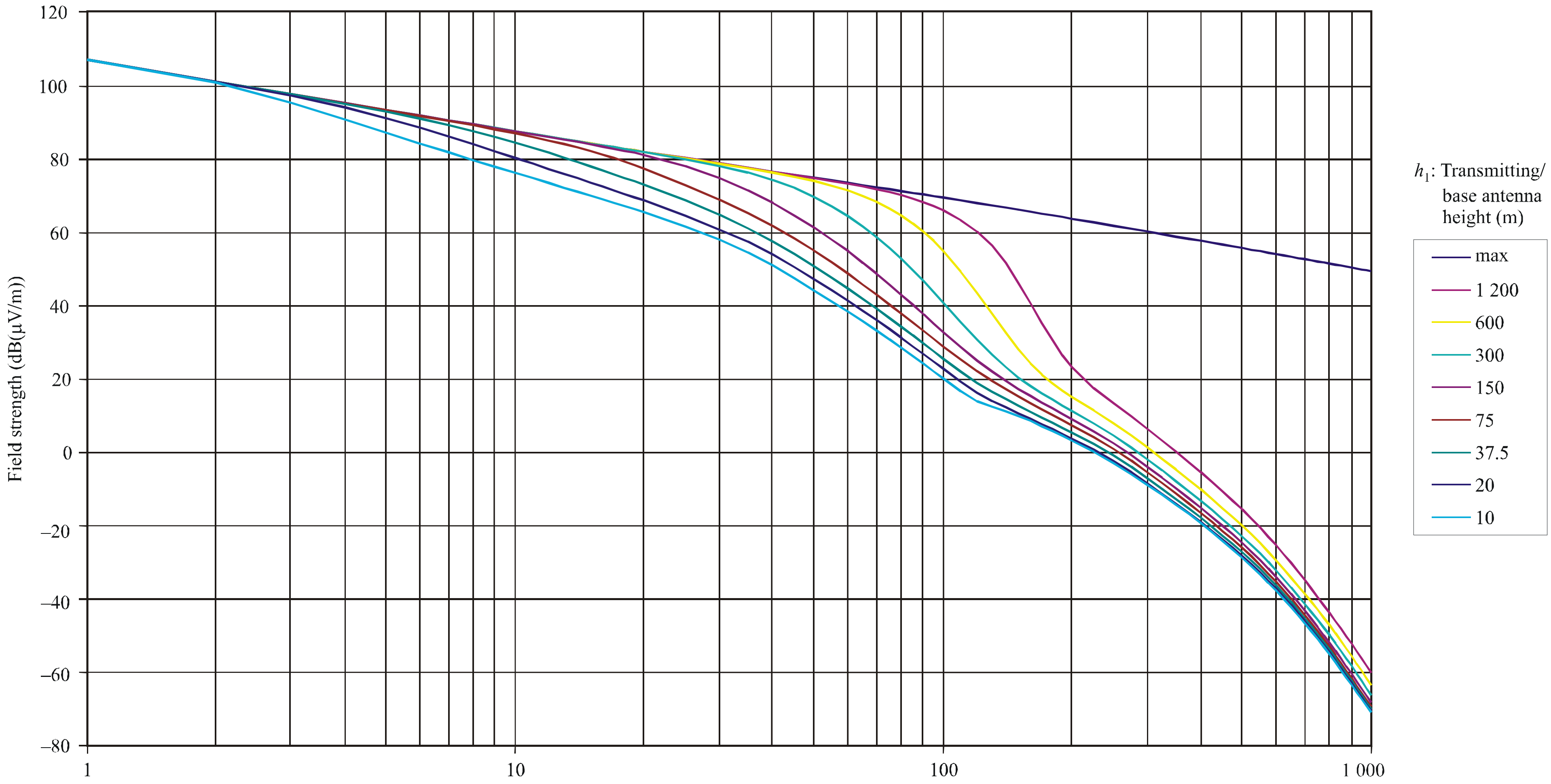


100 MHz at 1% time in Zone A



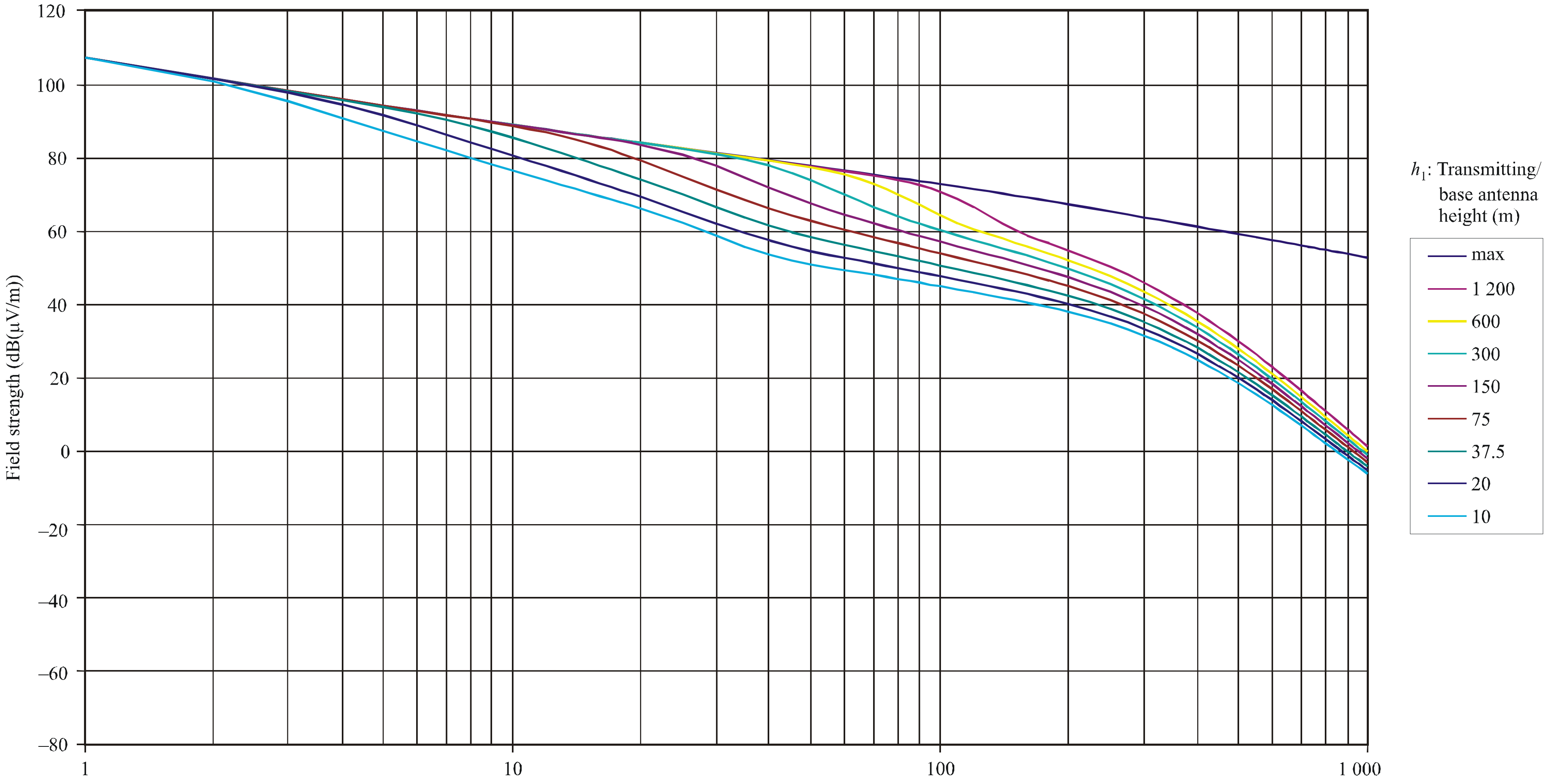
RRC06-A2-C2-A2-3-C48

600 MHz at 50% time in Zone A



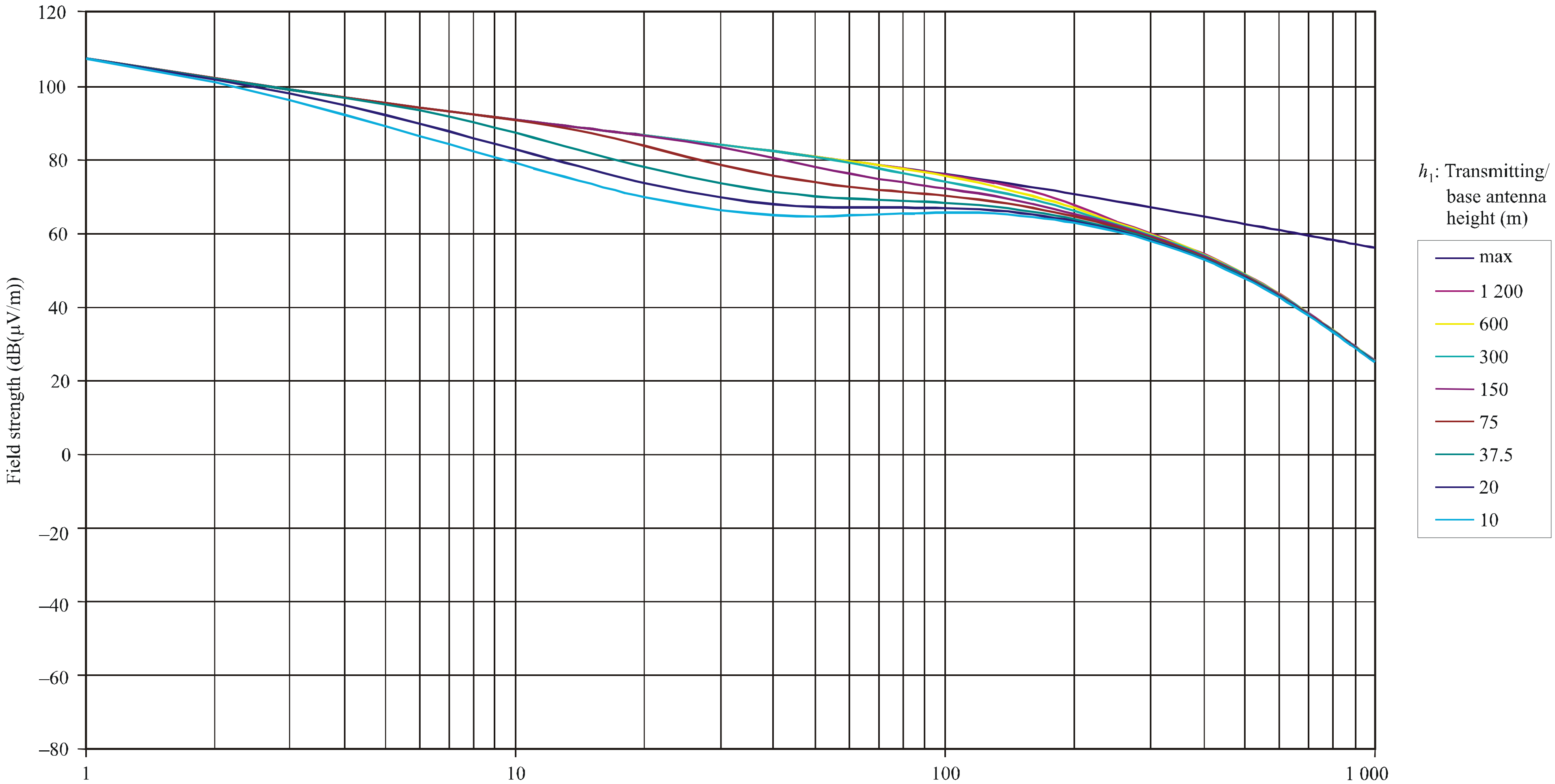
RRC06-A2-C2-A2-3-C49

600 MHz at 10% time in Zone A



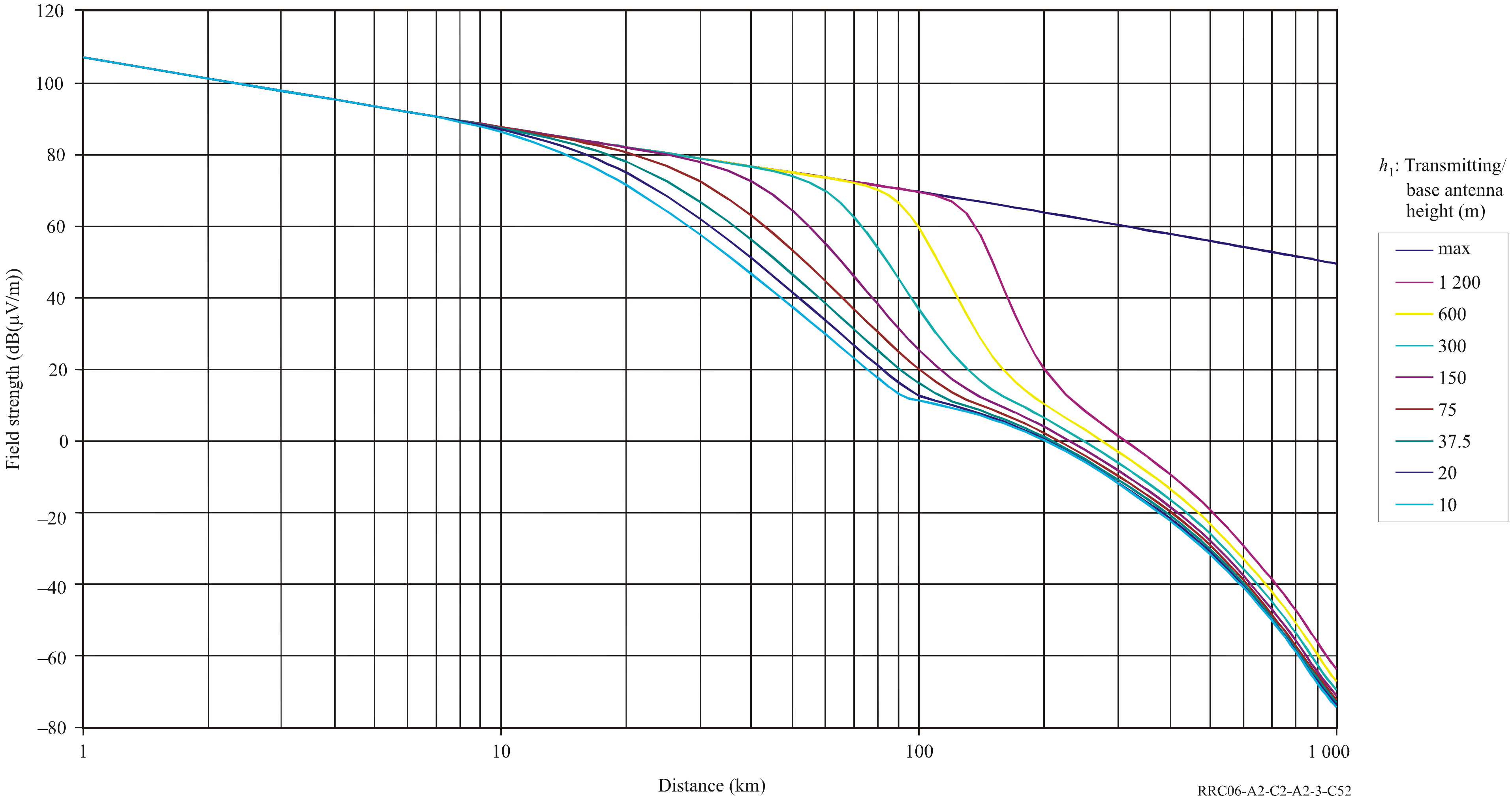
RRC06-A2-C2-A2-3-C50

600 MHz at 1% time in Zone A

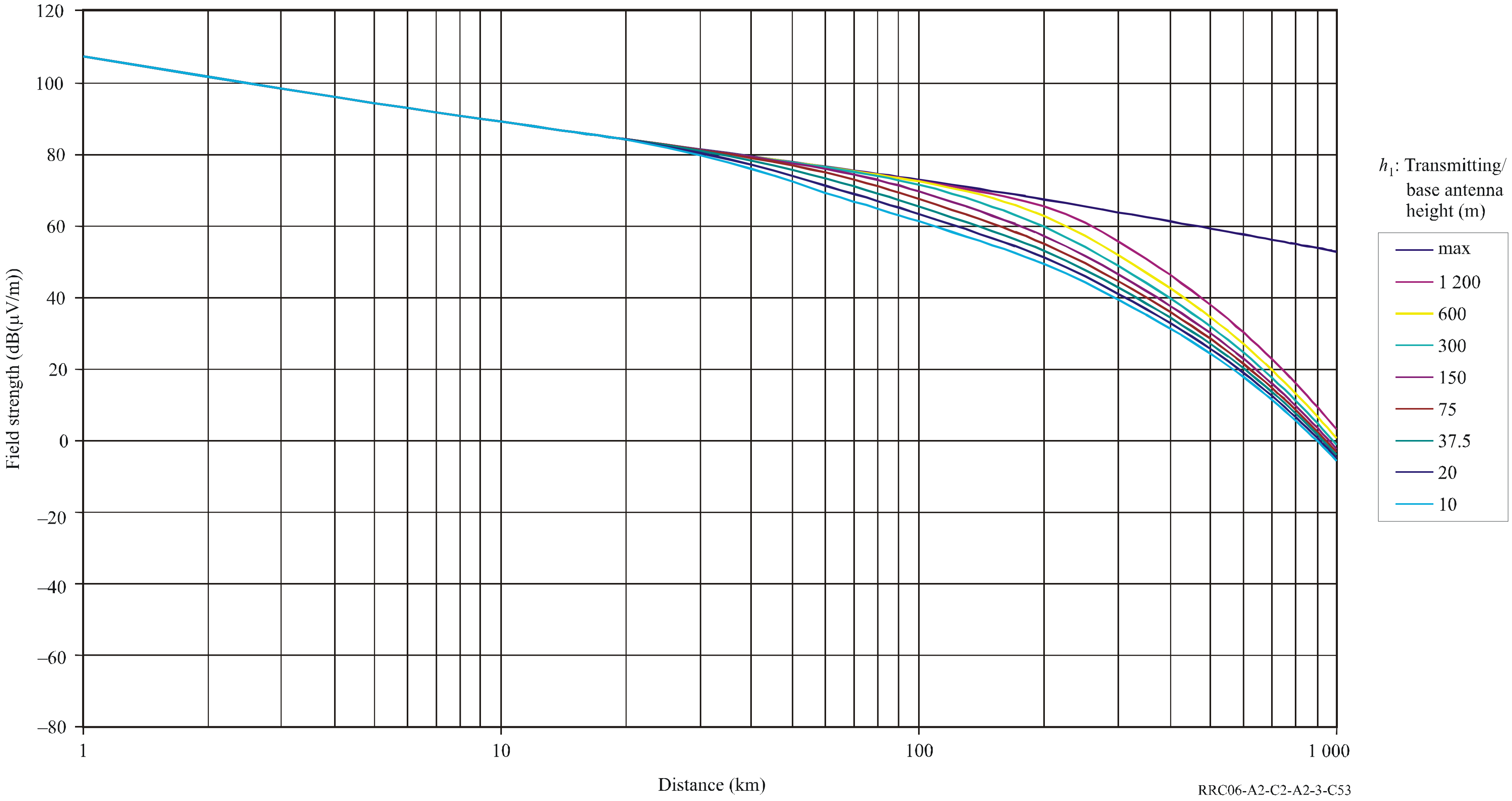


RRC06-A2-C2-A2-3-C51

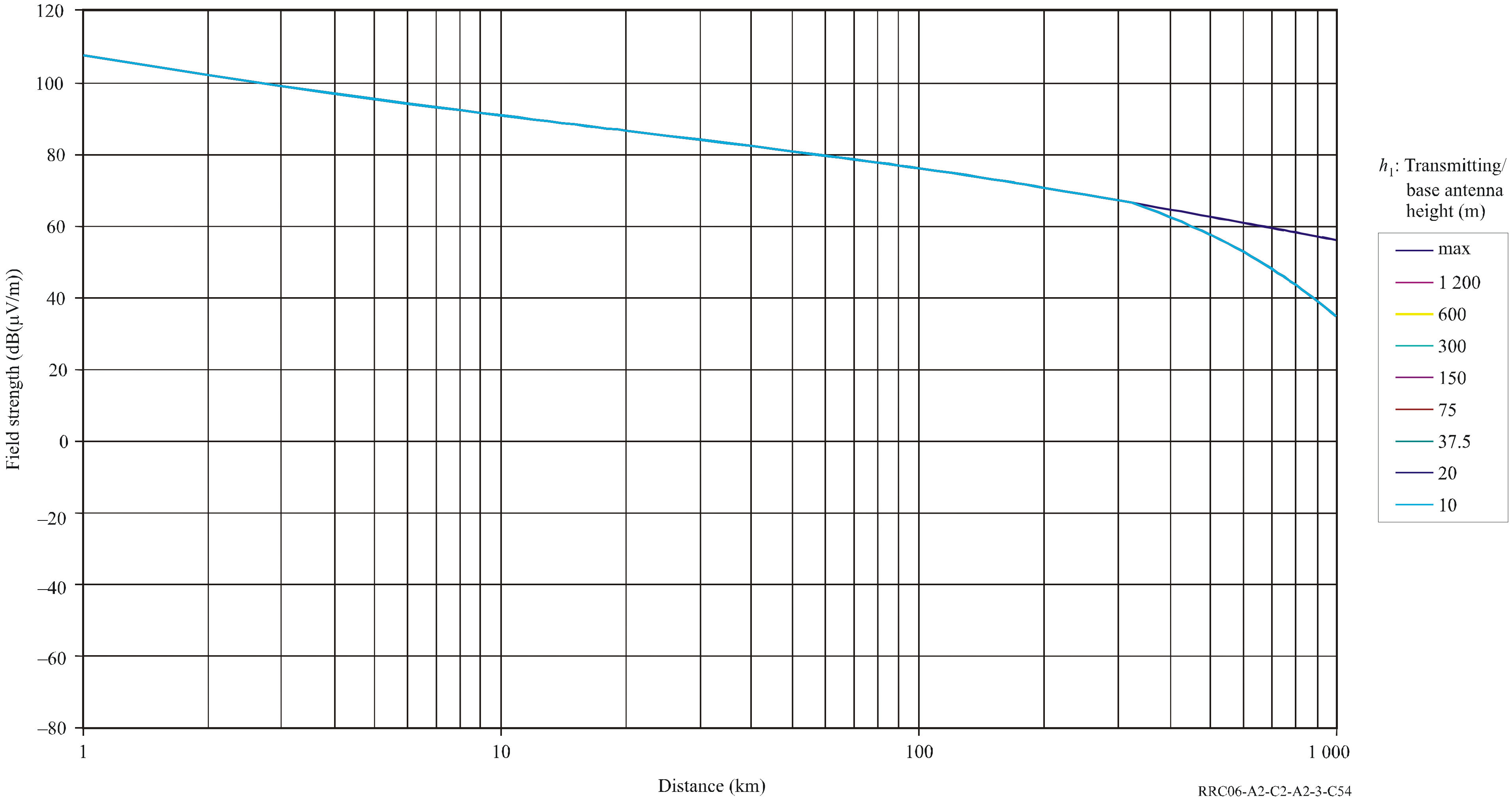
2 000 MHz at 50% time in Zone A



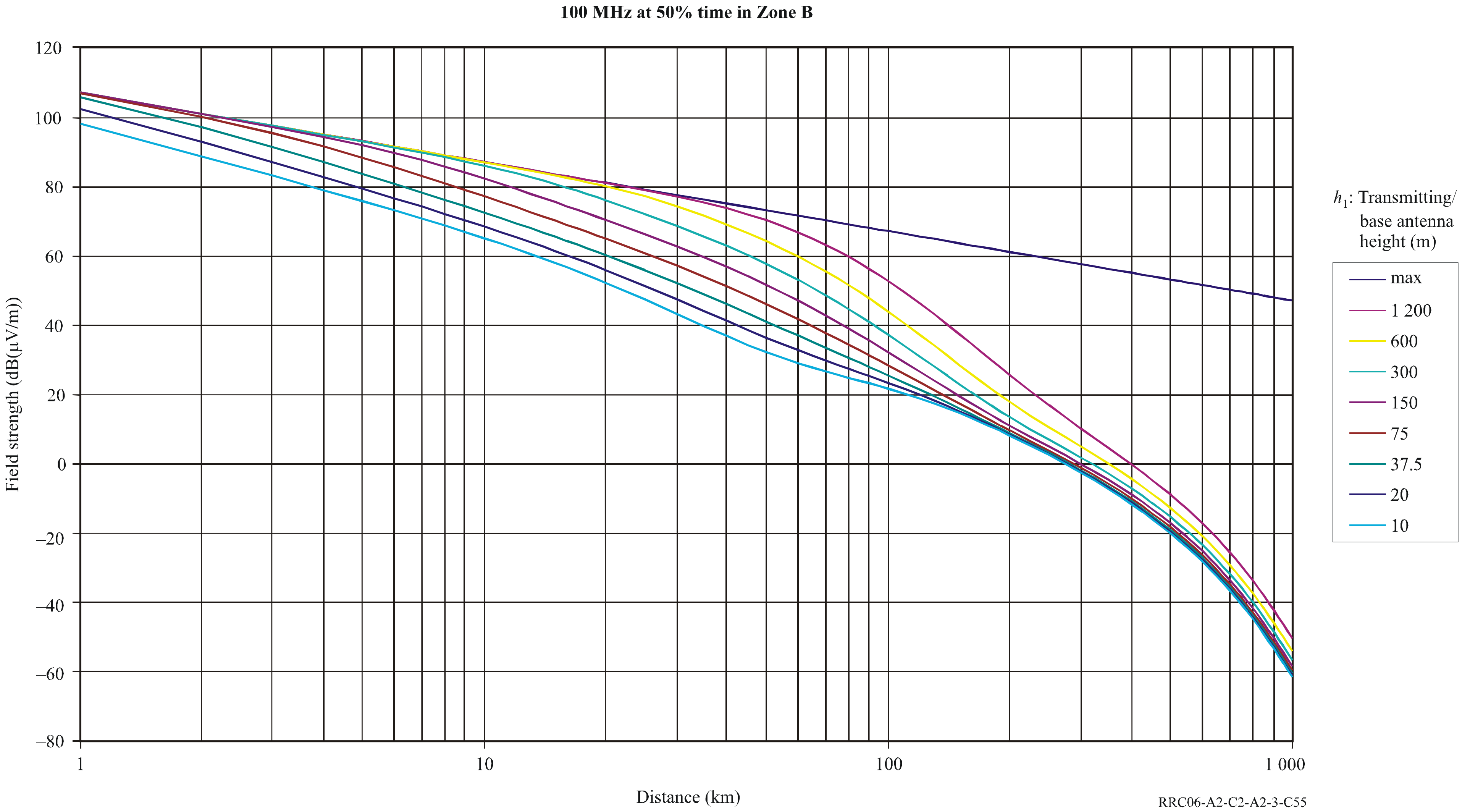
2 000 MHz at 10% time in Zone A



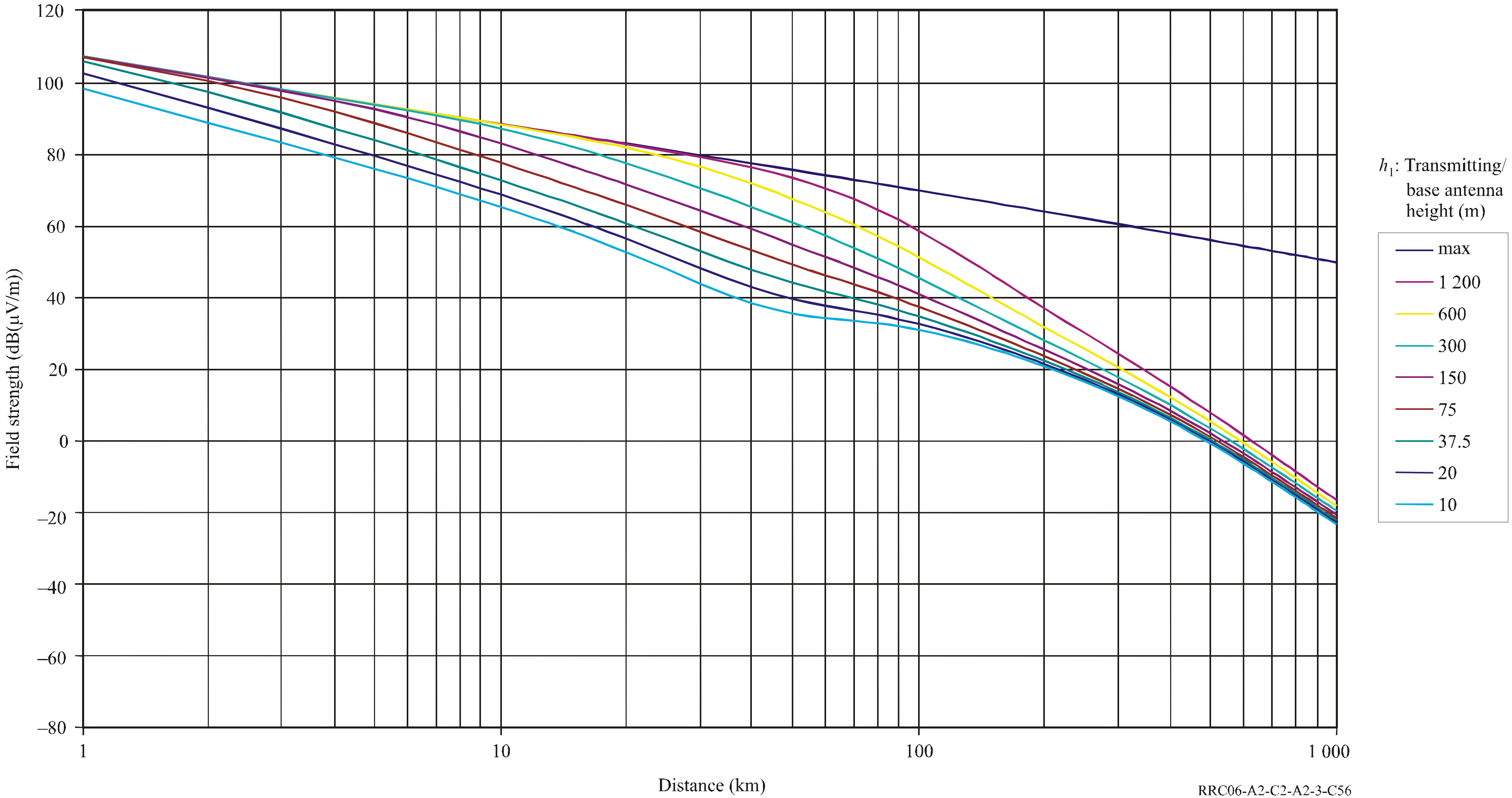
2 000 MHz at 1% time in Zone A



RRC06-A2-C2-A2-3-C54

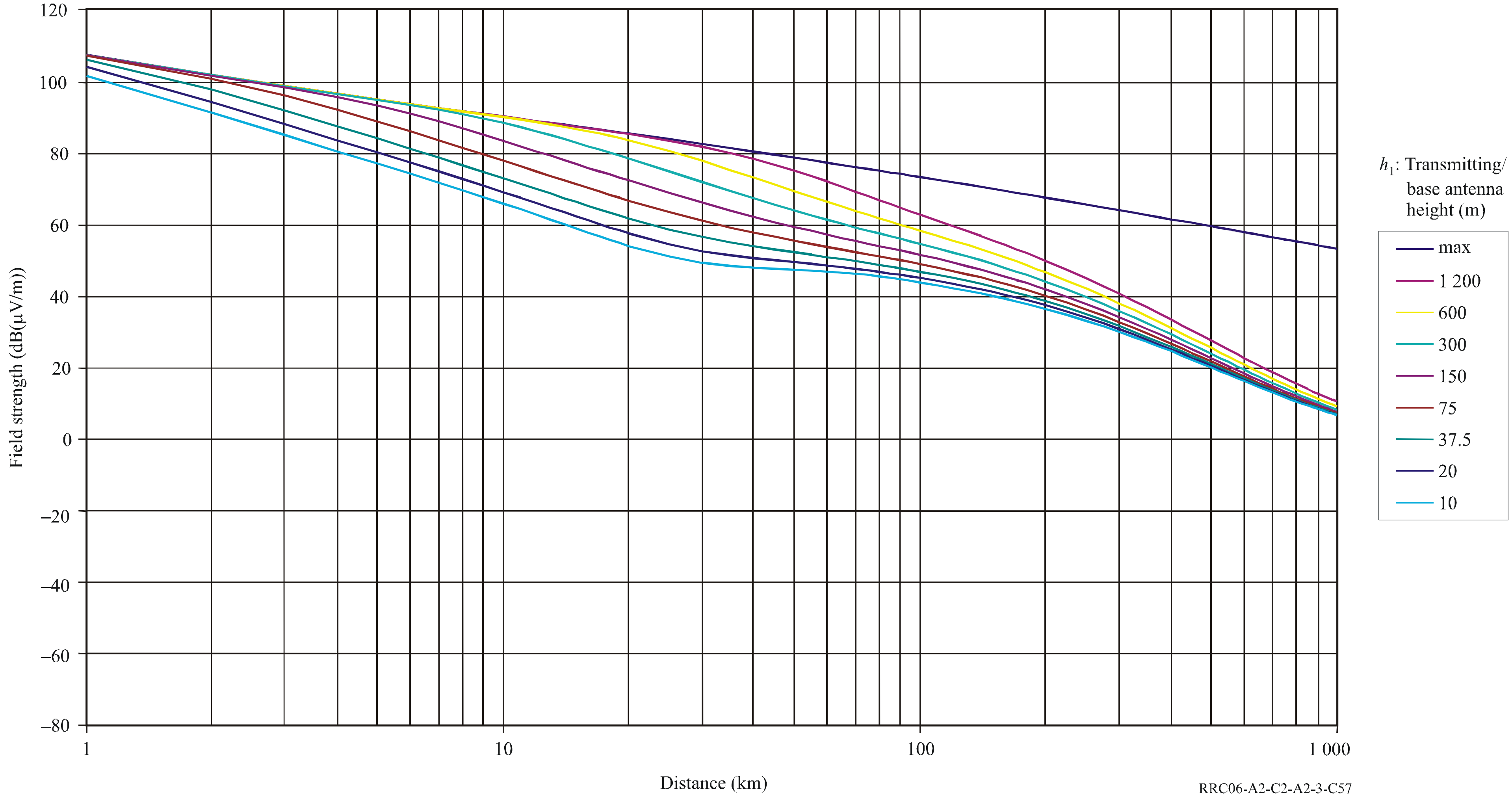

100 MHz at 50% time in Zone B
Field strength (dB(μV/m))
120
100
80
60
40
20
0
–20
–40
–60
–80
1
10
100
1 000
Distance (km)
h_1: Transmitting/ base antenna height (m)
max
1 200
600
300
150
75
37.5
20
10
RRC06-A2-C2-A2-3-C55

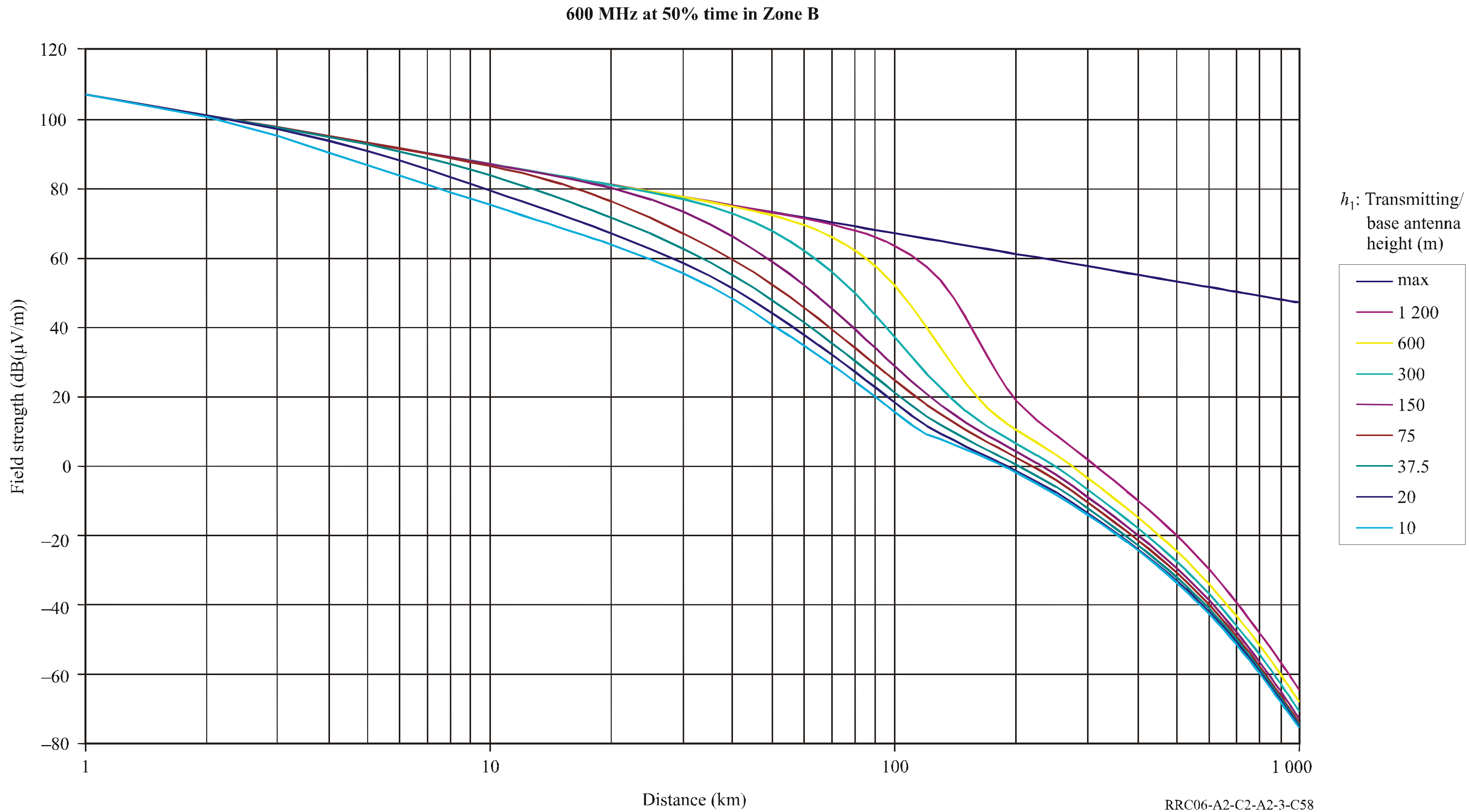
100 MHz at 10% time in Zone B



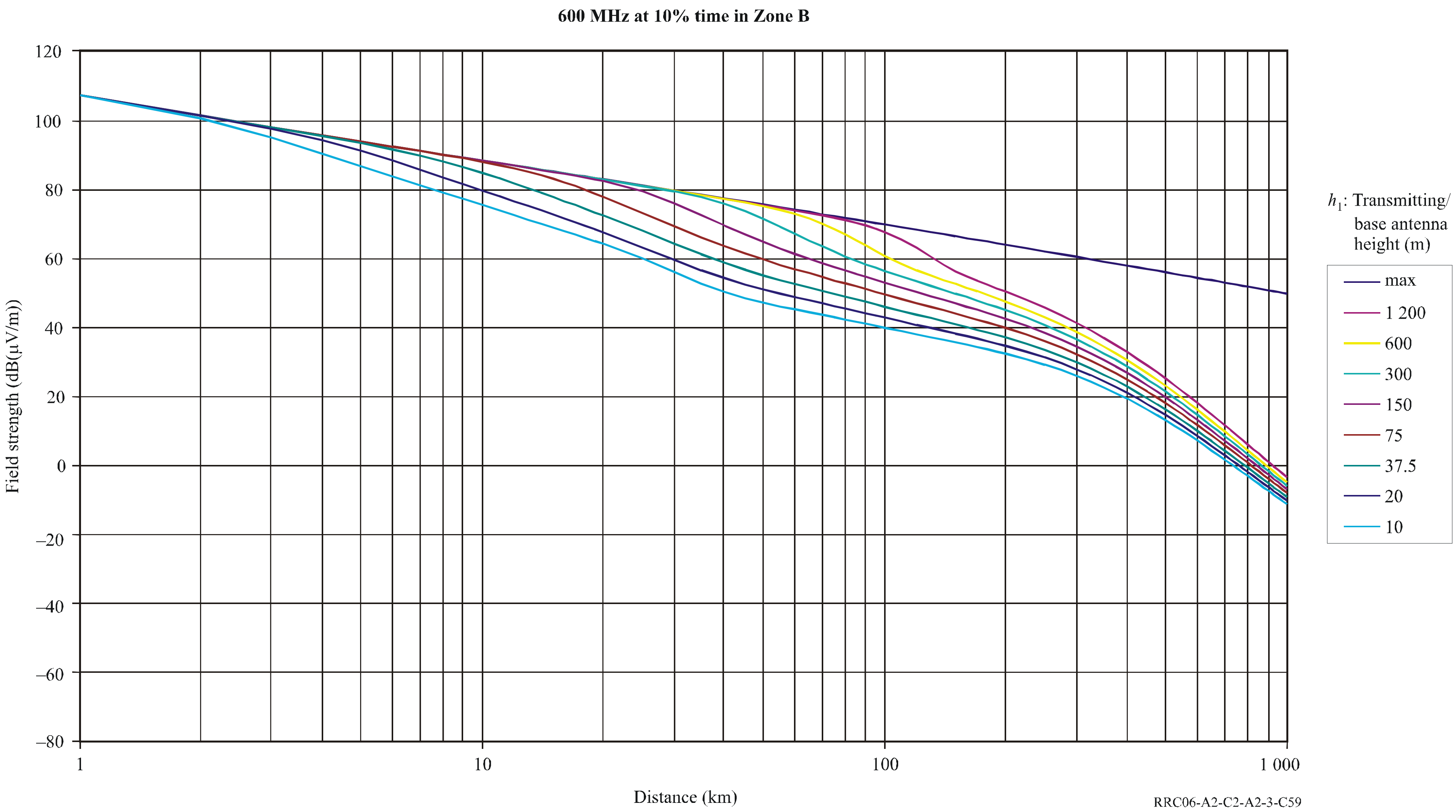
RRC06-A2-C2-A2-3-C56

100 MHz at 1% time in Zone B

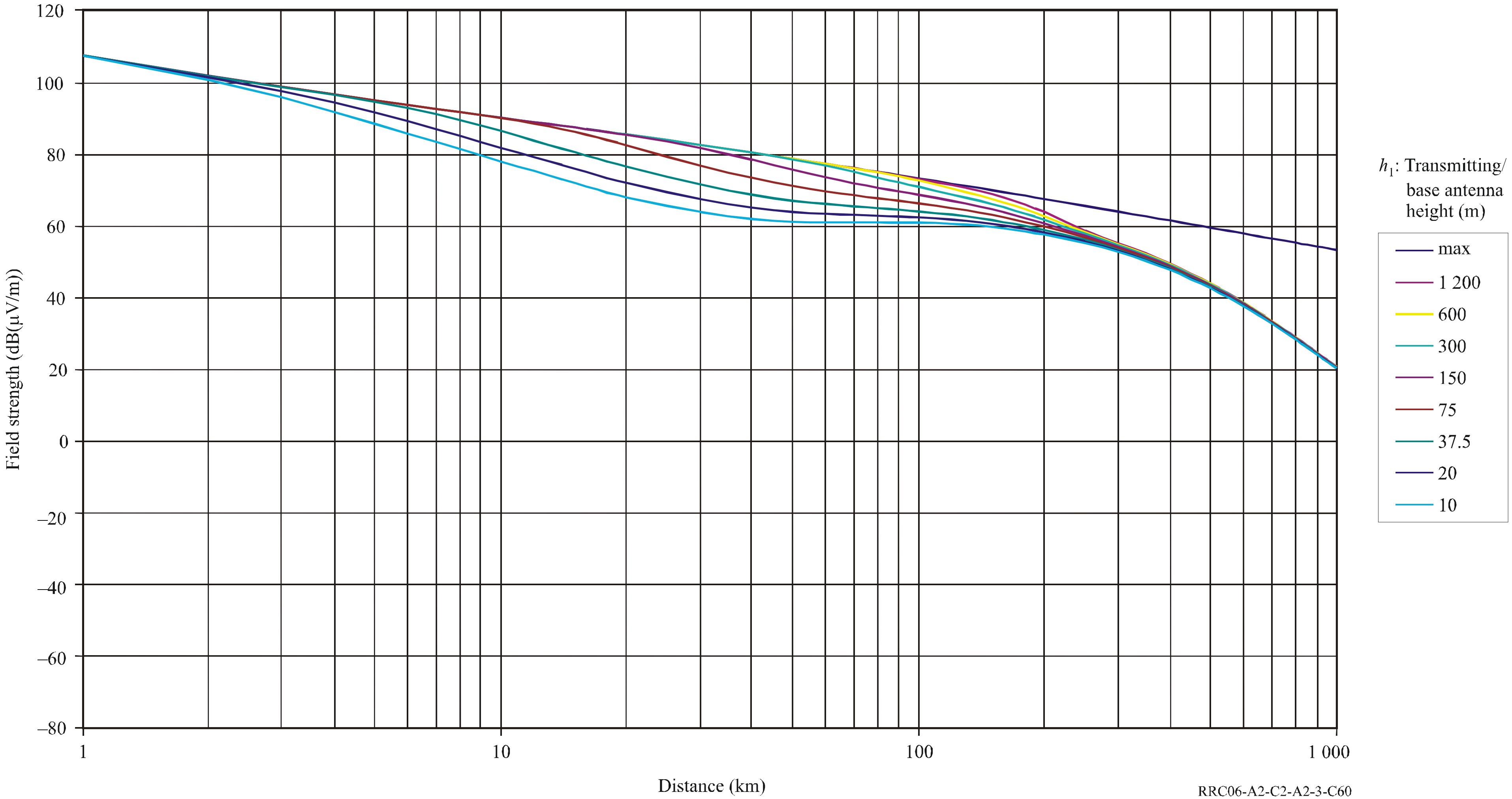




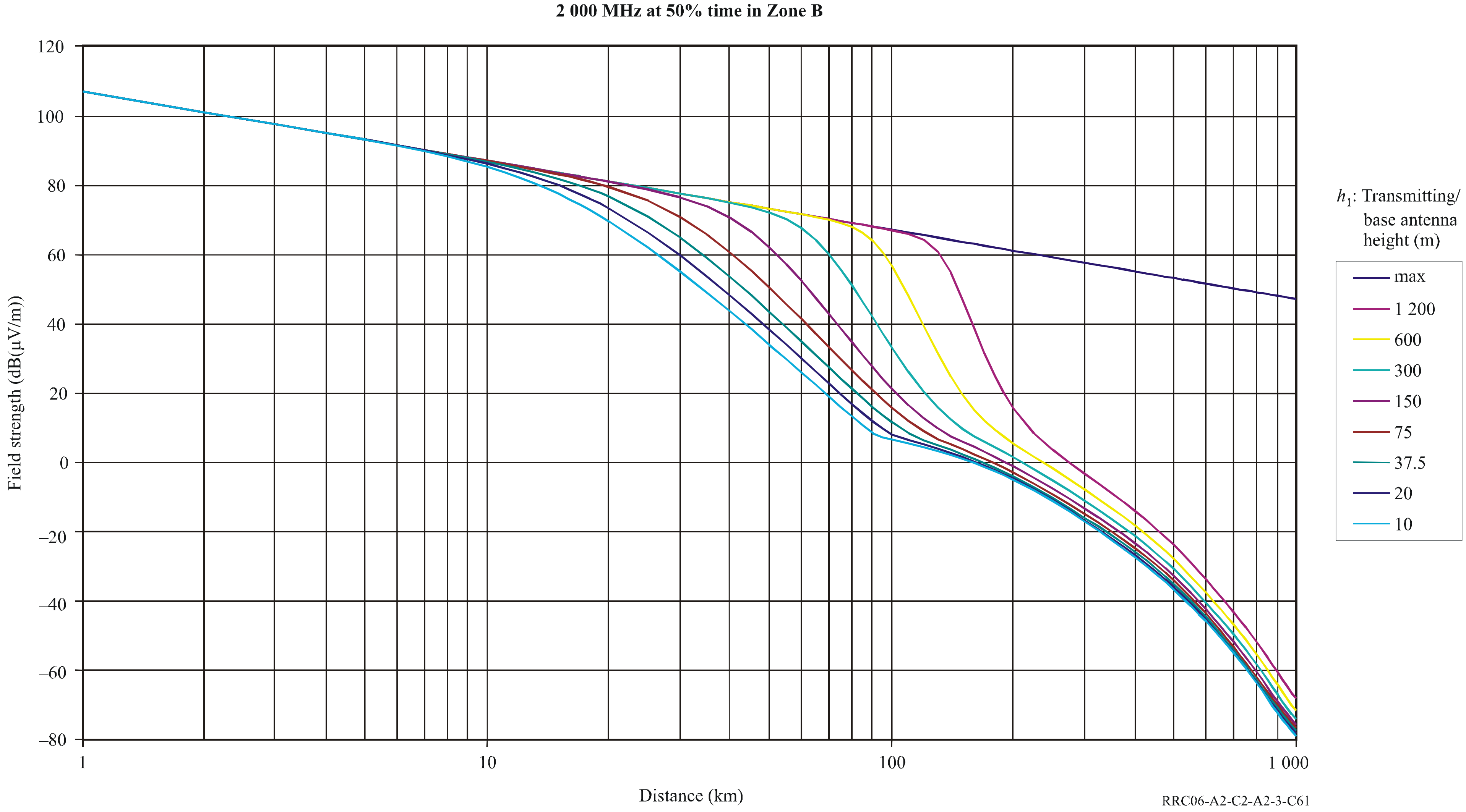
RRC06-A2-C2-A2-3-C58


600 MHz at 10% time in Zone B
120
100
80
60
40
20
0
–20
–40
–60
–80
Field strength (dB(μV/m))
1
10
100
1 000
Distance (km)
h_1: Transmitting/
base antenna
height (m)
max
1 200
600
300
150
75
37.5
20
10
RRC06-A2-C2-A2-3-C59

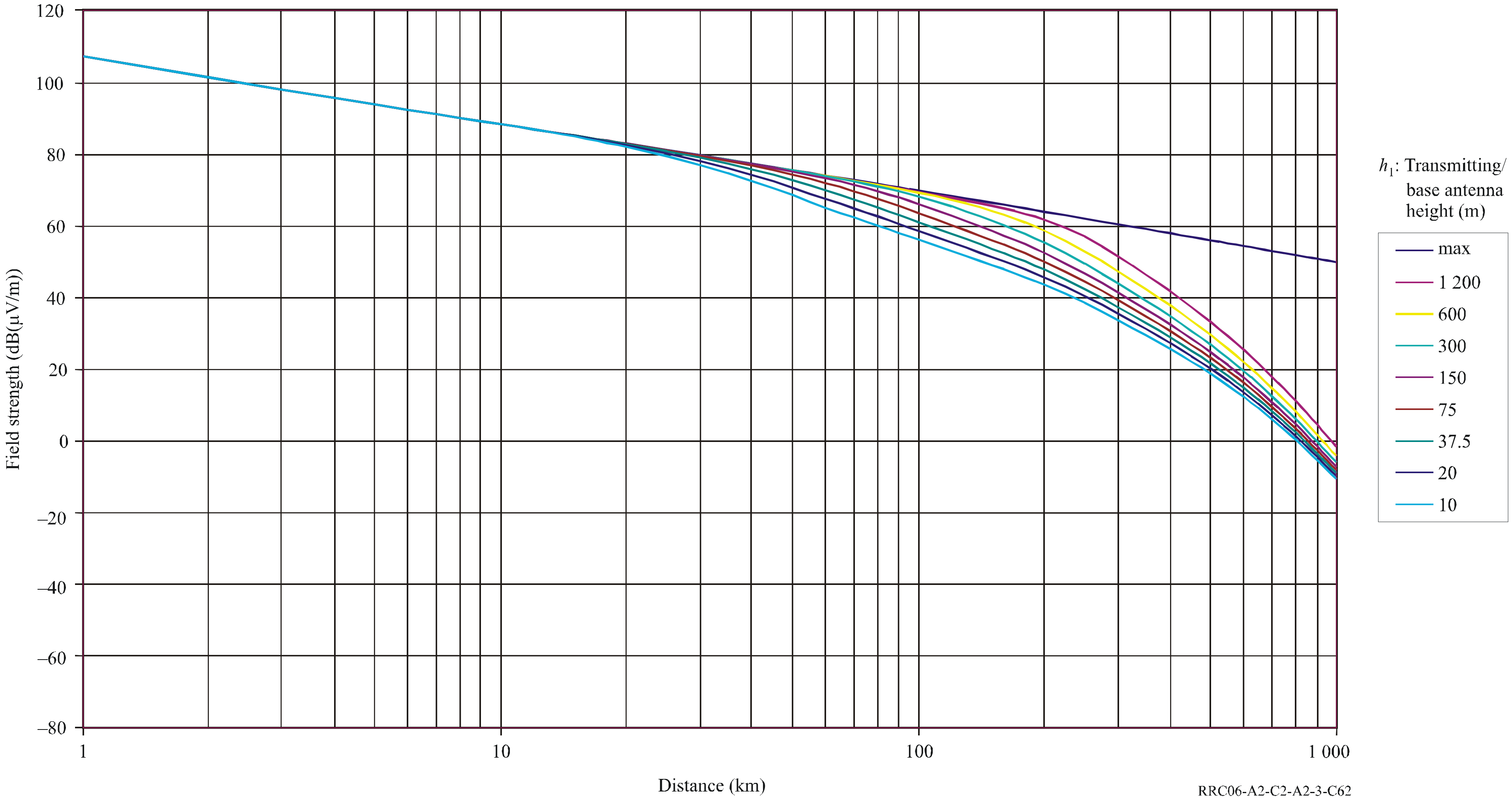
600 MHz at 1% time in Zone B



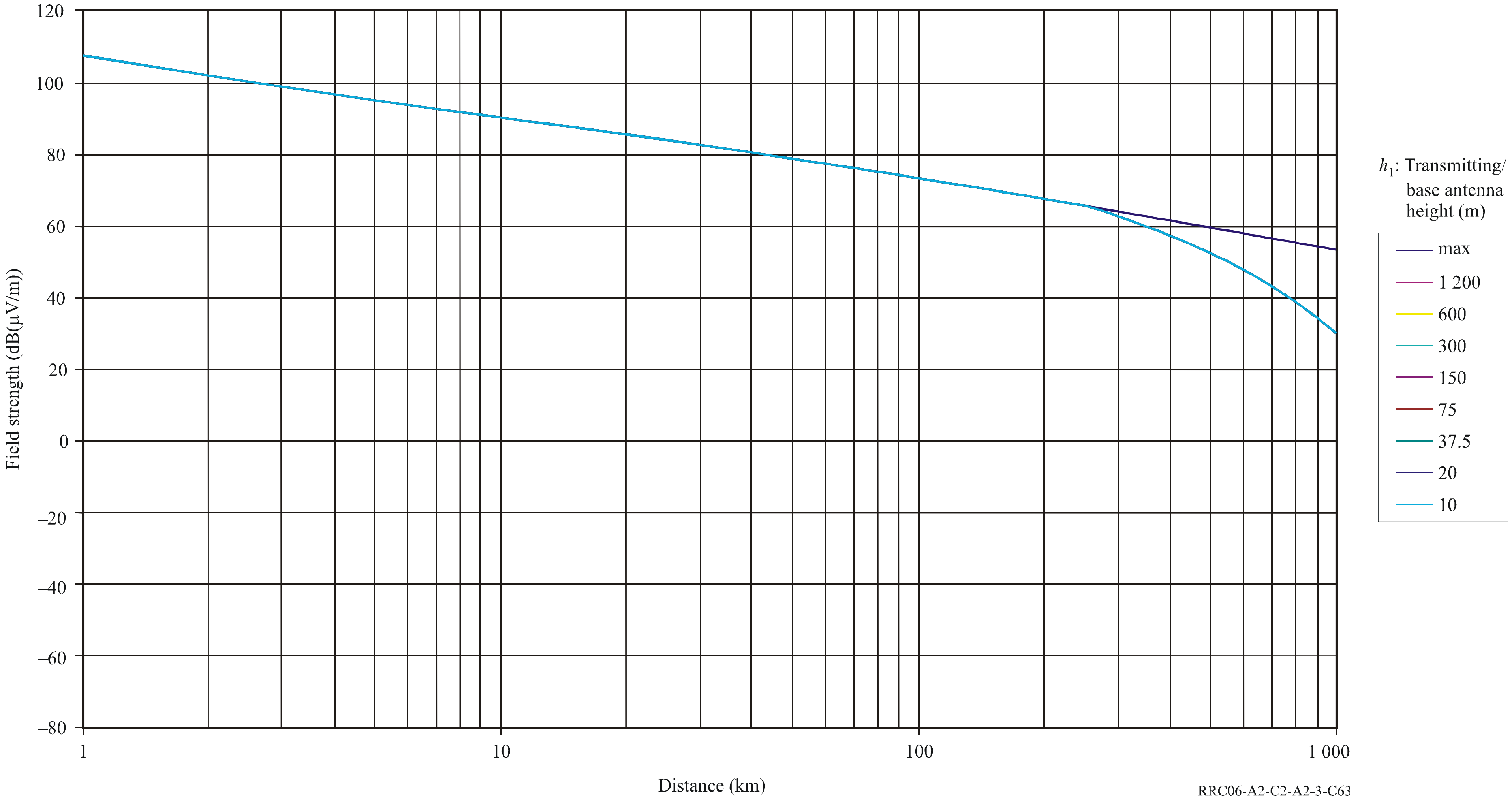
RRC06-A2-C2-A2-3-C60


2 000 MHz at 50% time in Zone B
120
100
80
60
40
20
0
–20
–40
–60
–80
Field strength (dB(μV/m))
1
10
100
1 000
Distance (km)
h1: Transmitting/ base antenna height (m)
max
1 200
600
300
150
75
37.5
20
10
RRC06-A2-C2-A2-3-C61

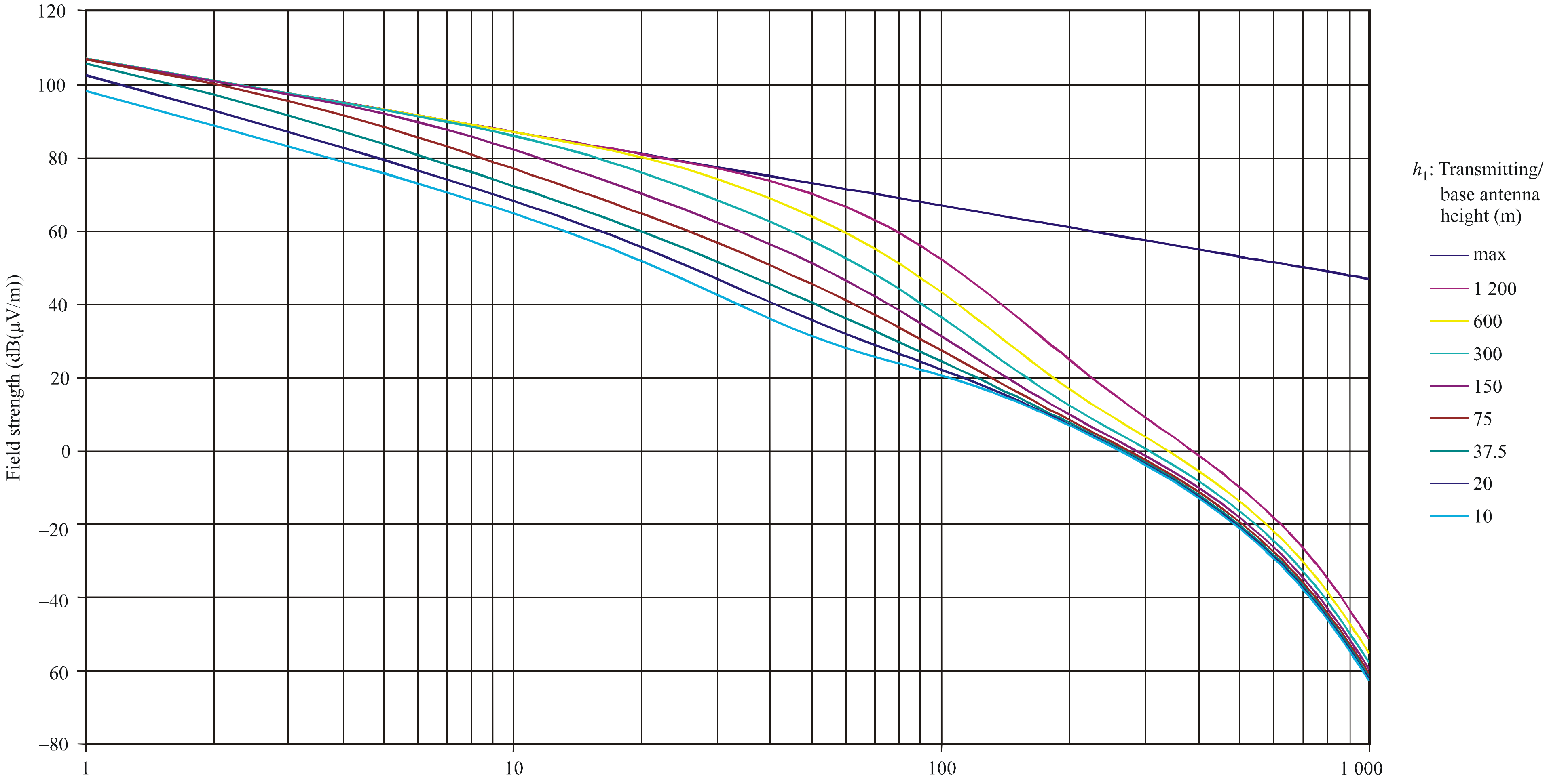
2 000 MHz at 10% time in Zone B



2 000 MHz at 1% time in Zone B

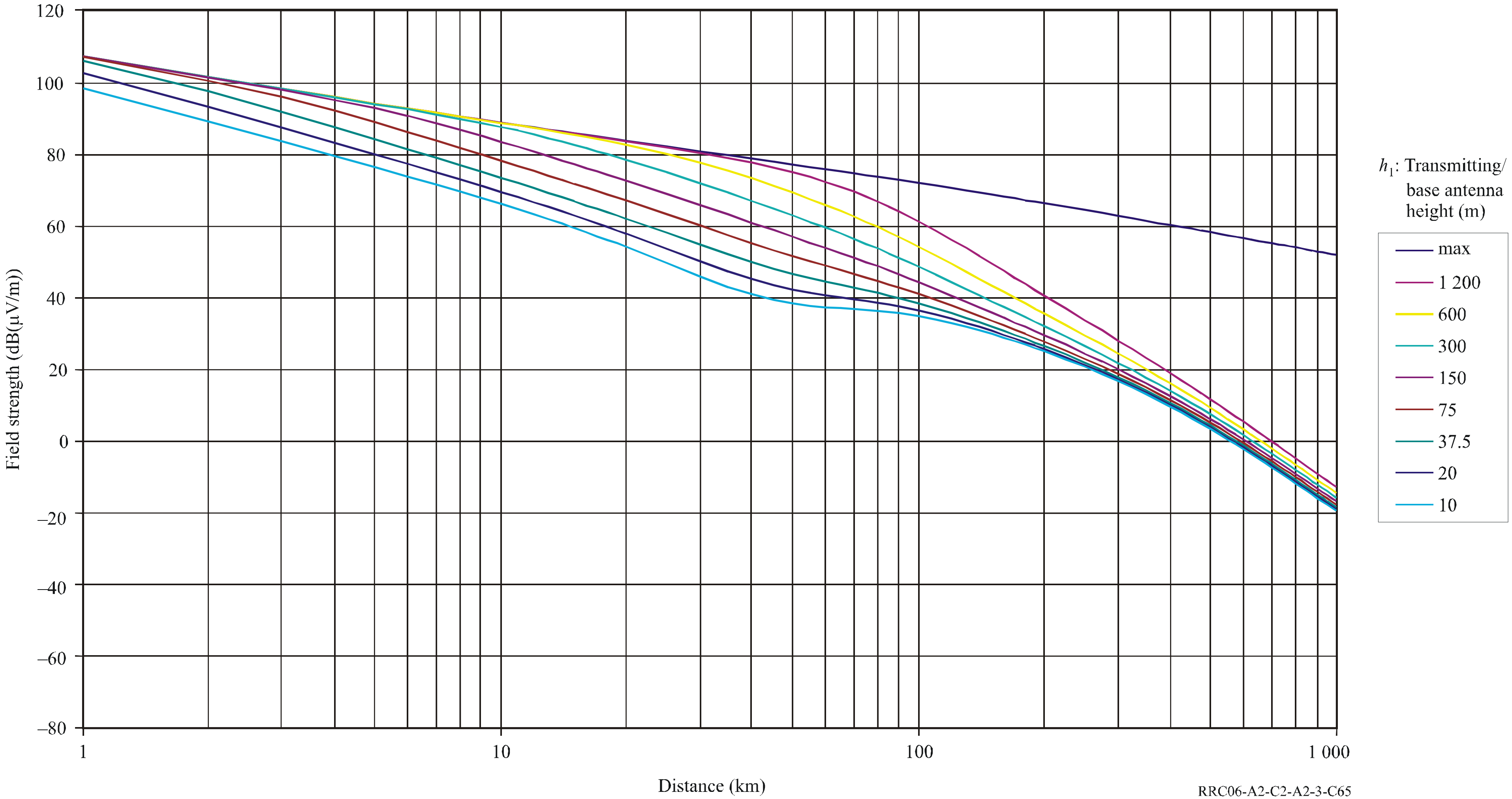


100 MHz at 50% time in Zone C

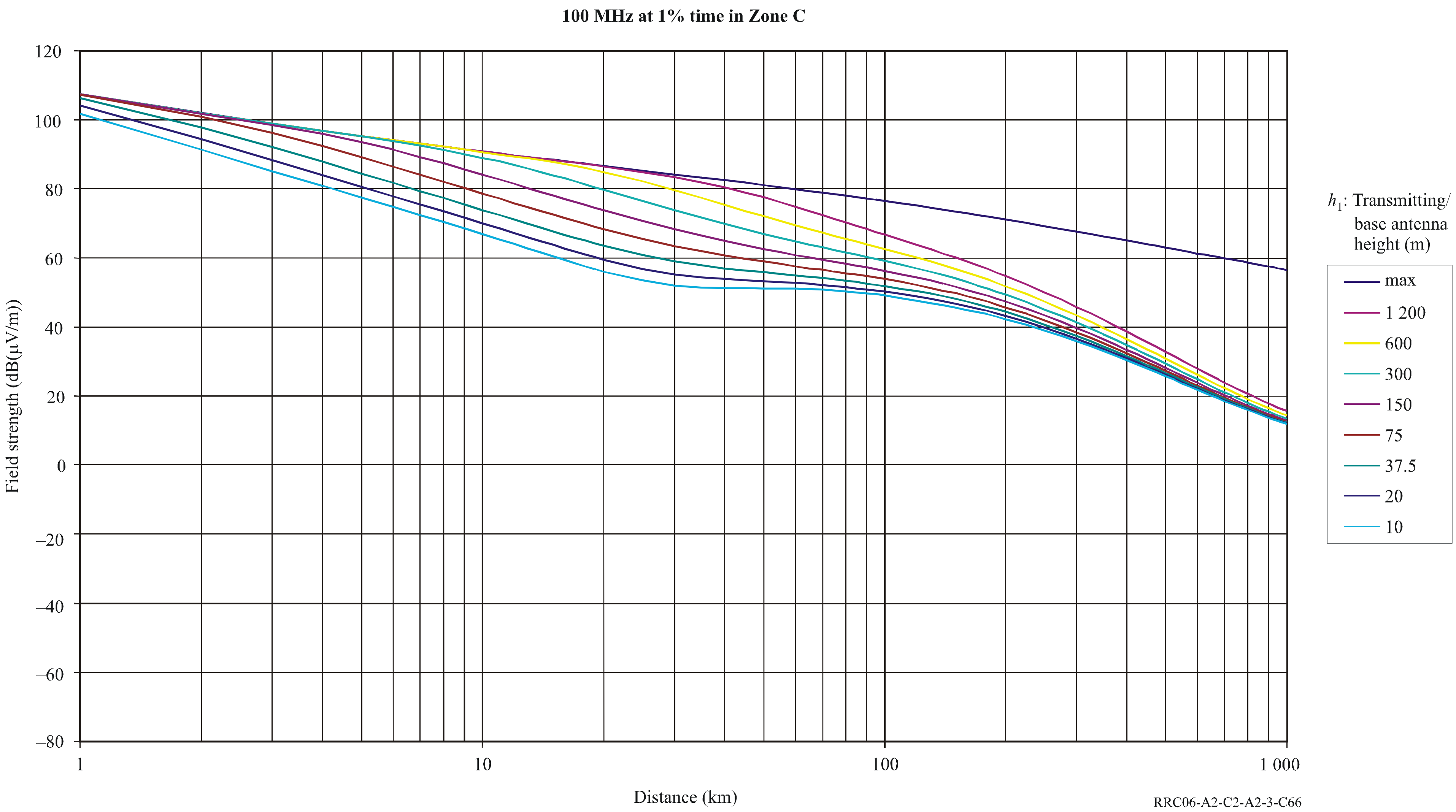


RRC06-A2-C2-A2-3-C64

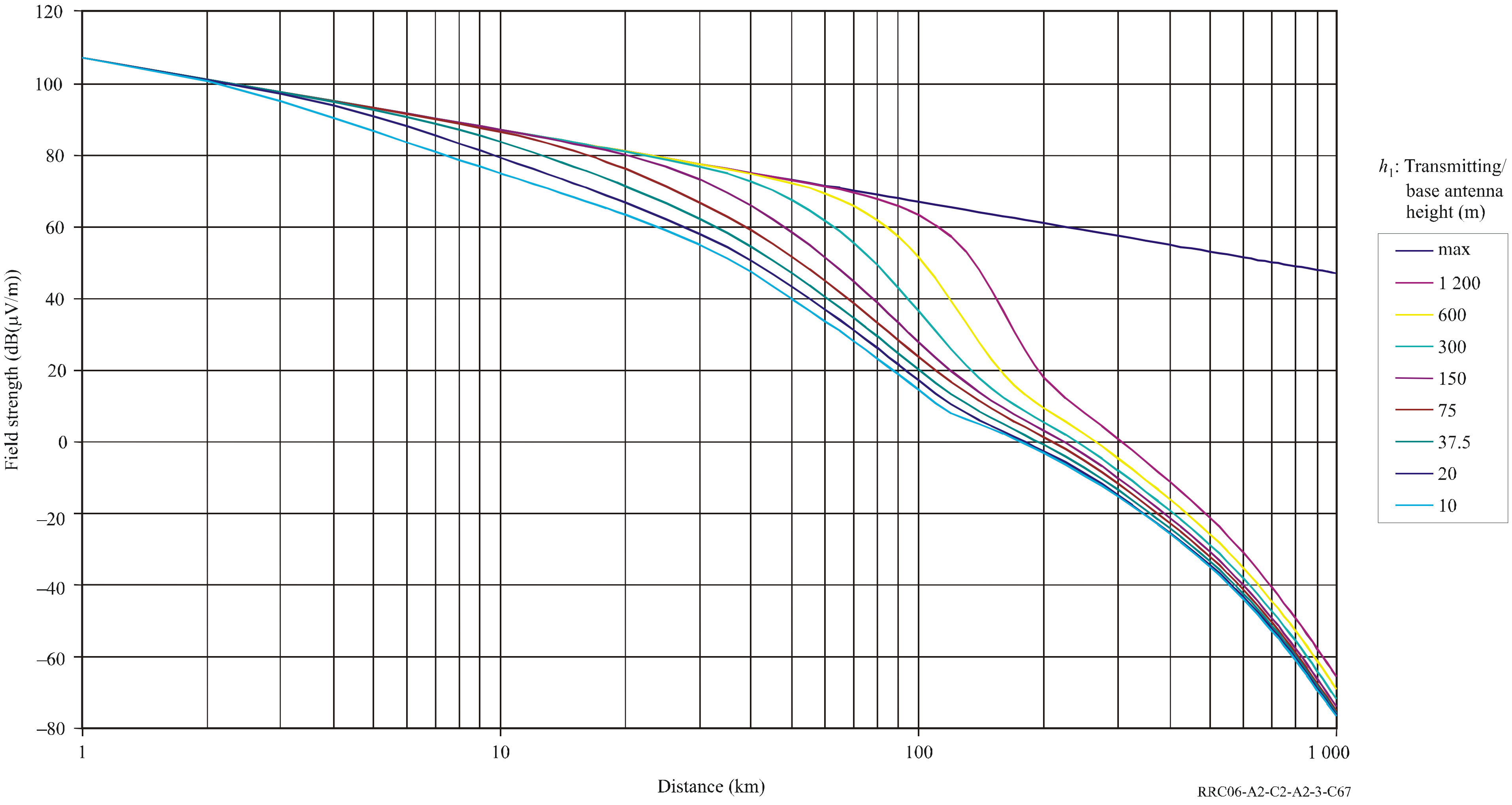
100 MHz at 10% time in Zone C



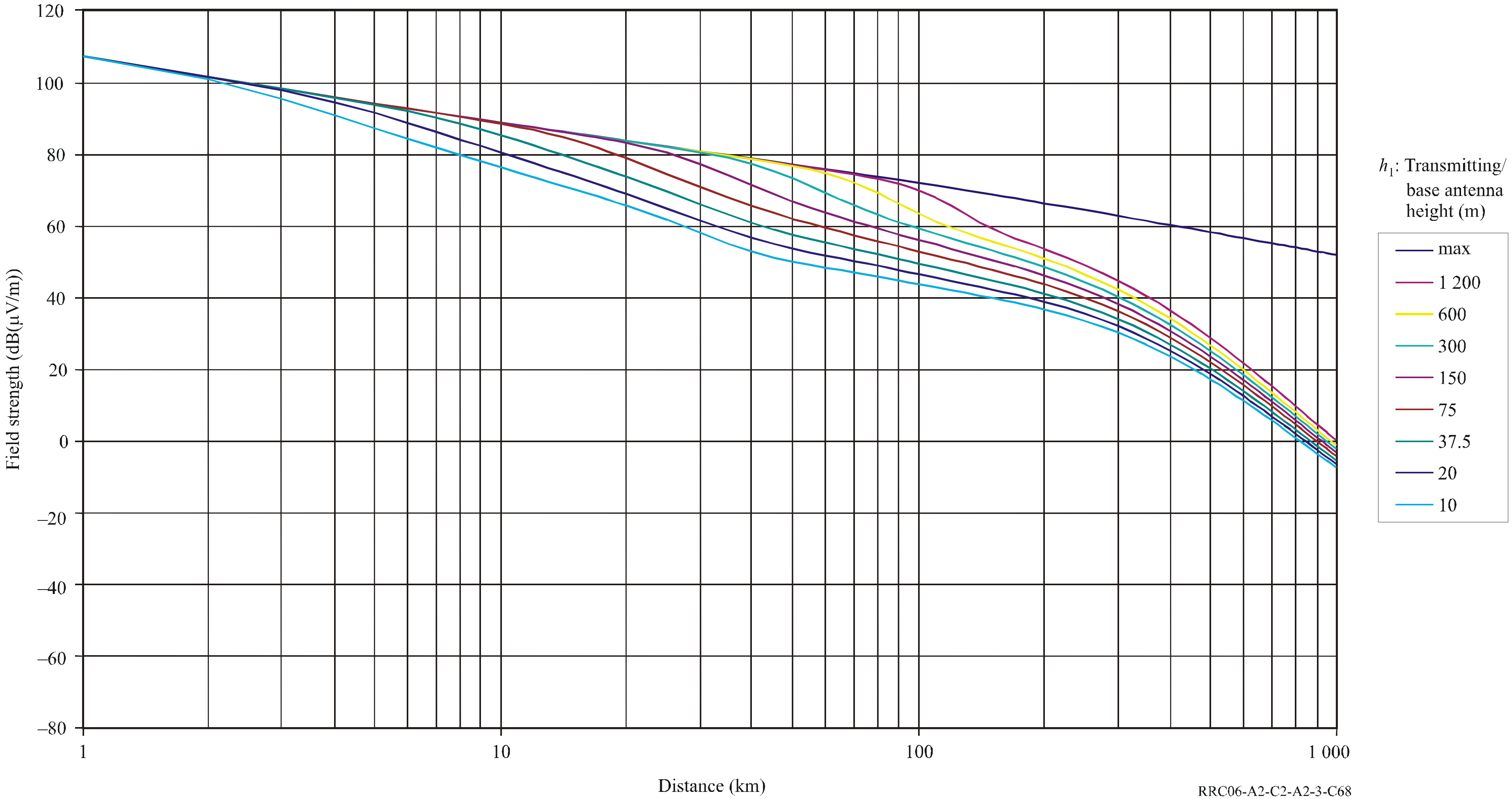
RRC06-A2-C2-A2-3-C65


100 MHz at 1% time in Zone C
120
100
80
60
40
20
0
–20
–40
–60
–80
Field strength (dB(μV/m))
1
10
100
1 000
Distance (km)
RRC06-A2-C2-A2-3-C66
h_1: Transmitting/ base antenna height (m)
max
1 200
600
300
150
75
37.5
20
10

600 MHz at 50% time in Zone C

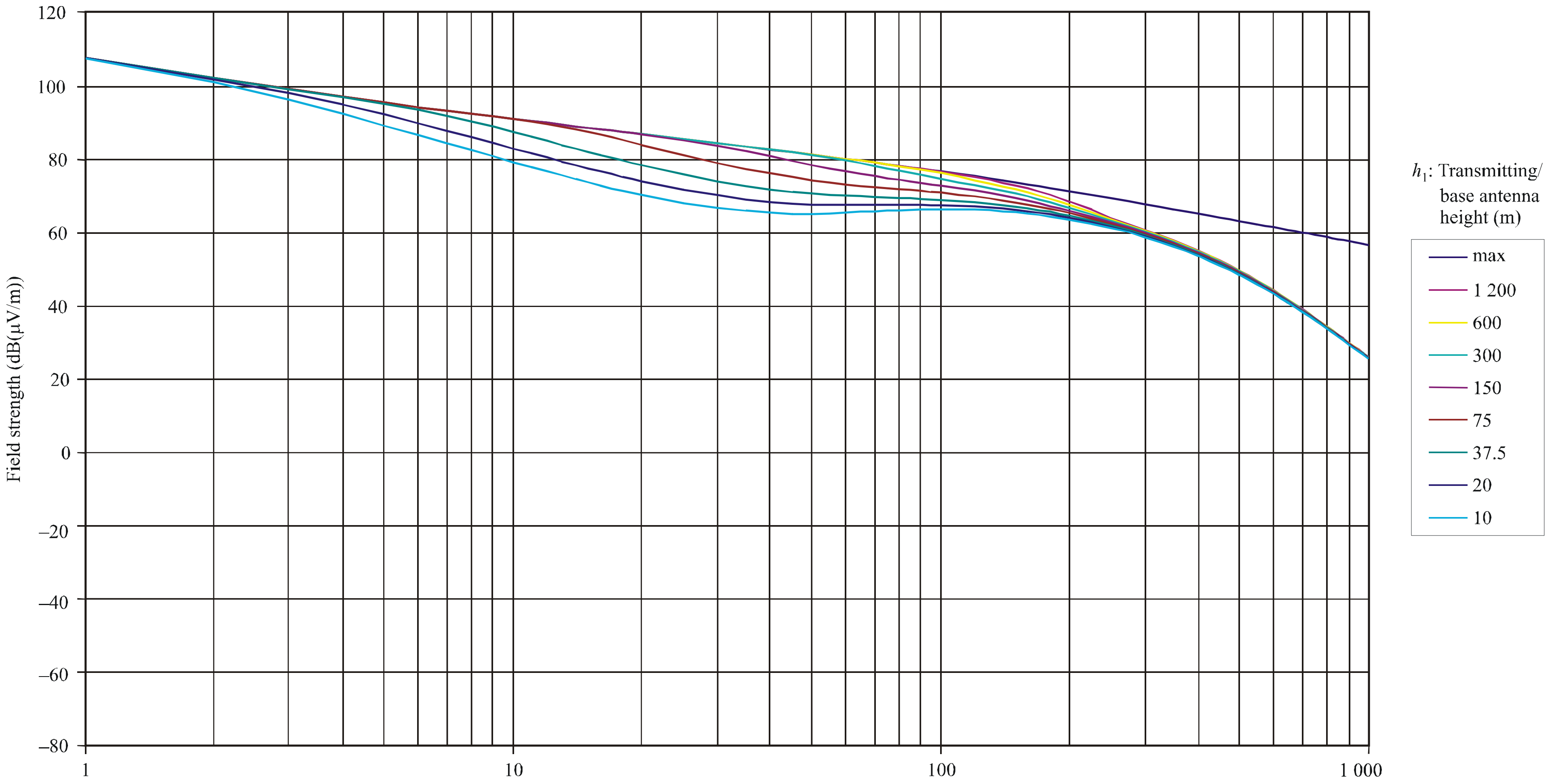


600 MHz at 10% time in Zone C



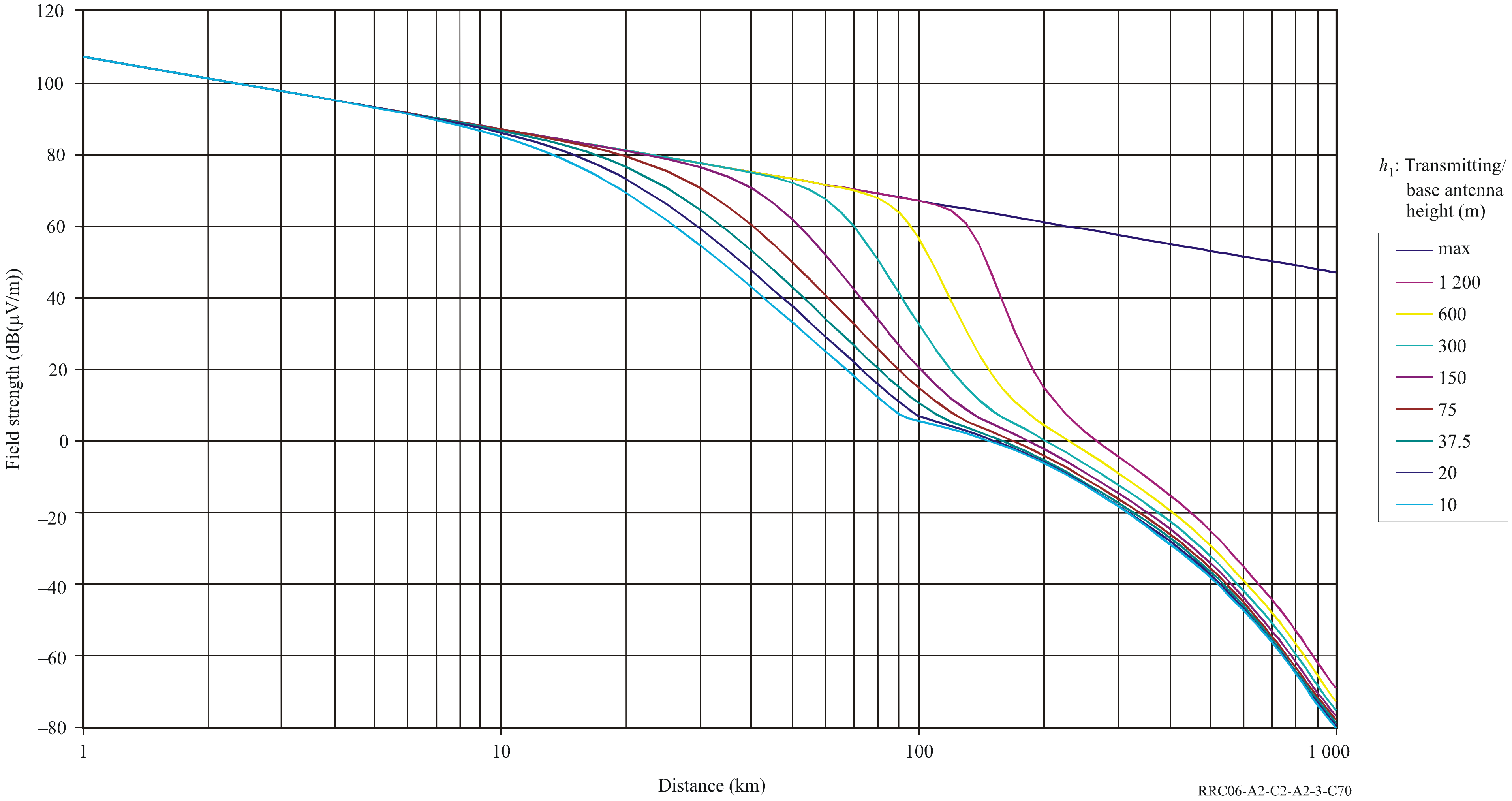
RRC06-A2-C2-A2-3-C68

600 MHz at 1% time in Zone C

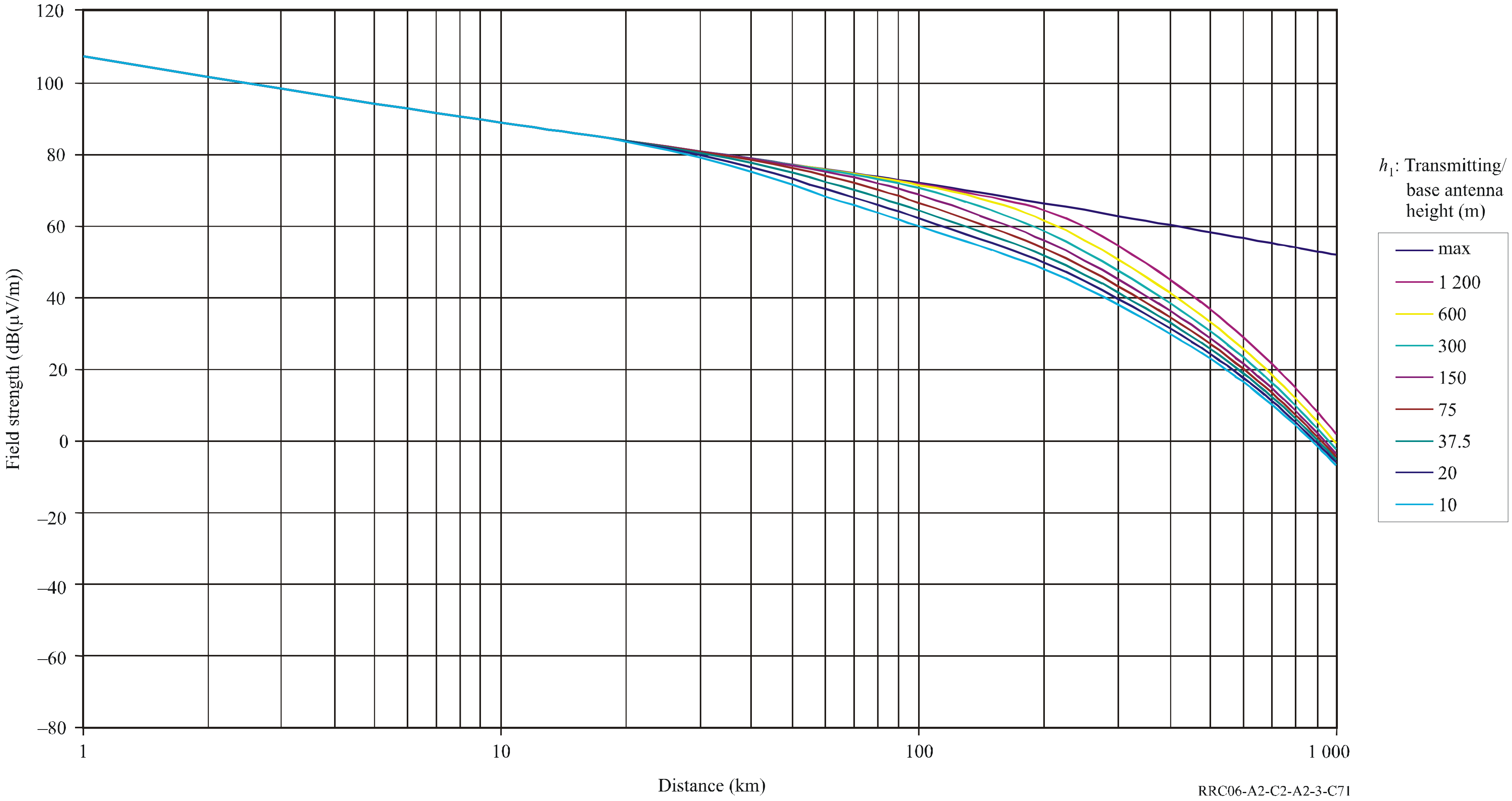


RRC06-A2-C2-A2-3-C69

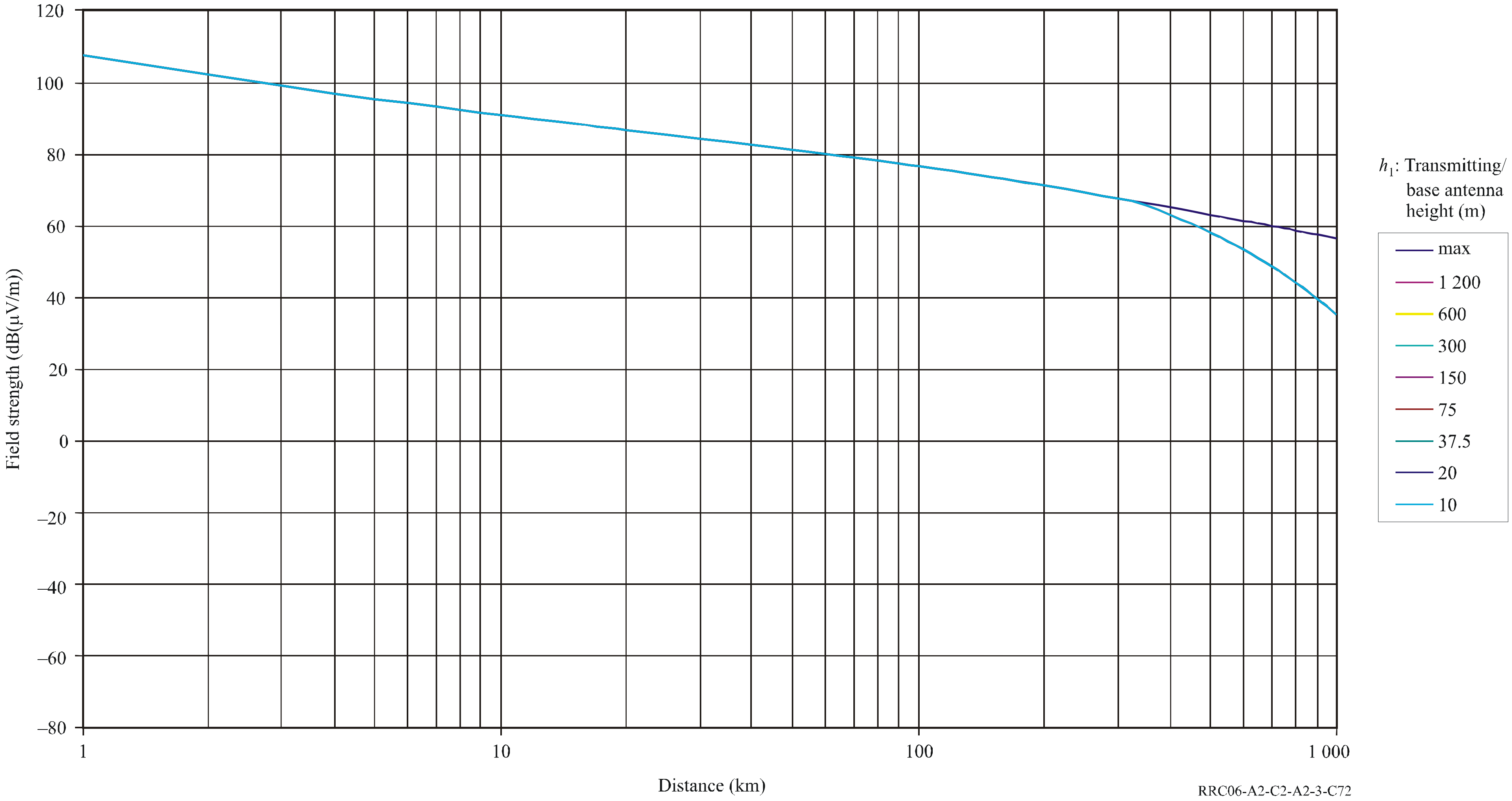
2 000 MHz at 50% time in Zone C



2 000 MHz at 10% time in Zone C

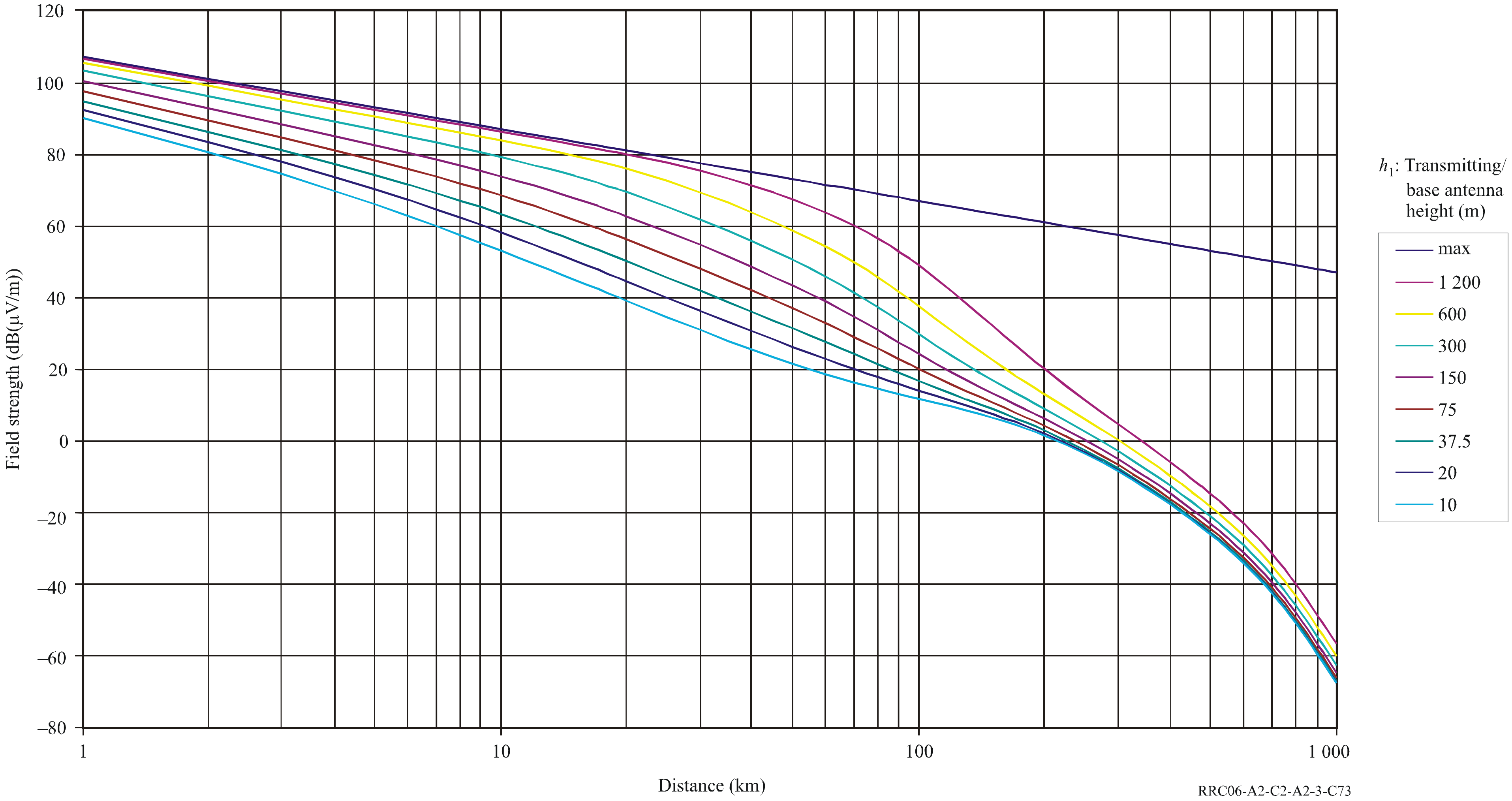


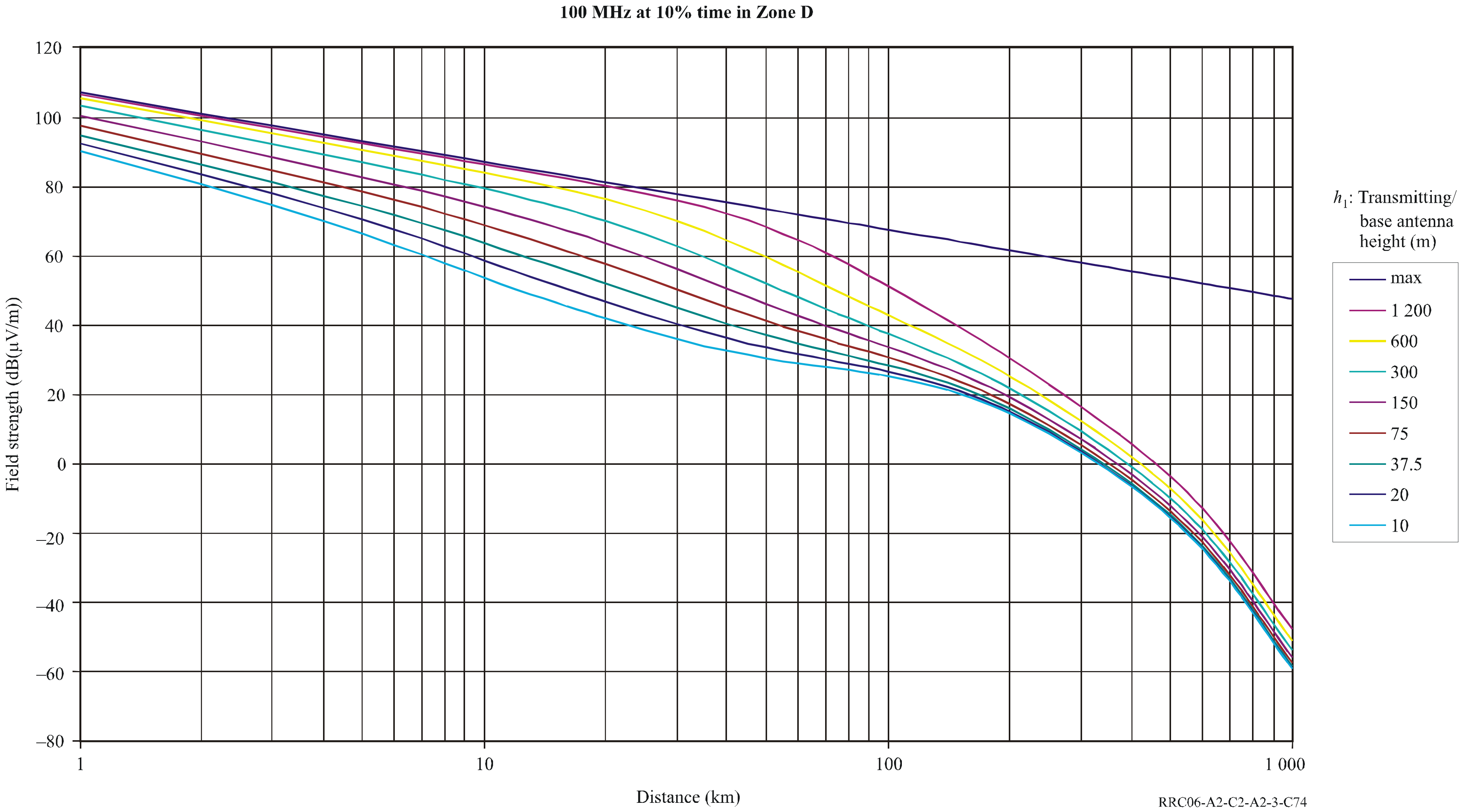
2 000 MHz at 1% time in Zone C



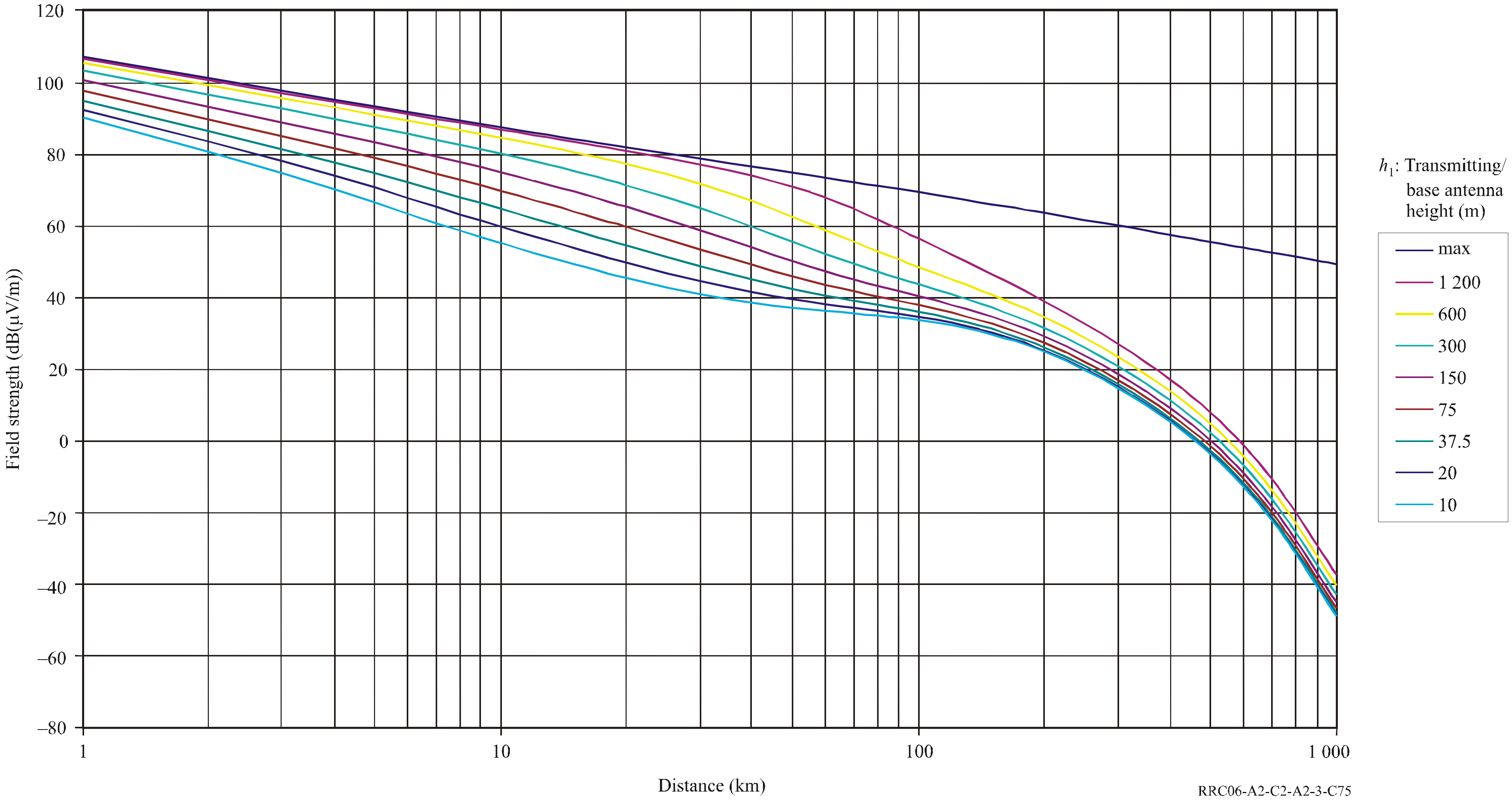
RRC06-A2-C2-A2-3-C72

100 MHz at 50% time in Zone D

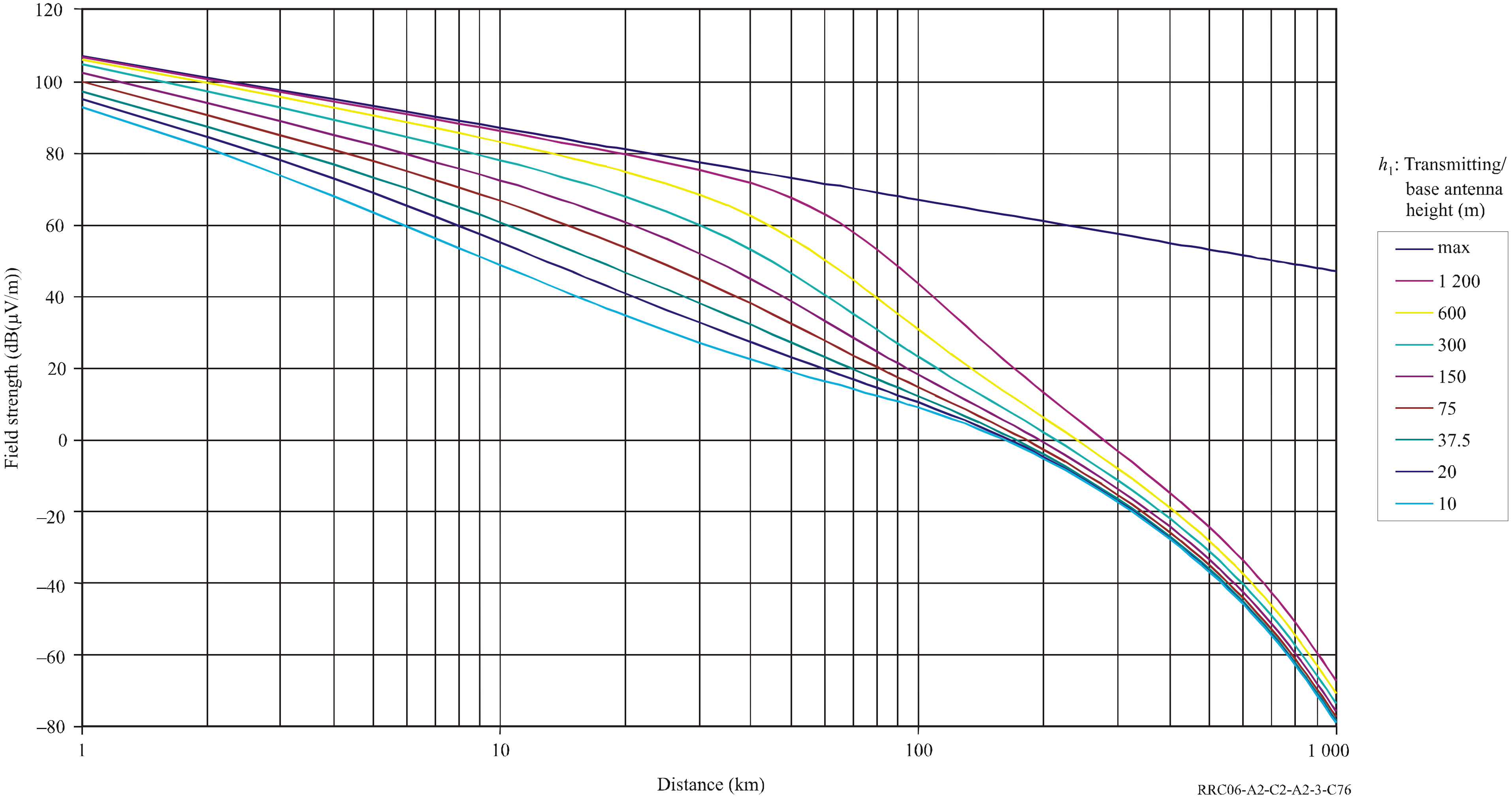



100 MHz at 10% time in Zone D
120
100
80
60
40
20
0
–20
–40
–60
–80
Field strength (dB(μV/m))
1
10
100
1 000
Distance (km)
h1: Transmitting/
base antenna
height (m)
max
1 200
600
300
150
75
37.5
20
10
RRC06-A2-C2-A2-3-C74

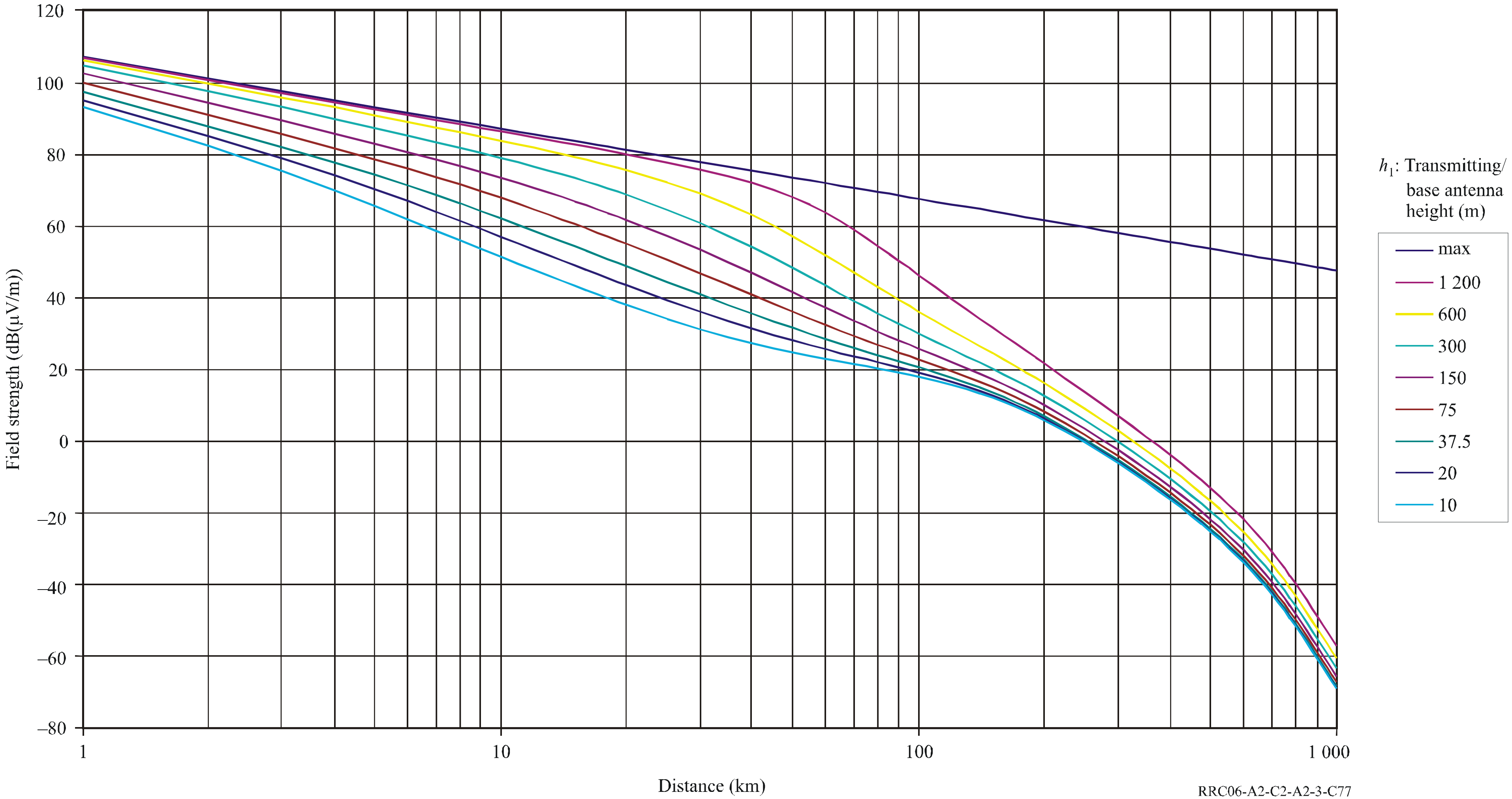
100 MHz at 1% time in Zone D



600 MHz at 50% time in Zone D

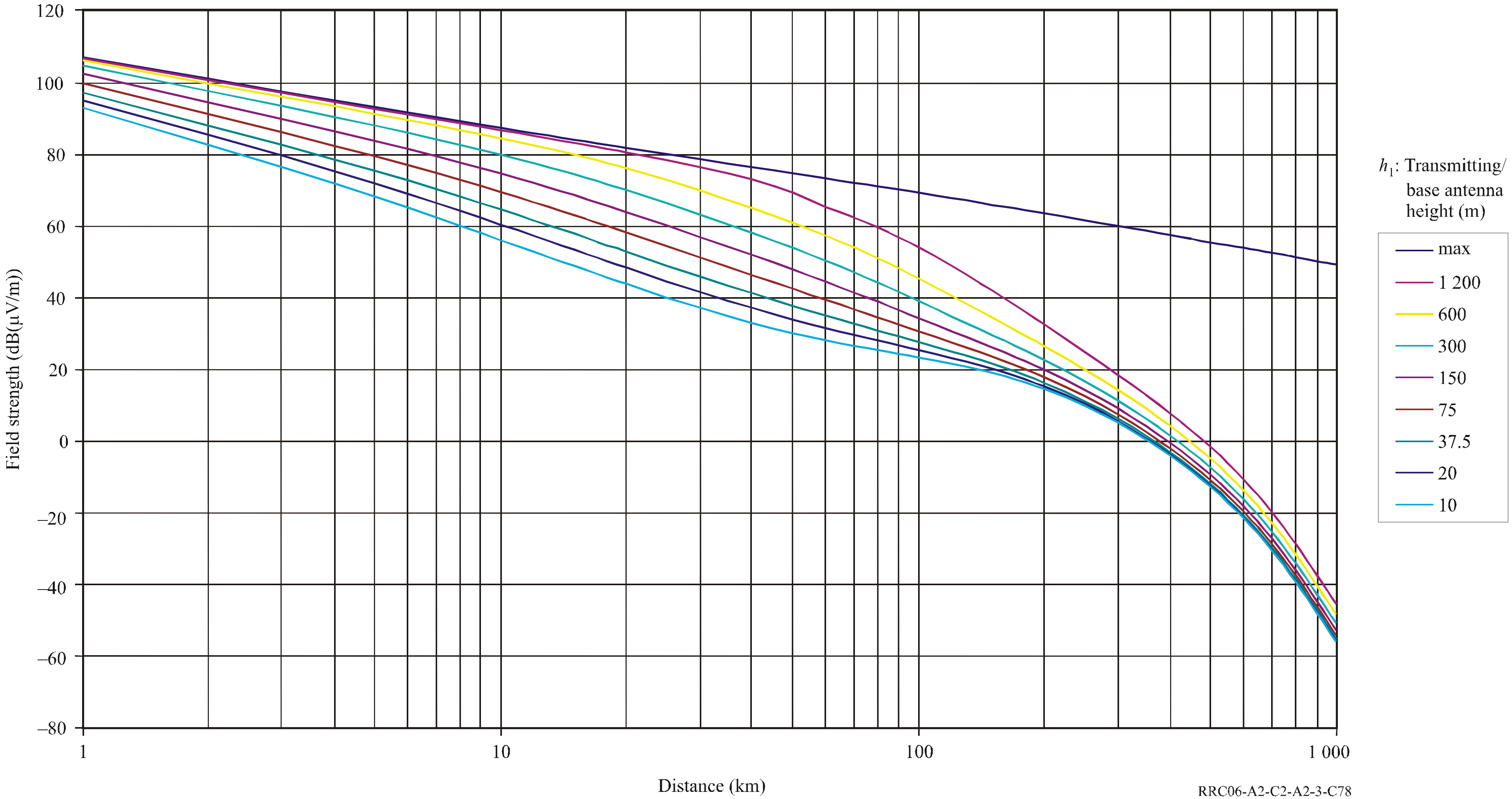


600 MHz at 10% time in Zone D



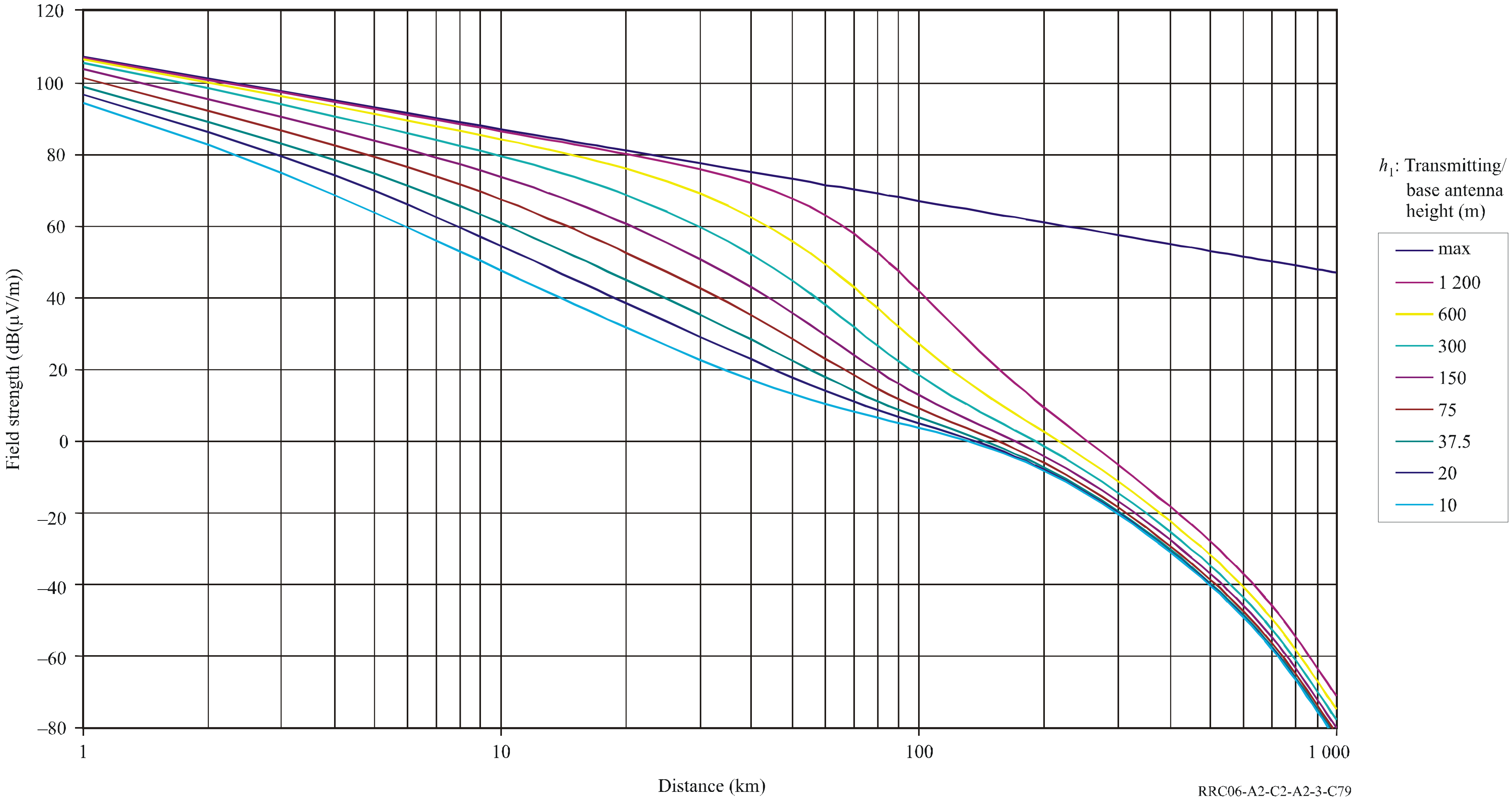
RRC06-A2-C2-A2-3-C77

600 MHz at 1% time in Zone D



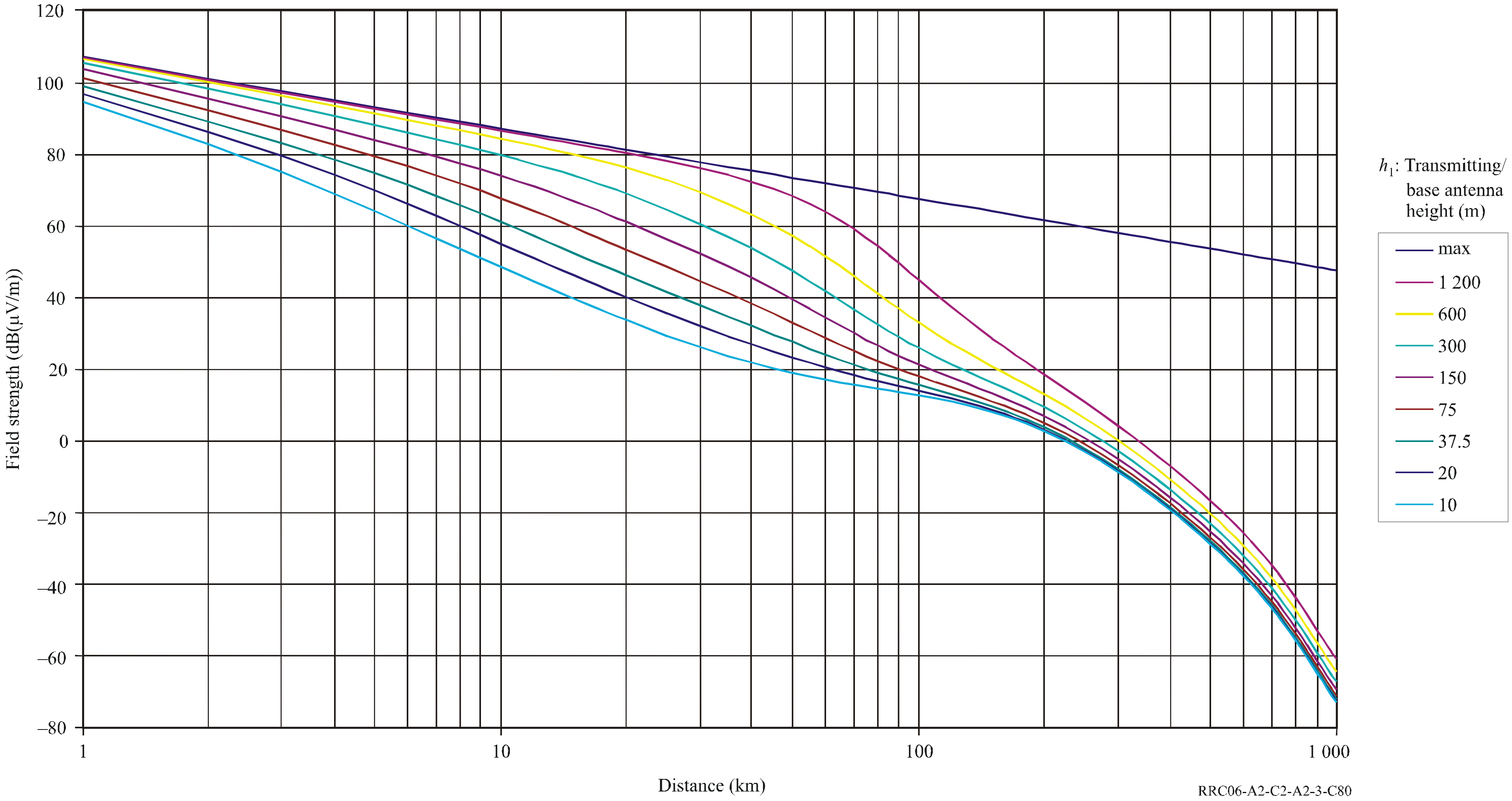
RRC06-A2-C2-A2-3-C78

2 000 MHz at 50% time in Zone D

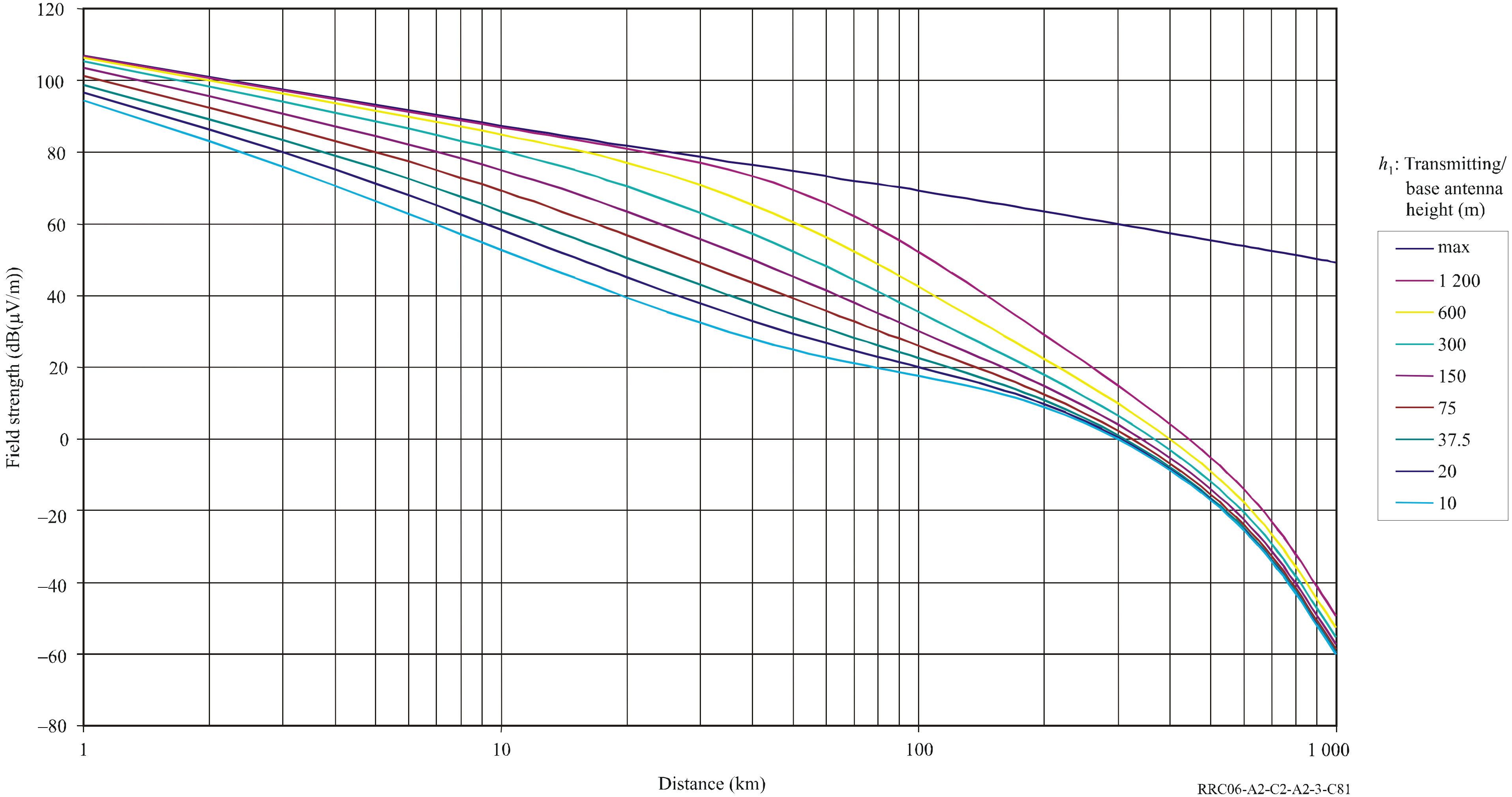


RRC06-A2-C2-A2-3-C79

2 000 MHz at 10% time in Zone D



2 000 MHz at 1% time in Zone D



CHAPTER 3
TO ANNEX 2

Technical basis for the terrestrial broadcasting service

3.1 Terrestrial broadcasting systems, frequency bands, channel spacing and channel distribution

3.1.1 Terrestrial broadcasting systems in Bands III, IV and V

The digital Plan contains T-DAB and DVB-T entries defined by the set of characteristics listed in Annex 1 to the Agreement.

Band III contains plan entries for DVB-T, for T-DAB and for analogue television assignments to be protected during the transition period.

Bands IV and V contain plan entries for DVB-T and for analogue television assignments to be protected during the transition period.

Recommendation ITU-R BT.470-7 contains detailed technical information on conventional analogue television systems.

Recommendations ITU-R BT.1306-3 and ITU-R BT.1368-6 contain detailed technical information on DVB-T. Table A.3.1-1 in Annex 3.1 to this chapter gives information about the designators and net bit rates associated with the DVB-T system variants.

Recommendations ITU-R BS.1114-5 and ITU-R BS.1660-2 contain detailed technical information on T-DAB.

The values and parameters given in this chapter have been used in the development of the Plan and shall be used for its modification.

3.1.2 Frequency bands, channel spacing and channel distribution

In Band III, different television channel spacings are used across the planning area. The relationships between the channel spacing and the channel distribution for DVB-T for the administrations from the planning area are contained in the Tables A.3.1-3 to A.3.1-5 of Annex 3.1 to this chapter.

In Bands IV and V, a single channel spacing of 8 MHz, with the upper and lower edges of each channel being the same for all countries in the planning area, is used.

In Bands IV and V, the same channel spacing and channel distribution is used for digital and analogue television. For digital television, the assigned frequency is given as the centre frequency. Table A.3.1-2 contains the relevant channel information.

Information on channel spacing and channel distribution for analogue television systems with respect to vision carrier and sound carrier is given in the Tables A.3.1-6 to A.3.1-14 of Annex 3.1 to this chapter.

For T-DAB in Band III, all administrations of the planning area use the same frequency blocks and block distribution. The assigned frequencies and block bandwidth in Band III for T-DAB are given in Table A.3.1-15 of Annex 3.1 to this chapter.

3.2 Reception modes for DVB-T and T-DAB

DVB-T was planned for a number of different reception modes, namely, fixed reception, portable (outdoor and indoor) reception and mobile reception, using a number of appropriate system variants and location probabilities.

T-DAB was planned for mobile reception and portable indoor reception.

3.2.1 Fixed reception

The reference receiving antenna height considered to be representative in calculating the field strength for fixed reception is 10 m above ground level. In order to derive the minimum median field-strength levels for Bands III, IV and V, the receiving antenna gain and feeder-loss values are given in § 3.2.1.2 and 3.2.1.3 to this chapter for reference frequencies. Minimum median field-strength levels for other frequencies are derived by interpolation as described in Annex 3.3 to this chapter.

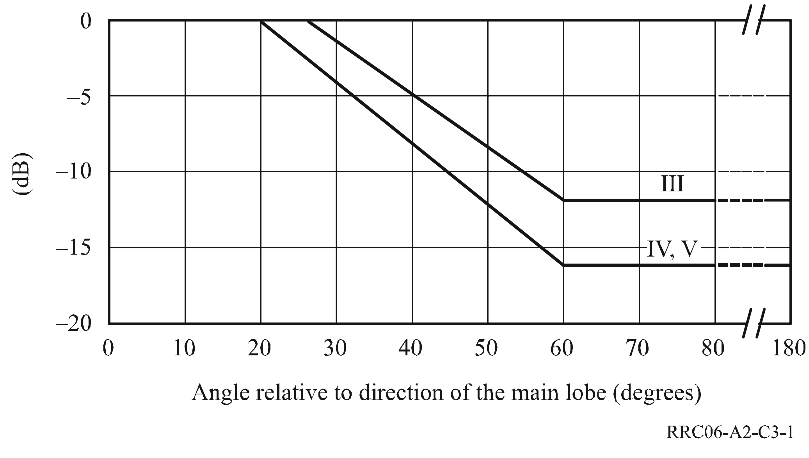
3.2.1.1 Radiation patterns for fixed receiving antennas at roof level

Standard radiation patterns for receiving antennas for Bands III, IV and V are given in Recommendation ITU-R BT.419-3 (see Fig. 3-1).

FIGURE 3-1

Directivity of receiving antennas for Bands III, IV and V

(The number of the broadcasting band is shown on the curve)



3.2.1.2 Antenna gain

The antenna gain values (relative to a half-wave dipole) used in the derivation of the minimum median equivalent field-strength values are given in Table 3-1.

TABLE 3-1

Antenna gain (relative to a half-wave dipole) in Bands III, IV and V

Frequency (MHz)	200	500	800
Antenna gain (dBd)	7	10	12

3.2.1.3 Feeder loss

The feeder-loss values used in the derivation of the minimum median wanted signal levels are given in Table 3-2.

TABLE 3-2

Feeder loss in Bands III, IV and V

Frequency (MHz)	200	500	800
Feeder loss (dB)	2	3	5

3.2.1.4 Location probability for fixed reception

For fixed reception, a location probability of 95% shall be used.

3.2.1.5 Polarization discrimination for fixed reception

It is possible to take advantage of polarization discrimination for fixed reception. However, in the case of orthogonal polarization, the combined discrimination provided by directivity and orthogonality cannot be calculated by adding together the separate discrimination values. A combined discrimination value of 16 dB shall be applied for all angles of azimuth in Bands III to V.

3.2.2 Portable and mobile reception

3.2.2.1 Considerations on height loss

For portable (indoor and outdoor) reception, a receiving antenna height of 1.5 m above ground level is used. The same receiving antenna height is also used for mobile reception. Since all field-strength calculations are for a receiving antenna height of 10 m, a height loss correction factor for an antenna height of 1.5 m shall be used in the calculation of minimum median field-strength levels.

For planning purposes, the height-loss values for portable and for mobile reception for reference frequencies are given in Table 3-3. Minimum median field-strength levels for other frequencies are derived by interpolation, as described in Annex 3.3 to this chapter.

TABLE 3-3

Height loss in Bands III, IV and V

Frequency (MHz)	200	500	800
Height loss (dB)	12	16	18

These values are those obtained for suburban coverage.

3.2.2.2 Building entry loss

Table 3-4 contains the mean values for building entry loss and the corresponding standard deviation at VHF and UHF.

TABLE 3-4

Building entry loss in Bands III, IV and V

	Building entry loss	Standard deviation
VHF	9 dB	3 dB
UHF	8 dB	5.5 dB

3.2.2.3 Antenna gain for portable reception

Recommendation ITU-R BT.1368-6 gives in its Annex 4, § 4.1, information on antennas for portable reception. For portable reception, an omnidirectional antenna shall be applied. The antenna gain (relative to a half-wave dipole) is as given in Table 3-5.

TABLE 3-5

Antenna gain (dBd) for portable reception

Band	Gain (dBd)
Band III (VHF)	–2
Band IV (UHF)	0
Band V (UHF)	0

3.2.2.4 Location probability for portable reception

For portable indoor and outdoor reception, a location probability of 95% shall be used.

3.2.2.5 Polarization discrimination for portable reception

Polarization discrimination shall not be taken into account in frequency planning for portable reception.

3.2.2.6 Antenna gain for mobile reception

The values of antenna gain given in Table 3-6 shall be used for mobile reception.

TABLE 3-6

Antenna gain (dBd) for mobile reception

Band	**Gain (dBd)**
Band III (VHF)	–2
Band IV (UHF)	0
Band V (UHF)	0

3.2.2.7 Location probability for mobile reception

For mobile reception of DVB-T, a location probability of 95% shall be used; for mobile reception of T-DAB, a location probability of 99% shall be used.

3.2.2.8 Polarization discrimination for mobile reception

Polarization discrimination shall not be taken into account for mobile reception.

3.2.3 Reference planning configurations

A planning configuration describes relevant technical aspects of a broadcasting service implementation. The various aspects of a planning configuration, for the example of DVB-T, are summarized in Table 3-7.

TABLE 3-7

Aspects of DVB-T planning configurations

Aspect	**Element**
Reception mode	Fixed Portable outdoor Portable indoor Mobile
Coverage quality (in terms of percentage of locations)	70% 95% 99%
Network structure	MFN (single transmitter) SFN Dense SFN
DVB-T system variant	From QPSK 1/2 to 64-QAM 7/8
Frequency band	Band III Band IV Band V

Further information on reference planning configurations is given in Annex 3.5 to this chapter.

3.3 T-DAB and DVB-T receiver noise figure

A receiver noise figure of 7 dB shall be used for both DVB-T and T-DAB.

3.4 Planning criteria

For the development of the Plan in Bands III, IV and V, the following planning criteria have been used; they shall also be used for the modification of the Plan:

– minimum median field strengths;

– nuisance field strengths;

based on:

– *C*/*N* values;

– protection ratios;

– building entry loss for indoor reception;

– location correction factors and the percentage time;

– possibly, the constraints of the spectrum mask applied to a digital transmission.

3.4.1 *C*/*N* values for planning

For DVB-T, the *C/N* values are based on current DVB-T receivers in non-hierarchical modes. These *C*/*N* values, for different DVB-T system variants and for different reception conditions, are indicated in Table A.3.2-1 in Annex 3.2 to this chapter.

The *C*/*N* values given for the Ricean channel shall be used for the fixed reception case, and those for the Rayleigh channel shall be used for the portable and mobile reception cases.

In addition, the reference *C*/*N* values for the three DVB-T reference planning configurations (RPCs) are found in Table A.3.5-1 in Annex 3.5 to this chapter.

For T-DAB, a *C*/*N* value of 15 dB is derived from Recommendation ITU-R BS.1660-2.

In the case of T-DAB, portable indoor and mobile reception modes are relevant for planning purposes. A unique reference *C*/*N* value of 15 dB is considered for both T-DAB reception modes, as indicated in Table A.3.5-2 in Annex 3.5 to this chapter for the RPCs.

3.4.2 Protection ratios

The protection ratios are summarized in the tables in Annex 3.3 to this chapter.

For DVB-T (vis-à-vis DVB-T, T-DAB and analogue television, and conversely), the protection ratios given in Annex 3.3 to this chapter are based on those developed in Recommendation ITU-R BT.1368-6, especially Annex 2 thereto – Planning criteria for DVB-T digital television system in the VHF/UHF bands.

In cases of a partial overlap between T-DAB and DVB-T (8 MHz), the protection ratio of complete overlap shall be used.

For T-DAB vis-à-vis T-DAB, the protection ratio of 15 dB shall be used.

For T-DAB interfered with by DVB-T or analogue television, the protection ratios in Annex 3.3 to this chapter shall be used. These protection ratios are based on Recommendation ITU-R BS.1660-2.

For analogue television interfered with by T-DAB or analogue television, the protection ratios in Recommendation ITU-R BT.655-7 shall be used.

3.4.3 Minimum signal levels for digital broadcasting systems

For the different reception modes, the field strengths required to provide the desired location probability for reception of the wanted signal can best be compared by using a reference receiving antenna height, location probability and percentage time, as follows:

- Receiving antenna height: 10 m above ground level
- Location probability: 50%
- Percentage time: 50%.

The field strengths corresponding to these conditions are termed the "minimum median field strengths", referred to as E_{med} in Annexes 3.2, 3.4 and 3.5 to this chapter. These field strengths correspond to the minimum signal levels needed to overcome natural and man-made noise (in the absence of interference from other transmitters) known also as the "minimum usable field strengths".

3.4.4 Minimum signal levels for analogue broadcasting systems

For analogue TV, the minimum field strength and the reference parameters for field-strength representation in Recommendation ITU-R BT.417-5 shall be used.

3.4.5 Location correction factors and percentage time

Due to the sharp degradation of quality that occurs when the required carrier-to-interference ratio or the required carrier-to-noise ratio is not attained, a higher percentage of location probability is required for the wanted field strengths (and lower percentage for the interfering signals). Therefore, a correction to the value derived from the tables and curves in Chapter 2 to Annex 2 of the Agreement is required, termed location correction factor.

Compatibility calculations for the digital broadcasting systems are based on propagation curves for 50% time for the wanted field strength, and 1% for the unwanted field strength, as given in Chapter 2 of Annex 2 of the Agreement.

Compatibility calculations for analogue television systems are based on propagation curves as given in Chapter 2 of Annex 2 of the Agreement. Tropospheric or continuous interference is treated as described in Annex 2 to Recommendation ITU-R BT.655-7.

3.4.5.1 Signal variations at outdoor locations

Recommendation ITU-R P.1546-2 gives a standard deviation macro-scale of 5.5 dB for wideband signals. This value shall be used to determine the field-strength variation at outdoor locations, which is taken into account by means of the "location correction factor".

The location correction factors for macro-scale variations (see formulas in Annex 3.4 to this chapter) are given in Table 3-8.

TABLE 3-8

Coverage target (location probability) (%)	Location correction factor (VHF and UHF) (dB)
99	13
95	9
70	3

3.4.5.2 Signal variations at indoor locations

The field-strength variation at indoor locations is the combined result of the outdoor variation and the variation due to building attenuation. For VHF, where the signal standard deviations are 5.5 dB and 3 dB respectively, the combined value is 6.3 dB. For UHF, where both signal standard deviations are 5.5 dB, the combined value is 7.8 dB.

The location correction factor for macro-scale variations at indoor locations given in Table 3-9 shall be used.

TABLE 3-9

Coverage target (location probability) (%)	Location correction factor (VHF) (dB)	Location correction factor (UHF) (dB)
95	10	13
70	3	4

3.4.5.3 Combined location correction factor

The combined location correction factor is used to convert the wanted and nuisance field strengths which refer to 50% of location, to the value corresponding to the percentage of location needed for the wanted service.

The combined location correction factor shall be calculated as follows:

$$CF = \mu\sqrt{\sigma_w^2 + \sigma_n^2} \qquad \text{dB}$$

where:

σ_w: standard deviation of location variation for the wanted signal (dB)

σ_n: standard deviation of location variation for the nuisance signal (dB)

μ: distribution factor being 0.52 for 70% locations, 1.64 for 95% locations and 2.33 for 99% locations and can be calculated as follows:

$$\mu = Q_i(1 - x/100)$$

where:

Q_i: multiplying factor given in § 2.1.12 of Annex 2.1 to Chapter 2 of Annex 2 of the Agreement

x: percentage of location for which protection is required.

3.5 Power-sum method

The power sum is the logarithmic value of the sum of the individual field strengths expressed as arithmetic powers:

$$\text{Sum} = 10\ \log\left(\sum 10^{\frac{E_i}{10}}\right)$$

where E_i represents the individual field strengths (dB(μV/m)).

3.6 Spectrum mask

For modifications to the Plan, a spectrum mask with a performance at least equivalent to that of the non-critical mask for both T-DAB and DVB-T shall be used.

The spectrum masks for sensitive cases may be used to facilitate coordination between administrations.

3.6.1 Spectrum mask for T-DAB

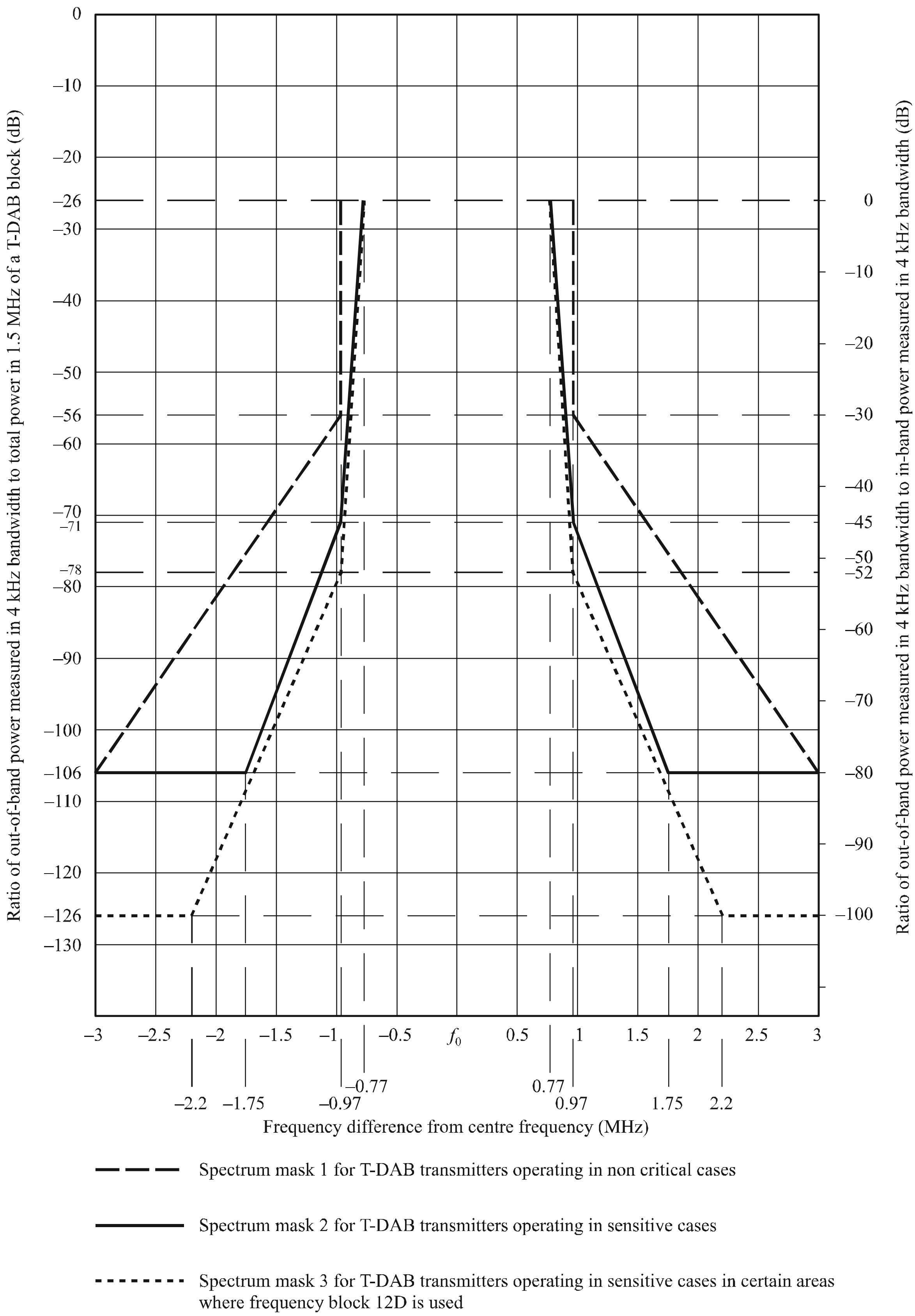
The out-of-band radiated signal spectrum in any 4 kHz band shall be constrained by one of the masks defined in Fig. 3-2 and the associated Table 3-10.

The dashed line defines the spectrum mask for T-DAB transmitters operating in non-critical cases (spectrum mask 1). The solid line defines the spectrum mask for T-DAB transmitters operating in sensitive cases (spectrum mask 2) and the dotted line mask defines the spectrum mask for T-DAB transmitters operating in sensitive cases in certain areas where frequency block 12D is used (spectrum mask 3)[2].

[2] This mask may be used for other frequency blocks, where there is a bilateral/multilateral agreement to do so.

FIGURE 3-2

Out-of-band spectrum masks for a T-DAB transmission signal



RRC06-A2-C3-2

TABLE 3-10

Out-of-band spectrum table for a T-DAB transmission signal

	Frequency relative to the centre of the 1.54 MHz channel (MHz)	**Relative level (dB)**
Spectrum mask for T-DAB transmitters operating in non-critical cases	±0.97	–26
	±0.97	–56
	±3.0	–106
Spectrum mask for T-DAB transmitters operating in sensitive cases	±0.77	–26
	±0.97	–71
	±1.75	–106
	±3.0	–106
Spectrum mask for T-DAB transmitters operating in sensitive cases in certain areas where frequency block 12D is used	±0.77	–26
	±0.97	–78
	±2.2	–126
	±3.0	–126

3.6.2 Spectrum mask for DVB-T in 8 MHz and 7 MHz channels

Two spectrum masks are specified in Fig. 3-3 and the associated Table 3-11. The upper curve defines the spectrum mask for the non-critical cases and the lower curve defines the spectrum mask for the sensitive cases.

FIGURE 3-3

Symmetrical spectrum masks for non-critical and sensitive cases

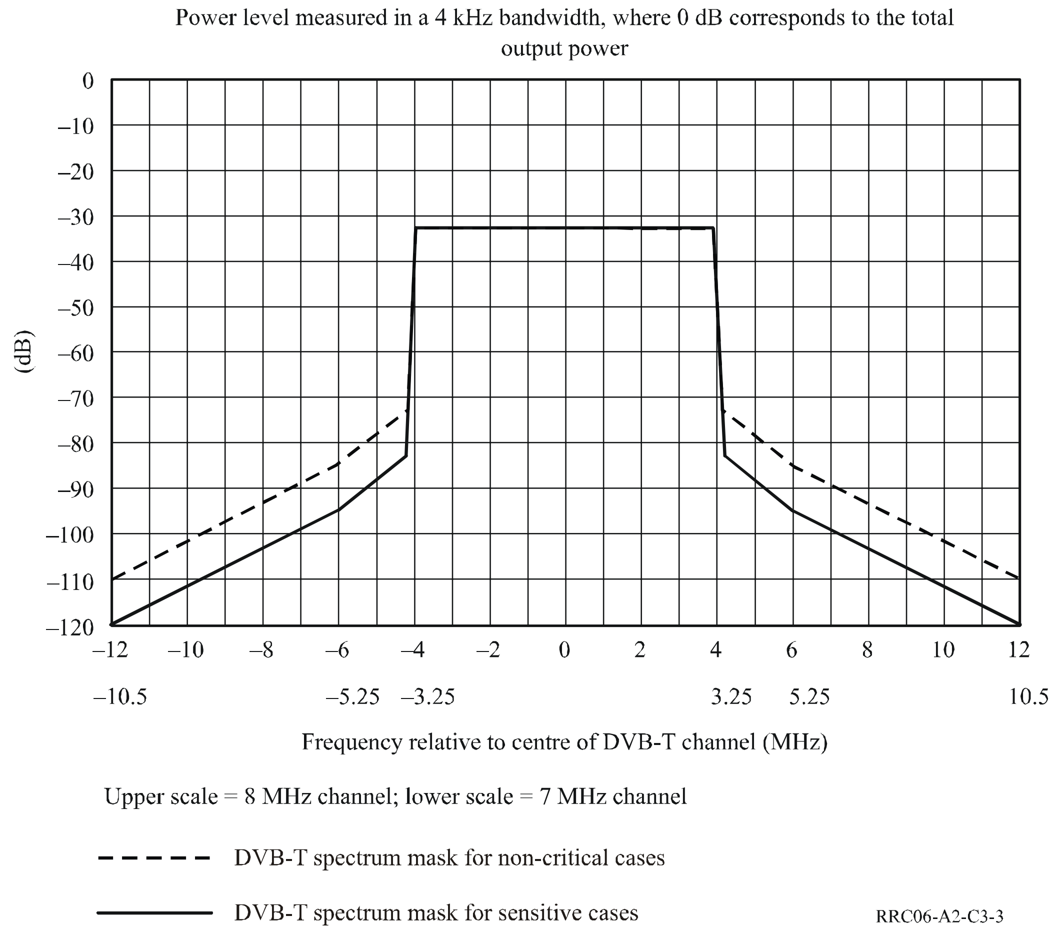


TABLE 3-11

Symmetrical spectrum masks for non-critical and sensitive cases

Breakpoints					
8 MHz channels			7 MHz channels		
	Non-critical cases	Sensitive cases		Non-critical cases	Sensitive cases
Relative frequency (MHz)	Relative level (dB)	Relative level (dB)	Relative frequency (MHz)	Relative level (dB)	Relative level (dB)
–12	–110	–120	–10.5	–110	–120
–6	–85	–95	–5.25	–85	–95
–4.2	–73	–83	–3.7	–73	–83
–3.9	–32.8	–32.8	–3.35	–32.8	–32.8
+3.9	–32.8	–32.8	+3.35	–32.8	–32.8
+4.2	–73	–83	+3.7	–73	–83
+6	–85	–95	+5.25	–85	–95
+12	–110	–120	+10.5	–110	–120

ANNEX 3.1

DVB-T system variants

TABLE A.3.1-1

DVB-T system variants and net bit rate values (Mbit/s)

System variant designator	Modulation	Code rate	Net bit rate (Mbit/s) For different guard intervals (GI)			
			GI = 1/4	GI = 1/8	GI = 1/16	GI = 1/32
8 MHz variants						
A1	QPSK	1/2	4.98	5.53	5.85	6.03
A2	QPSK	2/3	6.64	7.37	7.81	8.04
A3	QPSK	3/4	7.46	8.29	8.78	9.05
A5	QPSK	5/6	8.29	9.22	9.76	10.05
A7	QPSK	7/8	8.71	9.68	10.25	10.56
B1	16-QAM	1/2	9.95	11.06	11.71	12.06
B2	16-QAM	2/3	13.27	14.75	15.61	16.09
B3	16-QAM	3/4	14.93	16.59	17.56	18.10
B5	16-QAM	5/6	16.59	18.43	19.52	20.11
B7	16-QAM	7/8	17.42	19.35	20.49	21.11
C1	64-QAM	1/2	14.93	16.59	17.56	18.10
C2	64-QAM	2/3	19.91	22.12	23.42	24.13
C3	64-QAM	3/4	22.39	24.88	26.35	27.14
C5	64-QAM	5/6	24.88	27.65	29.27	30.16
C7	64-QAM	7/8	26.13	29.03	30.74	31.67
7 MHz variants						
D1	QPSK	1/2	4.35	4.84	5.12	5.28
D2	QPSK	2/3	5.81	6.45	6.83	7.04
D3	QPSK	3/4	6.53	7.26	7.68	7.92
D5	QPSK	5/6	7.26	8.06	8.54	8.80
D7	QPSK	7/8	7.62	8.47	8.97	9.24
E1	16-QAM	1/2	8.71	9.68	10.25	10.56
E2	16-QAM	2/3	11.61	12.90	13.66	14.08
E3	16-QAM	3/4	13.06	14.52	15.37	15.83
E5	16-QAM	5/6	14.52	16.13	17.08	17.59
E7	16-QAM	7/8	15.24	16.93	17.93	18.47
F1	64-QAM	1/2	13.06	14.51	15.37	15.83
F2	64-QAM	2/3	17.42	19.35	20.49	21.11
F3	64-QAM	3/4	19.60	21.77	23.05	23.75
F5	64-QAM	5/6	21.77	24.19	25.61	26.39
F7	64-QAM	7/8	22.86	25.40	26.90	27.71

Channel numbering and channel boundaries

TABLE A.3.1-2

DVB-T channel arrangement in Bands IV and V

Channel number	Channel boundaries (MHz)		Assigned frequency (MHz)
Band IV			
21	470	478	474
22	478	486	482
23	486	494	490
24	494	502	498
25	502	510	506
26	510	518	514
27	518	526	522
28	526	534	530
29	534	542	538
30	542	550	546
31	550	558	554
32	558	566	562
33	566	574	570
34	574	582	578
Band V			
35	582	590	586
36	590	598	594
37	598	606	602
38	606	614	610
39	614	622	618
40	622	630	626
41	630	638	634
42	638	646	642
43	646	654	650
44	654	662	658
45	662	670	666
46	670	678	674
47	678	686	682
48	686	694	690
49	694	702	698

TABLE A.3.1-2 (*end*)

Channel number	**Channel boundaries (MHz)**		**Assigned frequency (MHz)**
50	702	710	706
51	710	718	714
52	718	726	722
53	726	734	730
54	734	742	738
55	742	750	746
56	750	758	754
57	758	766	762
58	766	774	770
59	774	782	778
60	782	790	786
61	790	798	794
62	798	806	802
63	806	814	810
64	814	822	818
65	822	830	826
66	830	838	834
67	838	846	842
68	846	854	850
69	854	862	858

TABLE A.3.1-3

DVB-T channel arrangement in Band III

(Applicable for the following geographical areas: ALB, ALG, AND, ARS, AUT, BEL, BHR, BIH, BUL, CME, CNR, CVA, CYP, CZE, D, DJI, DNK, E, EGY, ERI, EST, ETH, F, FIN, FRO, GHA, GIB, GNB, GNE, GRC, HNG, HOL, HRV, I, IRL, IRN, IRQ, ISL, ISR, JOR, KEN, KWT, LBN, LBR, LBY, LIE, LTU, LUX, LVA, MAU, MDA, MDR, MKD, MLI, MLT, MRC, MTN, NIG, NOR, OMA, POL, POR, QAT, ROU, RRW, S, SCG, SDN, SEY, SMR, SOM, SRL, STP, SUI, SVK, SVN, SYR, TCD, TUN, TUR, UAE, UGA, UKR, YEM, ZMB)

Channel number	**Channel boundaries (MHz)**		**Assigned frequency (MHz)**
5	174	181	177.50
6	181	188	184.50
7	188	195	191.50
8	195	202	198.50
9	202	209	205.50
10	209	216	212.50
11	216	223	219.50
12	223	230	226.50

TABLE A.3.1-4

DVB-T channel arrangement in Band III

(Applicable for the following geographical areas: ARM, AZE, BLR, GEO, KAZ, KGZ, RUS, TJK, TKM, UZB)

Channel number	**Channel boundaries (MHz)**		**Assigned frequency (MHz)**
6	174	182	178
7	182	190	186
8	190	198	194
9	198	206	202
10	206	214	210
11	214	222	218
12	222	230	226

TABLE A.3.1-5

DVB-T channel arrangement in Band III

(Applicable for the following geographical areas: BDI, BEN, BFA, CAF, COD, COG, COM, CPV, CTI, GAB, GUI, MDG, MYT, NGR, REU, SEN, TGO)

and

(Applicable for the following geographical areas: AFS, AGL, ASC, BOT, G, GMB, LSO, MWI, NMB, SHN, TRC, TZA)

and

(Applicable for the following geographical areas: MOZ, SWZ, ZWE)

Channel number	Channel number*	Channel boundaries (MHz)		Assigned frequency (MHz)
5	4	174	182	178
6	5	182	190	186
7	6	190	198	194
8	7	198	206	202
9	8	206	214	210
10	9	214	222	218
11	10	222	230	226

* In MYT and REU.

TABLE A.3.1-6

Analogue TV System B in Band III

Used in the following geographical areas:

ALB, ALG, ARS, AUT, BEL, BHR, BIH, CME, CNR, CVA, CYP, D, DJI, DNK, E, EGY, ERI, ETH, FIN, FRO, GHA, GIB, GNB, GNE, GRC, HOL, HRV, IRN, IRQ, ISL, ISR, JOR, KEN, KWT, LBN, LBR, LBY, LIE, LUX, MAU, MDR, MKD, MLI, MLT, MTN, NIG, NOR, OMA, POR, QAT, RRW, S, SCG, SDN, SEY, SOM, SRL, STP, SUI, SVN, SYR, TCD, TUN, TUR, UAE, UGA, YEM, ZMB

Channel number	Channel boundaries (MHz)		Assigned frequency (MHz)	Vision carrier (MHz)	Sound carrier (MHz)	Dual FM second sound carrier (MHz)	NICAM carrier (MHz)
5	174	181	177.50	175.25	180.75	180.99	181.1
6	181	188	184.50	182.25	187.75	187.99	188.1
7	188	195	191.50	189.25	194.75	194.99	195.1
8	195	202	198.50	196.25	201.75	201.99	202.1
9	202	209	205.50	203.25	208.75	208.99	209.1
10	209	216	212.50	210.25	215.75	215.99	216.1
11	216	223	219.50	217.25	222.75	222.99	223.1
12	223	230	226.50	224.25	229.75	229.99	230.1
13*	230	237	233.50	231.25	236.75	236.99	237.1
14*	246.18	253.18	249.68	247.43	252.63	252.87	252.98

* Used in ZMB only (outside the planned bands for RRC-06).

TABLE A.3.1-7

Analogue TV System B in Band III

Used in the following geographical areas:

I, SMR

Channel number	Channel boundaries (MHz)		Assigned frequency (MHz)	Vision carrier (MHz)	Sound carrier (MHz)	Dual FM second sound carrier (MHz)
D	174.00	181.00	177.50	175.25	180.75	180.99
E	182.50	189.50	186.00	183.75	189.25	188.49
F	191.00	198.00	194.50	192.25	197.75	197.99
G	200.00	207.00	203.50	201.25	206.75	206.99
H	209.00	216.00	212.50	210.25	215.75	215.99
H1	216.00	223.00	219.50	217.25	222.75	222.99
H2	223.00	230.00	226.50	224.25	229.75	229.99

TABLE A.3.1-8

Analogue TV System B in Band III

Used in the following geographical area:

MRC

Channel number	Channel boundaries (MHz)		Assigned frequency (MHz)	Vision carrier (MHz)	Sound carrier (MHz)
4*	162	169	165.50	163.25	168.75
5*	170	177	173.50	171.25	176.75
6	178	185	181.50	179.25	184.75
7	186	193	189.50	187.25	192.75
8	194	201	197.50	195.25	200.75
9	202	209	205.50	203.25	208.75
10	210	217	213.50	211.25	216.75
11	216	223	219.50	217.25	222.75
12	223	230	226.50	224.25	229.75

* Outside the planned bands (or partially outside) for RRC-06.

TABLE A.3.1-9

Analogue TV System B1 in Band III

Used in the following geographical areas:

EST, SVK

Channel number	Channel boundaries (MHz)		Assigned frequency (MHz)	Vision carrier (MHz)	Sound carrier (MHz)	Dual FM second sound carrier (MHz)	NICAM carrier (MHz)
6	174	182	178.00	175.25	180.75	180.99	181.1
7	182	190	186.00	183.25	188.75	188.99	189.1
8	190	198	194.00	191.25	196.75	196.99	197.1
9	198	206	202.00	199.25	204.75	204.99	205.1
10	206	214	210.00	207.25	212.75	212.99	213.1
11	214	222	218.00	215.25	220.75	220.99	221.1
12	222	230	226.00	223.25	228.75	228.99	229.1

TABLE A.3.1-10

Analogue TV System D in Band III

Used in the following geographical areas:

ARM, AZE, BLR, BUL, CZE, GEO, HNG, KAZ, KGZ, LTU, LVA, MDA, ROU, RUS, SVK, TJK, TKM, UKR, UZB

Analogue TV System D1 in Band III

Used in the following geographical areas:

LTU, LVA, POL

Analogue TV System K1 in Band III

Used in the following geographical areas:

BDI, BEN, BFA, CAF, COD, COG, COM, CPV, CTI, GAB, GUI, MDG, MYT, NGR, REU, SEN, TGO

Channel number System K1	Channel number Systems D and D1	Channel boundaries (MHz)		Assigned frequency (MHz)	Vision carrier (MHz)	Sound carrier (MHz)	NICAM carrier (MHz)
	6A*	173	181	177.00	174.25	180.75	180.10
5	6	174	182	178.00	175.25	181.75	181.10
6	7	182	190	186.00	183.25	189.75	189.10
7	8	190	198	194.00	191.25	197.75	197.10
8	9	198	206	202.00	199.25	205.75	205.10
9	10	206	214	210.00	207.25	213.75	213.10
10	11	214	222	218.00	215.25	221.75	221.10
11	12	222	230	226.00	223.25	229.75	229.10

* System D only.

TABLE A.3.1-11

Analogue TV System I in Band III

Used in the following geographical areas:

AFS, AGL, ASC, BOT, G, GMB, IRL, LSO, MWI, NMB, SHN, TRC, TZA

Channel number GE89	Channel number ST61	Channel boundaries (MHz)		Assigned frequency (MHz)	Vision carrier (MHz)	Sound carrier (MHz)	NICAM carrier (MHz)
5	D	174	182	178.00	175.25	181.25	181.80
6	E	182	190	186.00	183.25	189.25	189.80
7	F	190	198	194.00	191.25	197.25	197.80
8	G	198	206	202.00	199.25	205.25	205.80
9	H	206	214	210.00	207.25	213.25	213.80
10	J	214	222	218.00	215.25	221.25	221.80
11	K	222	230	226.00	223.25	229.25	229.80
12*	–	230	238	234.00	231.25	237.25	237.80
13*	–	246.18	254.18	250.18	247.43	253.43	253.98

* Used in AFS, BOT, MWI, NMB only (outside the planned bands for RRC-06).

TABLE A.3.1-12

Analogue TV System L in Band III

Used in the following geographical area:

F

Channel number	Channel boundaries (MHz)		Assigned frequency (MHz)	Vision carrier (MHz)	Sound carrier (MHz)	NICAM carrier (MHz)
5	174.75	182.75	178.75	176.00	182.50	181.85
6	182.75	190.75	186.75	184.00	190.50	189.85
7	190.75	198.75	194.75	192.00	198.50	197.85
8	198.75	206.75	202.75	200.00	206.50	205.85
9	206.75	214.75	210.75	208.00	214.50	213.85
10	214.75	222.75	218.75	216.00	222.50	221.85

TABLE A.3.1-13

Analogue TV System G in Band III

Used in the following geographical areas:

MOZ, SWZ, ZWE

Channel number	Channel boundaries (MHz)		Assigned frequency (MHz)	Vision carrier (MHz)	Sound carrier (MHz)
5	174.00	182.00	178.00	175.25	180.75
6	182.00	190.00	186.00	183.25	188.75
7	190.00	198.00	194.00	191.25	196.75
8	198.00	206.00	202.00	199.25	204.75
9	206.00	214.00	210.00	207.25	212.75
10	214.00	222.00	218.00	215.25	220.75
11	222.00	230.00	226.00	223.25	228.75
12*	230.00	238.00	234.00	231.25	236.75
13*	246.18	254.18	250.18	247.43	252.93

* Used in MOZ and ZWE only (outside the planned bands for RRC-06).

TABLE A.3.1-14

Analogue TV Systems D1, G, H, I, I1, K, K1 and L in Bands IV and V

Channel number	Channel boundaries (MHz)		Vision carrier (MHz)	System G, H sound carrier (MHz)	System G dual FM second sound carrier (MHz)	System G System L System D1 NICAM carrier (MHz)	System I System I1 sound carrier (MHz)	System K System K1 System L System D1 sound carrier (MHz)	System I System I1 NICAM carrier (MHz)
21	470	478	471.25	476.75	476.99	477.1	477.25	477.75	477.8
22	478	486	479.25	484.75	484.99	485.1	485.25	485.75	485.8
23	486	494	487.25	492.75	492.99	493.1	493.25	493.75	493.8
24	494	502	495.25	500.75	500.99	501.1	501.25	501.75	501.8
25	502	510	503.25	508.75	508.99	509.1	509.25	509.75	509.8
26	510	518	511.25	516.75	516.99	517.1	517.25	517.75	517.8
27	518	526	519.25	524.75	524.99	525.1	525.25	525.75	525.8
28	526	534	527.25	532.75	532.99	533.1	533.25	533.75	533.8
29	534	542	535.25	540.75	540.99	541.1	541.25	541.75	541.8
30	542	550	543.25	548.75	548.99	549.1	549.25	549.75	549.8
31	550	558	551.25	556.75	556.99	557.1	557.25	557.75	557.8
32	558	566	559.25	564.75	564.99	565.1	565.25	565.75	565.8
33	566	574	567.25	572.75	572.99	573.1	573.25	573.75	573.8
34	574	582	575.25	580.75	580.99	581.1	581.25	581.75	581.8
35	582	590	583.25	588.75	588.99	589.1	589.25	589.75	589.8
36	590	598	591.25	596.75	596.99	597.1	597.25	597.75	597.8
37	598	606	599.25	604.75	604.99	605.1	605.25	605.75	605.8
38	606	614	607.25	612.75	612.99	613.1	613.25	613.75	613.8
39	614	622	615.25	620.75	620.99	621.1	621.25	621.75	621.8
40	622	630	623.25	628.75	628.99	629.1	629.25	629.75	629.8
41	630	638	631.25	636.75	636.99	637.1	637.25	637.75	637.8
42	638	646	639.25	644.75	644.99	645.1	645.25	645.75	645.8
43	646	654	647.25	652.75	652.99	653.1	653.25	653.75	653.8
44	654	662	655.25	660.75	660.99	661.1	661.25	661.75	661.8
45	662	670	663.25	668.75	668.99	669.1	669.25	669.75	669.8
46	670	678	671.25	676.75	676.99	677.1	677.25	677.75	677.8
47	678	686	679.25	684.75	684.99	685.1	685.25	685.75	685.8
48	686	694	687.25	692.75	692.99	693.1	693.25	693.75	693.8
49	694	702	695.25	700.75	700.99	701.1	701.25	701.75	701.8
50	702	710	703.25	708.75	708.99	709.1	709.25	709.75	709.8
51	710	718	711.25	716.75	716.99	717.1	717.25	717.75	717.8
52	718	726	719.25	724.75	724.99	725.1	725.25	725.75	725.8
53	726	734	727.25	732.75	732.99	733.1	733.25	733.75	733.8

TABLE A.3.1-14 (*end*)

Channel number	Channel boundaries (MHz)		Vision carrier (MHz)	System G, H sound carrier (MHz)	System G dual FM second sound carrier (MHz)	System G System L System D1 NICAM carrier (MHz)	System I System I1 sound carrier (MHz)	System K System K1 System L System D1 sound carrier (MHz)	System I System I1 NICAM carrier (MHz)
54	734	742	735.25	740.75	740.99	741.1	741.25	741.75	741.8
55	742	750	743.25	748.75	748.99	749.1	749.25	749.75	749.8
56	750	758	751.25	756.75	756.99	757.1	757.25	757.75	757.8
57	758	766	759.25	764.75	764.99	765.1	765.25	765.75	765.8
58	766	774	767.25	772.75	772.99	773.1	773.25	773.75	773.8
59	774	782	775.25	780.75	780.99	781.1	781.25	781.75	781.8
60	782	790	783.25	788.75	788.99	789.1	789.25	789.75	789.8
61	790	798	791.25	796.75	796.99	797.1	797.25	797.75	797.8
62	798	806	799.25	804.75	804.99	805.1	805.25	805.75	805.8
63	806	814	807.25	812.75	812.99	813.1	813.25	813.75	813.8
64	814	822	815.25	820.75	820.99	821.1	821.25	821.75	821.8
65	822	830	823.25	828.75	828.99	829.1	829.25	829.75	829.8
66	830	838	831.25	836.75	836.99	837.1	837.25	837.75	837.8
67	838	846	839.25	844.75	844.99	845.1	845.25	845.75	845.8
68	846	854	847.25	852.75	852.99	853.1	853.25	853.75	853.8
69	854	862	855.25	860.75	860.99	861.1	861.25	861.75	861.8

TABLE A.3.1-15

T-DAB frequency blocks in Band III

T-DAB frequency block	Assigned frequency (MHz)	Frequency block bandwidth (MHz)	Lower guardband (kHz)	Upper guardband (kHz)	Frequency range* (MHz)
5A	174.928	174.160-175.696	–	176	174.0-181.0
5B	176.640	175.872-177.408	176	176	
5C	178.352	177.584-179.120	176	176	
5D	180.064	179.296-180.832	176	336	
6A	181.936	181.168-182.704	336	176	181.0-188.0
6B	183.648	182.880-184.416	176	176	
6C	185.360	184.592-186.128	176	176	
6D	187.072	186.304-187.840	176	320	
7A	188.928	188.160-189.696	320	176	188.0-195.0
7B	190.640	189.872-191.408	176	176	
7C	192.352	191.584-193.120	176	176	
7D	194.064	193.296-194.832	176	336	
8A	195.936	195.168-196.704	336	176	195.0-202.0
8B	197.648	196.880-198.416	176	176	
8C	199.360	198.592-200.128	176	176	
8D	201.072	200.304-201.840	176	320	
9A	202.928	202.160-203.696	320	176	202.0-209.0
9B	204.640	203.872-205.408	176	176	
9C	206.352	205.584-207.120	176	176	
9D	208.064	207.296-208.832	176	336	
10A	209.936	209.168-210.704	336	176	209.0-216.0
10B	211.648	210.880-212.416	176	176	
10C	213.360	212.592-214.128	176	176	
10D	215.072	214.304-215.840	176	320	
11A	216.928	216.160-217.696	320	176	216.0-223.0
11B	218.640	217.872-219.408	176	176	
11C	220.352	219.584-221.120	176	176	
11D	222.064	221.296-222.832	176	336	
12A	223.936	223.168-224.704	336	176	223.0-230.0
12B	225.648	224.880-226.416	176	176	
12C	227.360	226.592-228.128	176	176	
12D	229.072	228.304-229.840	176	–	

* The frequency ranges given correspond to the channels for System B/PAL, which are 7 MHz wide. They have no other significance.

ANNEX 3.2

C/*N* values and minimum median field-strength values of different DVB-T system variants for different reception conditions

TABLE A.3.2-1

C/N (dB) values of different DVB-T system variants for the Gaussian, Ricean and Rayleigh channels and the corresponding values for the case of fixed reception (FX), portable outdoor reception (PO), portable indoor reception (PI) and mobile reception (MO)

System variants	Modulation	Code rate	Gauss	Rice	Rayleigh		
				FX	PO	PI	MO
A1, D1	QPSK	1/2	4.9	5.9	8.1	8.1	11.1
A2, D2	QPSK	2/3	6.8	7.9	10.2	10.2	13.2
A3, D3	QPSK	3/4	7.9	9.1	11.5	11.5	14.5
A5, D5	QPSK	5/6	9.0	10.3	12.8	12.8	15.8
A7, D7	QPSK	7/8	9.9	11.3	13.9	13.9	16.9
B1, E1	16-QAM	1/2	10.6	11.6	13.8	13.8	16.8
B2, E2	16-QAM	2/3	13.0	14.1	16.4	16.4	19.4
B3, E3	16-QAM	3/4	14.5	15.7	18.1	18.1	21.1
B5, E5	16-QAM	5/6	15.6	16.9	19.4	19.4	22.4
B7, E7	16-QAM	7/8	16.1	17.5	20.1	20.1	23.1
C1, F1	64-QAM	1/2	16.2	17.2	19.4	19.4	22.4
C2, F2	64-QAM	2/3	18.4	19.5	21.8	21.8	24.8
C3, F3	64-QAM	3/4	20.0	21.2	23.6	23.6	26.6
C5, F5	64-QAM	5/6	21.4	22.7	25.2	25.2	28.2
C7, F7	64-QAM	7/8	22.3	23.7	26.3	26.3	29.3

TABLE A.3.2-2

Minimum median field-strength values (dB(µV/m)) of different DVB-T system variants for the case of fixed reception (FX), portable outdoor reception (PO), portable indoor reception (PI) and mobile reception (MO) for two reference frequencies, 200 MHz and 500 MHz

System variants	Modulation	Code rate	MHz	FX	PO	PI	MO
A1, D1	QPSK	1/2	200.0	34.90	56.10	66.10	59.10
A2, D2	QPSK	2/3	200.0	36.90	58.20	68.20	61.20
A3, D3	QPSK	3/4	200.0	38.10	59.50	69.50	62.50
A5, D5	QPSK	5/6	200.0	39.30	60.80	70.80	63.80
A7, D7	QPSK	7/8	200.0	40.30	61.90	71.90	64.90
B1, E1	16-QAM	1/2	200.0	40.60	61.80	71.80	64.80
B2, E2	16-QAM	2/3	200.0	43.10	64.40	74.40	67.40
B3, E3	16-QAM	3/4	200.0	44.70	66.10	76.10	69.10
B5, E5	16-QAM	5/6	200.0	45.90	67.40	77.40	70.40
B7, E7	16-QAM	7/8	200.0	46.50	68.10	78.10	71.10
C1, F1	64-QAM	1/2	200.0	46.20	67.40	77.40	70.40
C2, F2	64-QAM	2/3	200.0	48.50	69.80	79.80	72.80
C3, F3	64-QAM	3/4	200.0	50.20	71.60	81.60	74.60
C5, F5	64-QAM	5/6	200.0	51.70	73.20	83.20	76.20
C7, F7	64-QAM	7/8	200.0	52.70	74.30	84.30	77.30
A1, D1	QPSK	1/2	500.0	38.90	64.10	76.10	67.10
A2, D2	QPSK	2/3	500.0	40.90	66.20	78.20	69.20
A3, D3	QPSK	3/4	500.0	42.10	67.50	79.50	70.50
A5, D5	QPSK	5/6	500.0	43.30	68.80	80.80	71.80
A7, D7	QPSK	7/8	500.0	44.30	69.90	81.90	72.90
B1, E1	16-QAM	1/2	500.0	44.60	69.80	81.80	72.80
B2, E2	16-QAM	2/3	500.0	47.10	72.40	84.40	75.40
B3, E3	16-QAM	3/4	500.0	48.70	74.10	86.10	77.10
B5, E5	16-QAM	5/6	500.0	49.90	75.40	87.40	78.40
B7, E7	16-QAM	7/8	500.0	50.50	76.10	88.10	79.10
C1, F1	64-QAM	1/2	500.0	50.20	75.40	87.40	78.40
C2, F2	64-QAM	2/3	500.0	52.50	77.80	89.80	80.80
C3, F3	64-QAM	3/4	500.0	54.20	79.60	91.60	82.60
C5, F5	64-QAM	5/6	500.0	55.70	81.20	93.20	84.20
C7, F7	64-QAM	7/8	500.0	56.70	82.30	94.30	85.30

The minimum median field strengths in Table A.3.2-2 are given for 200 MHz (Band III) and 500 MHz (Bands IV/V). For other frequencies the following interpolation rule shall be used:

– $E_{med}(f) = E_{med}(f_r) + \text{Corr}$;

– for fixed reception, Corr = 20 $\log_{10} (f/f_r)$, where f is the actual frequency and f_r the reference frequency of the relevant band quoted above;

– for portable reception and mobile reception, Corr = 30 $\log_{10} (f/f_r)$ where f is the actual frequency and f_r the reference frequency of the relevant band quoted above.

ANNEX 3.3

Protection ratios for terrestrial broadcasting systems

3.3.1 Overview of tables of protection ratios

Wanted signal	Unwanted signal	Table
DVB-T	Co-channel DVB-T	A.3.3-1
DVB-T	Adjacent channel DVB-T	A.3.3-2
DVB-T	Co-channel analogue TV	A.3.3-3
DVB-T	Lower channel analogue TV	A.3.3-4
DVB-T	Upper channel analogue TV	A.3.3-5
DVB-T (8 MHz)	Overlapping 7 MHz analogue TV	A.3.3-6
DVB-T (7 MHz)	Overlapping 7 MHz analogue TV	A.3.3-7
DVB-T (8 MHz)	Overlapping 8 MHz analogue TV	A.3.3-8
DVB-T (7 MHz)	Overlapping 8 MHz analogue TV	A.3.3-9
DVB-T	Co-channel T-DAB	A.3.3-10
DVB-T (for RPCs)	Co-channel DVB-T	A.3.3-11
DVB-T (for RPCs)	Co-channel T-DAB	A.3.3-12
T-DAB	DVB-T (8 MHz)	A.3.3-13
T-DAB	DVB-T (7 MHz)	A.3.3-14
T-DAB	Analogue TV – I/PAL	A.3.3-15
T-DAB	Analogue TV – B/PAL	A.3.3-16
T-DAB	Analogue TV – D/SECAM	A.3.3-17
T-DAB	Analogue TV – L/SECAM	A.3.3-18
T-DAB	Analogue TV – B/SECAM, B/PAL (T2)	A.3.3-19
T-DAB	Analogue TV – D/PAL	A.3.3-20
T-DAB	Analogue TV – G/PAL	A.3.3-21
T-DAB	Analogue TV – K1/SECAM	A.3.3-22
Analogue TV	Co-channel DVB-T	A.3.3-23
Analogue TV	Overlapping 7 MHz DVB-T	A.3.3-24
Analogue TV	Overlapping 8 MHz DVB-T	A.3.3-25

Notes for all tables:

FX: fixed reception

PO: portable outdoor reception

PI: portable indoor reception

MO: mobile reception

Gauss: gaussian channel (for information only)

3.3.2 Protection ratios for DVB-T

3.3.2.1 Protection ratios for DVB-T interfered with by DVB-T

TABLE A.3.3-1

Co-channel protection ratios (dB) for a DVB-T signal interfered with by a DVB-T signal for different DVB-T variants for the case of fixed reception (FX), portable outdoor reception (PO), portable indoor reception (PI) and mobile reception (MO)

DVB-T system variant	FX	PO	PI	MO
QPSK 1/2	6.00	8.00	8.00	11.00
QPSK 2/3	8.00	11.00	11.00	14.00
QPSK 3/4	9.30	11.70	11.70	14.70
QPSK 5/6	10.50	13.00	13.00	16.00
QPSK 7/8	11.50	14.10	14.10	17.10
16-QAM 1/2	11.00	13.00	13.00	16.00
16-QAM 2/3	14.00	16.00	16.00	19.00
16-QAM 3/4	15.00	18.00	18.00	21.00
16-QAM 5/6	16.90	19.40	19.40	22.40
16-QAM 7/8	17.50	20.10	20.10	23.10
64-QAM 1/2	17.00	19.00	19.00	22.00
64-QAM 2/3	20.00	23.00	23.00	26.00
64-QAM 3/4	21.00	25.00	25.00	28.00
64-QAM 5/6	23.30	25.80	25.80	28.80
64-QAM 7/8	24.30	26.90	26.90	29.90

3.3.2.2 Protection ratios for overlapping and adjacent channel case

The treatment of overlapping and adjacent channel cases (DVB-T vis-à-vis DVB-T) is described in Recommendation ITU-R BT.1368-6. The protection ratios for the adjacent channels in Table A.3.3-2 shall be used.

TABLE A.3.3-2

Protection ratios (dB) for a DVB-T signal interfered with by a DVB-T signal in the lower ($N - 1$) and upper ($N + 1$) adjacent channels

Channel	$N - 1$	$N + 1$
PR	–30	–30

3.3.2.3 Protection ratios for DVB-T interfered with by analogue television

TABLE A.3.3-3

Co-channel protection ratios (dB) for DVB-T signals interfered with by analogue television signals

DVB-T system variant	Gauss	FX	PO	PI	MO
QPSK 1/2	−12.0	−12.0	−12.0	−12.0	−9.0
QPSK 2/3	−8.0	−8.0	−8.0	−8.0	−5.0
QPSK 3/4	−4.0	−2.8	−0.4	−0.4	2.6
QPSK 5/6	3.0	4.3	6.8	6.8	9.8
QPSK 7/8	9.0	10.4	13.0	13.0	16.0
16-QAM 1/2	−8.0	−8.0	−8.0	−8.0	−5.0
16-QAM 2/3	−3.0	0.0	3.0	3.0	6.0
16-QAM 3/4	0.0	2.5	5.0	5.0	8.0
16-QAM 5/6	9.0	10.3	12.8	12.8	15.8
16-QAM 7/8	16.0	17.4	20.0	20.0	23.0
64-QAM 1/2	−3.0	0.0	3.0	3.0	6.0
64-QAM 2/3	3.0	4.5	6.0	6.0	9.0
64-QAM 3/4	9.0	12.0	15.0	15.0	18.0
64-QAM 5/6	15.0	16.3	18.8	18.8	21.8
64-QAM 7/8	20.0	21.4	24.0	24.0	27.0

TABLE A.3.3-4

Protection ratios (dB) for lower adjacent channel (*N* – 1) interference for DVB-T signals interfered with by analogue television signals including sound

DVB-T system variant	Gauss	FX	PO	PI	MO
QPSK 1/2	−44.0	−44.0	−44.0	−44.0	−41.0
QPSK 2/3	−44.0	−44.0	−44.0	−44.0	−41.0
QPSK 3/4	−42.9	−42.9	−42.9	−42.9	−39.9
QPSK 5/6	−41.8	−41.8	−41.8	−41.8	−38.8
QPSK 7/8	−40.9	−40.9	−40.9	−40.9	−37.9
16-QAM 1/2	−43.0	−43.0	−43.0	−43.0	−40.0
16-QAM 2/3	−42.0	−42.0	−42.0	−42.0	−39.0
16-QAM 3/4	−38.0	−38.0	−38.0	−38.0	−35.0
16-QAM 5/6	−39.4	−39.4	−39.4	−39.4	−36.4
16-QAM 7/8	−38.9	−38.9	−38.9	−38.9	−35.9
64-QAM 1/2	−40.0	−40.0	−40.0	−40.0	−37.0
64-QAM 2/3	−35.0	−35.0	−35.0	−35.0	−32.0
64-QAM 3/4	−32.0	−32.0	−32.0	−32.0	−29.0
64-QAM 5/6	−32.0	−32.0	−32.0	−32.0	−29.0
64-QAM 7/8	−31.1	−31.1	−31.1	−31.1	−28.1

TABLE A.3.3-5

Protection ratios (dB) for upper adjacent channel (*N* + 1) interference for DVB-T signals interfered with by analogue television signals including sound

DVB-T system variant	Gauss	FX	PO	PI	MO
QPSK 1/2	−48.9	−48.9	−48.9	−48.9	−45.9
QPSK 2/3	−47	−47	−47	−47	−44
QPSK 3/4	−45.9	−45.9	−45.9	−45.9	−42.9
QPSK 5/6	−44.8	−44.8	−44.8	−44.8	−41.8
QPSK 7/8	−43.9	−43.9	−43.9	−43.9	−40.9
16-QAM 1/2	−45.4	−45.4	−45.4	−45.4	−42.4
16-QAM 2/3	−43	−43	−43	−43	−40
16-QAM 3/4	−41.5	−41.5	−41.5	−41.5	−38.5
16-QAM 5/6	−40.4	−40.4	−40.4	−40.4	−37.4
16-QAM 7/8	−39.9	−39.9	−39.9	−39.9	−36.9
64-QAM 1/2	−40.2	−40.2	−40.2	−40.2	−37.2
64-QAM 2/3	−38	−38	−38	−38	−35
64-QAM 3/4	−36.4	−36.4	−36.4	−36.4	−33.4
64-QAM 5/6	−35	−35	−35	−35	−32
64-QAM 7/8	−34.1	−34.1	−34.1	−34.1	−31.1

TABLE A.3.3-6

Protection ratios (dB) for a DVB-T 8 MHz signal interfered with by an overlapping 7 MHz analogue television signal including sound for

Δf = 0.75 MHz

DVB-T system variant	Gauss	FX	PO	PI	MO
QPSK 1/2	−10.5	−9.5	−7.3	−7.3	−4.3
QPSK 2/3	−8.6	−7.5	−5.2	−5.2	−2.2
QPSK 3/4	−7.5	−6.3	−3.9	−3.9	−0.9
QPSK 5/6	−6.4	−5.1	−2.6	−2.6	0.4
QPSK 7/8	−5.5	−4.1	−1.5	−1.5	1.5
16-QAM 1/2	−4.8	−3.8	−1.6	−1.6	1.4
16-QAM 2/3	−2.4	−1.3	1.0	1.0	4.0
16-QAM 3/4	−0.9	0.3	2.7	2.7	5.7
16-QAM 5/6	0.2	1.5	4.0	4.0	7.0
16-QAM 7/8	0.7	2.1	4.7	4.7	7.7
64-QAM 1/2	0.8	1.8	4.0	4.0	7.0
64-QAM 2/3	3.0	4.1	6.4	6.4	9.4
64-QAM 3/4	4.6	5.8	8.2	8.2	11.2
64-QAM 5/6	6.0	7.3	9.8	9.8	12.8
64-QAM 7/8	6.9	8.3	10.9	10.9	13.9

Correction factor for other values of Δf relative to Δf = 0.75 MHz													
−9.75	**−9.25**	**−8.75**	**−8.25**	**−6.75**	**−3.95**	**−3.75**	**−2.75**	**−1.75**	**−0.75**	**2.25**	**3.25**	**4.75**	**5.25**
−40	−17	−11	−7	−5	−2	0	0	0	0	−1	−4	−32	−39

Δf: Analogue television vision carrier frequency minus DVB-T centre frequency.

TABLE A.3.3-7

Protection ratios (dB) for a DVB-T 7 MHz signal interfered with by an overlapping 7 MHz analogue television signal including sound for

Δf = 0 MHz

DVB-T system variant	Gauss	FX	PO	PI	MO
QPSK 1/2	−11.5	−10.5	−8.3	–8.3	–5.3
QPSK 2/3	−9.6	−8.5	−6.2	–6.2	–3.2
QPSK 3/4	−8.5	−7.3	−4.9	–4.9	–1.9
QPSK 5/6	−7.4	−6.1	−3.6	–3.6	–0.6
QPSK 7/8	−6.5	−5.1	−2.5	–2.5	0.5
16-QAM 1/2	−5.8	−4.8	−2.6	–2.6	0.4
16-QAM 2/3	−3.4	−2.3	0.0	0.0	3.0
16-QAM 3/4	−1.9	−0.7	1.7	1.7	4.7
16-QAM 5/6	−0.8	0.5	3.0	3.0	6.0
16-QAM 7/8	−0.3	1.1	3.7	3.7	6.7
64-QAM 1/2	−0.2	0.8	3.0	3.0	6.0
64-QAM 2/3	2.0	3.1	5.4	5.4	8.4
64-QAM 3/4	3.6	4.8	7.2	7.2	10.2
64-QAM 5/6	5.0	6.3	8.8	8.8	11.8
64-QAM 7/8	5.9	7.3	9.9	9.9	12.9

Correction factor for other values of Δf relative to Δf = 0 MHz													
−9.25	**−8.75**	**−8.25**	**−7.75**	**−6.25**	**−3.45**	**−3.25**	**−2.25**	**−1.25**	**0.00**	**1.75**	**2.75**	**4.25**	**4.75**
−37	−14	−13	−7	−5	−3	2	−1	−2	0	−7	−7	−38	−40

Δf: Analogue television vision carrier frequency minus DVB-T centre frequency.

TABLE A.3.3-8

Protection ratios (dB) for a DVB-T 8 MHz signal interfered with by an overlapping 8 MHz analogue television signal including sound for

Δ*f* = 0 MHz

DVB-T system variant	Gauss	FX	PO	PI	MO
QPSK 1/2	−11.5	−10.5	−8.3	−8.3	−5.3
QPSK 2/3	−9.6	−8.5	−6.2	−6.2	−3.2
QPSK 3/4	−8.5	−7.3	−4.9	−4.9	−1.9
QPSK 5/6	−7.4	−6.1	−3.6	−3.6	−0.6
QPSK 7/8	−6.5	−5.1	−2.5	−2.5	0.5
16-QAM 1/2	−5.8	−4.8	−2.6	−2.6	0.4
16-QAM 2/3	−3.4	−2.3	0.0	0.0	3.0
16-QAM 3/4	−1.9	−0.7	1.7	1.7	4.7
16-QAM 5/6	−0.8	0.5	3.0	3.0	6.0
16-QAM 7/8	−0.3	1.1	3.7	3.7	6.7
64-QAM 1/2	−0.2	0.8	3.0	3.0	6.0
64-QAM 2/3	2.0	3.1	5.4	5.4	8.4
64-QAM 3/4	3.6	4.8	7.2	7.2	10.2
64-QAM 5/6	5.0	6.3	8.8	8.8	11.8
64-QAM 7/8	5.9	7.3	9.9	9.9	12.9

Correction factor for other values of Δ*f* relative to Δ*f* = 0 MHz													
−10.25	**−9.75**	**−9.25**	**−8.75**	**−7.25**	**−3.45**	**−3.25**	**−2.25**	**−1.25**	**0.00**	**1.75**	**2.75**	**4.25**	**4.75**
−37	−14	−13	−7	−5	−3	2	−1	−2	0	−7	−7	−38	−40

Δ*f*: Analogue television vision carrier frequency minus DVB-T centre frequency.

TABLE A.3.3-9

Protection ratios (dB) for a DVB-T 7 MHz signal interfered with by an overlapping 8 MHz analogue television signal including sound for

Δf = 0 MHz

DVB-T system variant	Gauss	FX	PO	PI	MO
QPSK 1/2	−11.5	−10.5	−8.3	−8.3	−5.3
QPSK 2/3	−9.6	−8.5	−6.2	−6.2	−3.2
QPSK 3/4	−8.5	−7.3	−4.9	−4.9	−1.9
QPSK 5/6	−7.4	−6.1	−3.6	−3.6	−0.6
QPSK 7/8	−6.5	−5.1	−2.5	−2.5	0.5
16-QAM 1/2	−5.8	−4.8	−2.6	−2.6	0.4
16-QAM 2/3	−3.4	−2.3	0.0	0.0	3.0
16-QAM 3/4	−1.9	−0.7	1.7	1.7	4.7
16-QAM 5/6	−0.8	0.5	3.0	3.0	6.0
16-QAM 7/8	−0.3	1.1	3.7	3.7	6.7
64-QAM 1/2	−0.2	0.8	3.0	3.0	6.0
64-QAM 2/3	2.0	3.1	5.4	5.4	8.4
64-QAM 3/4	3.6	4.8	7.2	7.2	10.2
64-QAM 5/6	5.0	6.3	8.8	8.8	11.8
64-QAM 7/8	5.9	7.3	9.9	9.9	12.9

Correction factor for other values of Δf relative to Δf = 0 MHz													
−10.25	**−9.75**	**−9.25**	**−8.75**	**−7.25**	**−3.45**	**−3.25**	**−2.25**	**−1.25**	**0.00**	**1.75**	**2.75**	**4.25**	**4.75**
−37	−14	−13	−7	−5	−3	2	−1	−2	0	−7	−7	−38	−40

Δf: Analogue television vision carrier frequency minus DVB-T centre frequency.

3.3.2.4 Protection ratios for DVB-T interfered with by T-DAB

TABLE A.3.3-10

Co-channel protection ratios (dB) for a DVB-T signal interfered with by a T-DAB signal for different DVB-T variants for the case of fixed reception (FX), portable outdoor reception (PO), portable indoor reception (PI) and mobile reception (MO)

DVB-T system variant	FX	PO	PI	MO
QPSK 1/2	11.00	13.20	13.20	16.20
QPSK 2/3	13.10	15.40	15.40	18.40
QPSK 3/4	15.20	17.60	17.60	20.60
QPSK 5/6	15.50	18.00	18.00	21.00
QPSK 7/8	16.50	19.10	19.10	22.10
16-QAM 1/2	16.00	18.20	18.20	21.20
16-QAM 2/3	19.10	21.40	21.40	24.40
16-QAM 3/4	21.20	23.60	23.60	26.60
16-QAM 5/6	21.90	24.40	24.40	27.40
16-QAM 7/8	22.50	25.10	25.10	28.10
64-QAM 1/2	21.00	23.20	23.20	26.20
64-QAM 2/3	25.10	27.40	27.40	30.40
64-QAM 3/4	27.20	29.60	29.60	32.60
64-QAM 5/6	28.30	30.80	30.80	33.80
64-QAM 7/8	32.40	35.00	35.00	38.00

3.3.2.5 Protection ratios for RPCs

For a compatibility analysis, protection ratios for the reference planning configurations are also needed. Since the RPCs represent artificial configurations, no measurements exist for the appropriate protection ratios. The following values shall be used:

– for DVB-T interfered with by DVB-T, see Table A.3.3-11;
– for DVB-T interfered with by T-DAB, see Table A.3.3-12;
– for DVB-T interfered with by analogue television:
  – for RPC 1, protection ratio values for DVB-T variant 64-QAM 3/4 – fixed reception, to be found in Tables A.3.3-3 to A.3.3-9;
  – for RPC 2, protection ratio values for DVB-T variant 16-QAM 3/4 – portable outdoor reception, to be found in Tables A.3.3-3 to A.3.3-9;
  – for RPC 3, protection ratio values for DVB-T variant 16-QAM 2/3 – portable indoor reception, to be found in Tables A.3.3-3 to A.3.3-9.

TABLE A.3.3-11

Co-channel protection ratios (dB) for a DVB-T signal interfered with by a DVB-T signal for the RPCs

RPC	PR (dB)
RPC 1	21
RPC 2	19
RPC 3	17

TABLE A.3.3-12

Co-channel protection ratios (dB) for a DVB-T signal interfered with by a T-DAB signal for the RPCs

RPC	PR (dB)
RPC 1	27.2
RPC 2	23.6
RPC 3	21.4

3.3.3 Protection ratios for T-DAB

3.3.3.1 T-DAB interfered with by DVB-T

TABLE A.3.3-13

Protection ratios for T-DAB interfered with by a DVB-T 8 MHz system

$\Delta f^{(1)}$ (MHz)	−5	−4.2	−4	−3	0	3	4	4.2	5
PR (dB) mobile and portable reception	−43	6	7	8	8	8	7	6	−43
PR (dB) Gaussian channel	−50	−1	0	1	1	1	0	−1	−50

(1) Δf: Centre frequency of the DVB-T signal minus centre frequency of the T-DAB signal.

TABLE A.3.3-14

Protection ratios for T-DAB interfered with by a DVB-T 7 MHz system

$\Delta f^{(1)}$ (MHz)	−4.5	−3.7	−3.5	−2.5	0	2.5	3.5	3.7	4.5
PR (dB) mobile and portable reception	−42	7	8	9	9	9	8	7	−42
PR (dB) Gaussian channel	−49	0	1	2	2	2	1	0	−49

(1) Δf: Centre frequency of the DVB-T signal minus centre frequency of the T-DAB signal.

3.3.3.2 Protection ratios for T-DAB interfered with by analogue television signals

Protection ratios for T-DAB interfered with by analogue terrestrial television in Tables A.3.3-15 to A.3.3-22 shall be used.

TABLE A.3.3-15

Protection ratios for T-DAB interfered with by analogue television system I/PAL (Band III)

I/PAL (Band III)											
Δ*f* (MHz)	−8.0	−7.5	−7.0	−6.5	−6.0	−5.5	−5.0	−4.5	−4.0	−3.5	−3.0
PR (dB)	−42.0	−23.5	−10.0	−3.0	−2.0	−3.0	−24.0	−21.0	−23.0	−31.0	−31.5
Δ*f* (MHz)	−2.5	−2.0	−1.5	−1.0	−0.9	−0.8	−0.7	−0.6	0.0	0.6	0.7
PR (dB)	−30.0	−28.5	−25.0	−19.5	−17.5	−11.0	−7.0	−1.5	−1.5	−4.0	−5.5
Δ*f* (MHz)	0.8	0.9	1.0	2.0	3.0						
PR (dB)	−13.5	−17.0	−20.0	−33.0	−47.5						

Δ*f*: Analogue system vision carrier frequency minus T-DAB centre frequency.

TABLE A.3.3-16

Protection ratios for T-DAB interfered with by analogue television system B/PAL (Band III)

B/PAL (Band III)											
Δ*f* (MHz)	−7.0	−6.5	−6.0	−5.5	−5.0	−4.5	−4.0	−3.5	−3.0	−2.5	−2.0
PR (dB)	−47.0	−18.0	−5.0	−3.0	−5.0	−20.0	−22.0	−31.5	−31.5	−29.0	−26.5
Δ*f* (MHz)	−1.5	−1.0	−0.9	−0.8	−0.7	−0.6	0.0	0.6	0.7	0.8	0.9
PR (dB)	−23.0	−18.5	−16.0	−9.0	−5.0	−3.0	−0.5	−3.0	−4.0	−12.0	−16.0
Δ*f* (MHz)	1.0	2.0									
PR (dB)	−19.5	−45.3									

Δ*f*: Analogue system vision carrier frequency minus T-DAB centre frequency.

TABLE A.3.3-17

Protection ratios for T-DAB interfered with by analogue television system D/SECAM (Band III)

D/SECAM (Band III)											
Δ*f* (MHz)	−8.0	−7.5	−7.0	−6.5	−6.0	−5.5	−5.0	−4.5	−4.0	−3.5	−3.0
PR (dB)	−47.0	−42.5	−3.0	−2.5	−3.0	−37.5	−21.5	−18.5	−20.5	−26.5	−33.5
Δ*f* (MHz)	−2.5	−2.0	−1.5	−1.0	−0.9	−0.8	−0.7	−0.6	0.0	0.6	0.7
PR (dB)	−31.5	−29.0	−26.5	−18.5	−16.5	−9.0	−6.0	−3.0	−2.5	−4.0	−4.5
Δ*f* (MHz)	0.8	0.9	1.0	2.0							
PR (dB)	−12.0	−22.0	−25.0	−46.0							

Δ*f*: Analogue system vision carrier frequency minus T-DAB centre frequency.

TABLE A.3.3-18

Protection ratios for T-DAB interfered with by analogue television system L/SECAM (Band III)

L/SECAM (Band III)											
Δ*f* (MHz)	−8.0	−7.5	−7.0	−6.5	−6.0	−5.5	−5.0	−4.5	−4.0	−3.5	−3.0
PR (dB)	−46.5	−42.5	−15.5	−13.0	−15.0	−26.5	−18.5	−17.0	−18.0	−23.0	−31.5
Δ*f* (MHz)	−2.5	−2.0	−1.5	−1.0	−0.9	−0.8	−0.7	−0.6	0.0	0.6	0.7
PR (dB)	−30.5	−27.5	−24.5	−18.0	−16.5	−8.0	−5.0	−1.5	1.5	−2.0	−3.5
Δ*f* (MHz)	0.8	0.9	1.0	2.0	3.0						
PR (dB)	−12.5	−18.5	−19.0	−31.0	−46.8						

Δ*f:* Analogue system vision carrier frequency minus T-DAB centre frequency.

TABLE A.3.3-19

Protection ratios for T-DAB interfered with by analogue television systems B/SECAM, B/PAL (T2) (Band III)

B/SECAM (Band III), B/PAL (T2) data used											
Δ*f* (MHz)	−7.0	−6.5	−6.0	−5.5	−5.0	−4.5	−4.0	−3.5	−3.0	−2.5	−2.0
PR (dB)	−47.0	−18.0	−5.0	−3.0	−5.0	−20.0	−22.0	−31.5	−31.5	−29.0	−26.5
Δ*f* (MHz)	−1.5	−1.0	−0.9	−0.8	−0.7	−0.6	0.0	0.6	0.7	0.8	0.9
PR (dB)	−23.0	−18.5	−16.0	−9.0	−5.0	−3.0	−0.5	−3.0	−4.0	−12.0	−16.0
Δ*f* (MHz)	1.0	2.0									
PR (dB)	−19.5	−45.3									

Δ*f:* Analogue system vision carrier frequency minus T-DAB centre frequency.

TABLE A.3.3-20

Protection ratios for T-DAB interfered with by analogue television system D/PAL (Band III)

D/PAL (Band III)											
Δ*f* (MHz)	−8.0	−7.5	−7.0	−6.5	−6.0	−5.5	−5.0	−4.5	−4.0	−3.5	−3.0
PR (dB)	−47.0	−42.5	−3.0	−2.5	−3.0	−37.5	−21.5	−20.0	−22.0	−31.5	−31.5
Δ*f* (MHz)	−2.5	−2.0	−1.5	−1.0	−0.9	−0.8	−0.7	−0.6	0.0	0.6	0.7
PR (dB)	−29.0	−26.5	−23.0	−18.5	−16.0	−9.0	−5.0	−3.0	−0.5	−3.0	−4.0
Δ*f* (MHz)	0.8	0.9	1.0	2.0							
PR (dB)	−12.0	−16.0	−19.0	−45.3							

Δ*f:* Analogue system vision carrier frequency minus T-DAB centre frequency.

TABLE A.3.3-21

Protection ratios for T-DAB interfered with by analogue television system G/PAL (Band III)

G/PAL (Band III)											
Δf (MHz)	−7.0	−6.5	−6.0	−5.5	−5.0	−4.5	−4.0	−3.5	−3.0	−2.5	−2.0
PR (dB)	−47.0	−18.0	−5.0	−3.0	−5.0	−20.0	−22.0	−31.5	−31.5	−29.0	−26.5
Δf (MHz)	−1.5	−1.0	−0.9	−0.8	−0.7	−0.6	0.0	0.6	0.7	0.8	0.9
PR (dB)	−23.0	−18.5	−16.0	−9.0	−5.0	−3.0	−0.5	−3.0	−4.0	−12.0	−16.0
Δf (MHz)	1.0	2.0									
PR (dB)	−19.5	−45.3									

Δ*f:* Analogue system vision carrier frequency minus T-DAB centre frequency.

TABLE A.3.3-22

Protection ratios for T-DAB interfered with by analogue television system K1/SECAM (Band III)

K1/SECAM (Band III)											
Δf (MHz)	−8.0	−7.5	−7.0	−6.5	−6.0	−5.5	−5.0	−4.5	−4.0	−3.5	−3.0
PR (dB)	−47.0	−42.5	−3.0	−2.5	−3.0	−37.5	−21.5	−18.5	−20.5	−26.5	−33.5
Δf (MHz)	−2.5	−2.0	−1.5	−1.0	−0.9	−0.8	−0.7	−0.6	0.0	0.6	0.7
PR (dB)	−31.5	−29.0	−26.5	−18.5	−16.5	−9.0	−6.0	−3.0	−2.5	−4.0	−4.5
Δf (MHz)	0.8	0.9	1.0	2.0							
PR (dB)	−12.0	−22.0	−25.0	−46.0							

Δ*f:* Analogue system vision carrier frequency minus T-DAB centre frequency.

3.3.4 Protection ratios for analogue terrestrial television

3.3.4.1 Protection ratios for analogue television signals interfered with by DVB-T

a) The co-channel protection ratio values for all analogue terrestrial television systems interfered with by digital television are assumed to be the same. However, the protection ratio values differ by 1 dB depending on whether the unwanted signal is 8 MHz DVB-T or 7 MHz DVB-T. The protection ratios in Table A.3.3-23 shall be used.

TABLE A.3.3-23

Co-channel protection ratios (dB) for a analogue terrestrial television signal interfered with by co-channel DVB-T signal

	Tropospheric interference	Continuous interference
DVB-T 8 MHz (UHF)	34	40
DVB-T 7 MHz (VHF)	35	41

b) The protection ratios in Tables A.3.3-24 and A.3.3-25 shall be used for overlapping channel cases.

TABLE A.3.3-24

Protection ratios (dB) for analogue B, D, D1, G, H, K/PAL vision signals interfered with by a DVB-T 7 MHz signal (overlapping channels)

Centre frequency of the unwanted DVB-T signal minus the vision carrier frequency of the wanted analogue television signal (MHz)		Protection ratio	
		Tropospheric interference	Continuous interference
	−7.75	−16	−11
($N-1$)	−4.75	−9	−5
	−4.25	−3	4
	−3.75	13	21
	−3.25	25	31
	−2.75	30	37
	−1.75	34	40
	−0.75	35	41
(N)	2.25	35	41
	4.25	35	40
	5.25	31	38
	6.25	28	35
	7.25	26	33
	8.25	6	12
($N+1$)	9.25	−8	−5
	12.25	−8	−5

For all SECAM systems the same values apply.

TABLE A.3.3-25

Protection ratios (dB) for analogue B, D, D1, G, H, K/PAL vision signals interfered with by a DVB-T 8 MHz signal (overlapping channels)

Centre frequency of the unwanted DVB-T signal minus the vision carrier frequency of the wanted analogue television signal (MHz)	Protection ratio	
	Tropospheric interference[(1)]	Continuous interference[(1)]
−8.25	−16	−11
$(N-1)$ −5.25	−9	−5
−4.75	−4	3
−4.25	12	20
−3.75	24	30
−3.25	29	36
−2.25	33	39
−1.25	34	40
(N) 2.75	34	40
4.75	34	39
5.75	30	37
6.75	27	34
7.75	25	32
8.75	5	11
$(N+1)$ 9.75	−8	−5
12.75	−8	−5

(1) The values for tropospheric and continuous interference have been arrived at from Table A.3.3-24 by calculation.

For all SECAM systems the same values apply.

3.3.4.2 Protection ratios for analogue television signals interfered with by T-DAB and analogue television signals

For analogue television interfered with by T-DAB and interfered with by analogue television, the protection ratios in Recommendation ITU-R BT.655-7 shall be used.

ANNEX 3.4

Calculation of minimum median field strengths

The minimum median field-strength values shall be calculated using the following formulas:

$$P_n = F + 10 \log_{10} (k\, T_0\, B)$$

$$P_{s\,min} = C/N + P_n$$

$$A_a = G + 10 \log_{10} (1.64\lambda^2/4\pi)$$

$$\varphi_{min} = P_{s\,min} - A_a + L_f$$

$$E_{min} = \varphi_{min} + 120 + 10 \log_{10} (120\pi)$$

$$= \varphi_{min} + 145.8$$

$$E_{med} = E_{min} + P_{mmn} + C_l \quad \text{for fixed reception}$$

$$E_{med} = E_{min} + P_{mmn} + C_l + L_h \quad \text{for portable outdoor and mobile reception}$$

$$E_{med} = E_{min} + P_{mmn} + C_l + L_h + L_b \quad \text{for portable indoor reception}$$

$$C_l = \mu * \sigma_C$$

$$\sigma_C = \sqrt{\sigma_b^2 + \sigma_m^2}$$

where:

P_n : receiver noise input power (dBW)

F : receiver noise figure (dB)

k : Boltzmann's constant ($k = 1.38 \times 10^{-23}$ J/K)

T_0 : absolute temperature ($T_0 = 290$ K)

B : receiver noise bandwidth
(6.66×10^6 Hz for a 7 MHz DVB-T channel,
7.61×10^6 Hz for a 8 MHz DVB-T channel and
1.54×10^6 Hz for a T-DAB frequency block)

$P_{s\,min}$: minimum receiver input power (dBW)

C/N : RF signal-to-noise ratio at the receiver input required by the system (dB)

A_a : effective antenna aperture (dBm^2)

G : antenna gain related to half dipole (dBd)

λ : wavelength of the signal (m)

φ_{min} : minimum power flux-density at receiving place (dBW/m^2)

L_f: feeder loss (dB)

E_{min} : minimum field strength at the location of the receiving antenna (dB(μV/m))

E_{med} : minimum median field strength (dB(μV/m))

P_{mmn} : allowance for man-made noise (dB)

L_h : height loss correction factor (location of the receiving antenna at 1.5 m above ground level) (dB)

L_b : mean building entry loss (dB)

C_l : location correction factor (dB)

σ_c : combined standard deviation (dB)

σ_m : standard deviation macro-scale (dB) (σ_m = 5.5 dB)

σ_b : standard deviation building entry loss (dB)

μ : distribution factor (0.52 for 70%, 1.64 for 95% and 2.33 for 99%).

ANNEX 3.5

Reference planning configurations

3.5.1 Reference planning configurations for DVB-T

In order to define reference planning configurations (RPCs) for DVB-T, the planning configurations can be grouped according to reception mode and frequency band.

The reception modes have been grouped as follows:

– fixed reception;

– portable outdoor reception, mobile reception and lower coverage quality portable indoor reception;

– higher coverage-quality portable indoor reception.

For reference frequencies:

– 200 MHz (VHF);

– 650 MHz (UHF).

The reference planning configurations for DVB-T that shall be used are summarized in Table A.3.5-1.

TABLE A.3.5-1

RPCs for DVB-T

RPC	RPC 1	RPC 2	RPC 3
Reference location probability	95%	95%	95%
Reference C/N (dB)	21	19	17
Reference $(E_{med})_{ref}$ (dB(μV/m)) at f_r = 200 MHz	50	67	76
Reference $(E_{med})_{ref}$ (dB(μV/m)) at f_r = 650 MHz	56	78	88

$(E_{med})_{ref}$: Reference value for minimum median field strength

RPC 1: RPC for fixed reception

RPC 2: RPC for portable outdoor reception or lower coverage quality portable indoor reception or mobile reception

RPC 3: RPC for higher coverage quality for portable indoor reception

For other frequencies, the reference field-strength values in Table A.3.5-1 shall be adjusted by adding the correction factor defined according to the following rule:

– $(E_{med})_{ref}(f) = (E_{med})_{ref}(f_r)$ + Corr;

– for fixed reception, Corr = 20 $\log_{10}$ (f/f_r), where f is the actual frequency and f_r the reference frequency of the relevant band quoted in Table A.3.5-1;

– for portable reception and mobile reception, Corr = 30 $\log_{10}$ (f/f_r) where f is the actual frequency and f_r the reference frequency of the relevant band quoted in Table A.3.5-1.

The reference parameters of the RPC that are given in Table A.3.5-1 (location probability, *C*/*N*, minimum median field strength) are not associated with a particular DVB-T system variant or a real DVB-T network implementation; rather, they stand for a large number of different real implementations. For instance, a DVB-T service for mobile reception might use as real implementation parameters a location probability of 99% and a rugged DVB-T variant with a *C*/*N* of 14 dB. Nevertheless, this service will be represented by RPC 2 with a reference location probability of 95% and a reference *C*/*N* of 19 dB without restricting the possibilities for the implementation of the “real” service for mobile DVB-T reception.

The standard deviation used for the calculation of the location correction factor (see § 3.4.5 of this chapter) of each RPC shall be as follows:

– for RPC 1 and RPC 2: 5.5 dB in VHF and UHF,

– for RPC 3: 6.3 dB in VHF and 7.8 dB in UHF.

Protection ratios for the RPCs provided in Annex 3.3 to this chapter shall be used.

3.5.2 Reference planning configurations for T-DAB

The two RPCs defined in Table A.3.5-2 for T-DAB in Band III shall be used:

TABLE A.3.5-2

RPCs for T-DAB

Reference planning configuration	RPC 4	RPC 5
Location probability	99%	95%
Reference *C*/*N* (dB)	15	15
Reference $(E_{med})_{ref}$ (dB(μV/m)) at f_r = 200 MHz	60	66

$(E_{med})_{ref}$: Reference value for minimum median field strength

RPC 4: RPC for mobile reception

RPC 5: RPC for portable indoor reception

For other frequencies, the reference field-strength values in Table A.3.5-2 shall be adjusted by adding the correction factor defined according to the following rule:

– $(E_{med})_{ref}(f) = (E_{med})_{ref}(f_r)$ + Corr;

– Corr = 30 $\log_{10}$ (f/f_r) where f is the actual frequency and f_r the reference frequency of the relevant band quoted in Table A.3.5-2.

The relevant protection ratios for compatibility calculations in Annex 3.3 to this chapter shall be used.

ANNEX 3.6

Reference networks

3.6.1 Reference networks for DVB-T

3.6.1.1 General considerations

Four reference networks (RNs) have been designed in order to cover the different implementation requirements for DVB-T networks.

For the determination of the power budget of the reference networks, antenna heights and powers are adjusted in such a way that the desired coverage probability is achieved at each location of the service area.

The method of adjusting the power budget of the network uses a noise-limited basis, which is known to be not very frequency-efficient. To overcome this drawback, the powers of the transmitters in the reference networks are increased by a value of 3 dB. (See Tables A.3.6-1 to A.3.6-4.)

For the effective antenna heights of the transmitter in the reference networks, 150 m shall be used as an average value.

An open network structure has been chosen for the reference networks, since it is assumed that real network implementations will normally resemble this network type. The service area is defined as a hexagon about 15% larger than the hexagon formed by the peripheral transmitters. However, in order to allow for network implementations with very low interference potentials, a reference network with a semi-closed network structure is also introduced. (See reference network 4 in § 3.6.1.5 of this annex.)

In some cases, the interference potentials of reference networks significantly overestimate the interference potential of real network implementations, for example, where the standard geometry of a reference network differs considerably from the particular shape of the real service area. In these cases, administrations may adopt an appropriate method, agreed on bilateral basis, to better model the interference potential of the reference network.

3.6.1.2 Reference network 1 (large service-area SFN)

The network consists of seven transmitters situated at the centre and at the vertices of a hexagonal lattice. An open network type has been chosen, i.e. the transmitters have non-directional antenna patterns and the service area is assumed to exceed the transmitter hexagon by about 15%. The geometry of the network is given in Fig. A.3.6-1.

This reference network (RN 1) is applied to different cases: fixed (RPC 1), outdoor/mobile (RPC 2) and indoor (RPC 3) reception, for both Band III and Bands IV/V.

RN 1 is intended for large service area SFN coverage. It is assumed that main transmitter sites with an appropriate effective antenna height are used as a backbone for this type of network. For portable and mobile reception, the size of the real service areas for this type of SFN coverage is restricted to 150 to 200 km in diameter because of self-interference degradation, unless very rugged DVB-T system variants are used or the concept of dense networks is employed.

FIGURE A.3.6-1

RN 1 (large service area SFN)

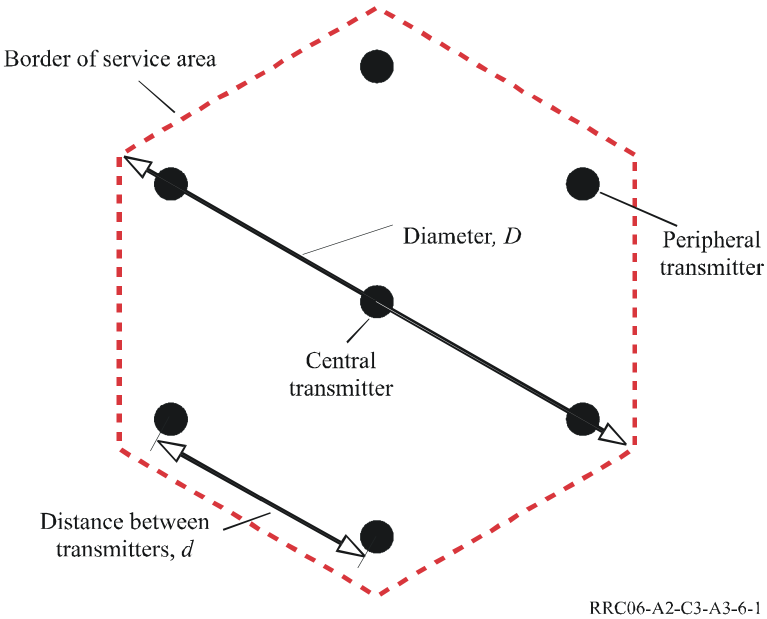


TABLE A.3.6-1

Parameters of RN 1 (large service area SFN)

RPC and reception type		**RPC 1 Fixed antenna**	**RPC 2 Portable outdoor and mobile**	**RPC 3 Portable indoor**
Type of network		Open	Open	Open
Geometry of service area		Hexagon	Hexagon	Hexagon
Number of transmitters		7	7	7
Geometry of transmitter lattice		Hexagon	Hexagon	Hexagon
Distance between transmitters d (km)		70	50	40
Service area diameter D (km)		161	115	92
Tx effective antenna height (m)		150	150	150
Tx antenna pattern		Non-directional	Non-directional	Non-directional
e.r.p.* (dBW)	Band III	34.1	36.2	40.0
	Bands IV/V	42.8	49.7	52.4

The e.r.p. is given for 200 MHz in Band III and 650 MHz in Bands IV/V; for other frequencies (f in MHz) the frequency correction factor to be added is: 20 $\log_{10}(f/200$ or $f/650)$ for RPC 1 and 30 $\log_{10}(f/200$ or $f/650)$ for RPC 2 and RPC 3.

* The e.r.p. values indicated in this table incorporate an additional power margin of 3 dB.

For the guard interval length, the maximum value 1/4 T_u of the 8k FFT mode is assumed. The distance between transmitters in an SFN should not significantly exceed the distance equivalent to the guard interval duration. In this case, the guard interval duration is 224 µs, which corresponds to a distance of 67 km. The distance between transmitters for RPC 1 is taken as 70 km. For RPC 2 and RPC 3, 70 km is too large a distance from a power budget point of view. Therefore, smaller values for the distance between transmitters have been selected, 50 km for RPC 2 and 40 km for RPC 3.

The parameters and the power budgets of RN 1 given in Table A.3.6-1 shall be used.

3.6.1.3 Reference network 2 (small service area SFN, dense SFN)

The network consists of three transmitters situated at the vertices of an equilateral triangle. An open network type has been chosen, i.e. the transmitters have non-directional antenna patterns. The service area is assumed to be hexagonal, as indicated in Fig. A.3.6-2.

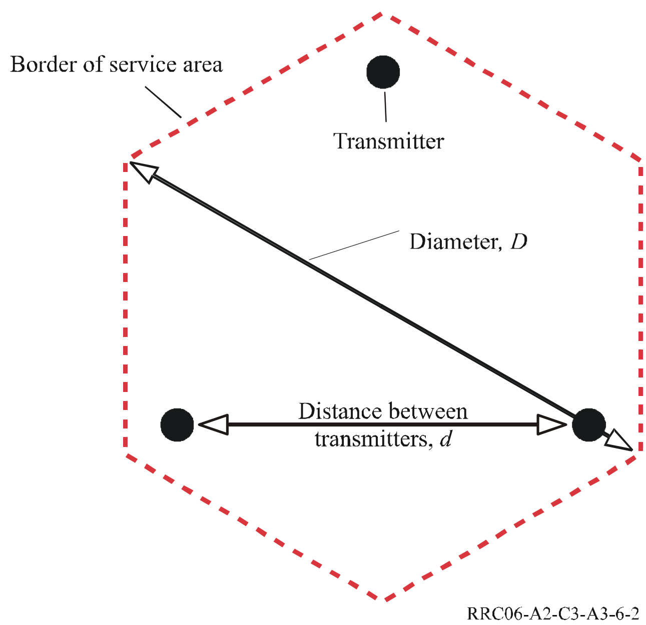
This reference network (RN 2) is applied to different cases: fixed (RPC 1), outdoor/mobile (RPC 2) and indoor (RPC 3) reception, for both Band III and Bands IV/V.

RN 2 is intended for small service area SFN coverage. Transmitter sites with appropriate effective antenna heights are assumed to be available for this type of network and self-interference restrictions are expected to be small. Typical service area diameters may be from 30 to 50 km.

It is also possible to cover large service areas with this kind of dense SFN. However, a very large number of transmitters is then necessary. It therefore seems reasonable to have large service areas being represented by RN 1, even if a dense network structure is envisaged.

FIGURE A.3.6-2

RN 2 (small service area SFN)



In RN 2 the inter-transmitter distance is 25 km in the case of RPCs 2 and 3. It is therefore possible to use a value of 1/8 T_u (8k FFT) for the guard interval, which would increase the available data capacity as compared to the use of a guard interval of 1/4 T_u. The same guard interval value might also be feasible for RPC 1, with its greater distance between transmitters of 40 km, since fixed roof-level reception is less sensitive to self-interference because of the directional properties of the receiving antenna.

The parameters and the power budgets of the RN 2 given in Table A.3.6-2 shall be used.

TABLE A.3.6-2

Parameters of RN 2 (small service area SFN)

RPC and reception type		**RPC 1 Fixed antenna**	**RPC 2 Portable outdoor and mobile**	**RPC 3 Portable indoor**
Type of network		Open	Open	Open
Geometry of service area		Hexagon	Hexagon	Hexagon
Number of transmitters		3	3	3
Geometry of transmitter lattice		Triangle	Triangle	Triangle
Distance between transmitters *d* (km)		40	25	25
Service area diameter *D* (km)		53	33	33
Tx effective antenna height (m)		150	150	150
Tx antenna pattern		Non-directional	Non-directional	Non-directional
e.r.p.* (dBW)	Band III	24.1	26.6	34.1
	Bands IV/V	31.8	39.0	46.3

The e.r.p. is given for 200 MHz in Band III and 650 MHz in Bands IV/V; for other frequencies (f in MHz) the frequency correction factor to be added is: 20 $\log_{10}(f/200$ or $f/650)$ for RPC 1 and 30 $\log_{10}(f/200$ or $f/650)$ for RPC 2 and RPC 3.

* The e.r.p. values indicated in this table incorporate an additional power margin of 3 dB.

3.6.1.4 Reference network 3 (small service area SFN for urban environment)

The geometry of the transmitter lattice of reference network 3 (RN 3) and the service area are identical to those of RN 2. (See Fig. A.3.6-2.)

RN 3 is applied to different cases: fixed (RPC 1), outdoor/mobile (RPC 2) and indoor (RPC 3) reception, for both Band III and Bands IV/V.

RN 3 is intended for small service area SFN coverage in an urban environment. It is identical to RN 2, apart from the fact that urban-type height loss figures are used. This increases the required power of the SFN transmitters by about 5 dB for RPC 2 and RPC 3.

The parameters and the power budgets of the RN 3 given in Table A.3.6-3 shall be used.

TABLE A.3.6-3

Parameters of RN 3 (small service area SFN for urban environment)

RPC and reception type		**RPC 1 Fixed antenna**	**RPC 2 Portable outdoor and mobile**	**RPC 3 Portable indoor**
Type of network		Open	Open	Open
Geometry of service area		Hexagon	Hexagon	hexagon
Number of transmitters		3	3	3
Geometry of transmitter lattice		Triangle	Triangle	Triangle
Distance *d* (km)		40	25	25
Service area diameter *D* (km)		53	33	33
Tx effective antenna height (m)		150	150	150
Tx antenna pattern		Non-directional	Non-directional	Non-directional
e.r.p.* (dBW)	Band III	24.1	32.5	40.1
	Bands IV/V	31.8	44.9	52.2

The e.r.p. is given for 200 MHz in Band III and 650 MHz in Bands IV/V; for other frequencies (f in MHz) the frequency correction factor to be added is: 20 $\log_{10}$ (*f*/200 or *f*/650) for RPC 1 and 30 $\log_{10}$ (*f*/200 or *f*/650) for RPC 2 and RPC 3.

* The e.r.p. values indicated in this table incorporate an additional power margin of 3 dB.

3.6.1.5 Reference network 4 (semi-closed small service area SFN)

This reference network (RN 4) is intended for cases in which increased implementation efforts regarding transmitter locations and antenna patterns are undertaken in order to reduce the outgoing interference of the network.

The geometry for RN 4 is identical to that for RN 2, except for the antenna patterns of the transmitters, which have a reduction of the outgoing field strength of 6 dB over 240 degrees (i.e. it is a semi-closed RN). The service area of this RN is shown in Fig. A.3.6-3. A sharp transition from 0 dB to 6 dB reduction is assumed at the indicated bearings.

RN 4 is applied to different cases: fixed (RPC 1), outdoor/mobile (RPC 2) and indoor (RPC 3) reception, for both Band III and Bands IV/V.

FIGURE A.3.6-3

RN4 (semi-closed small service area SFN)

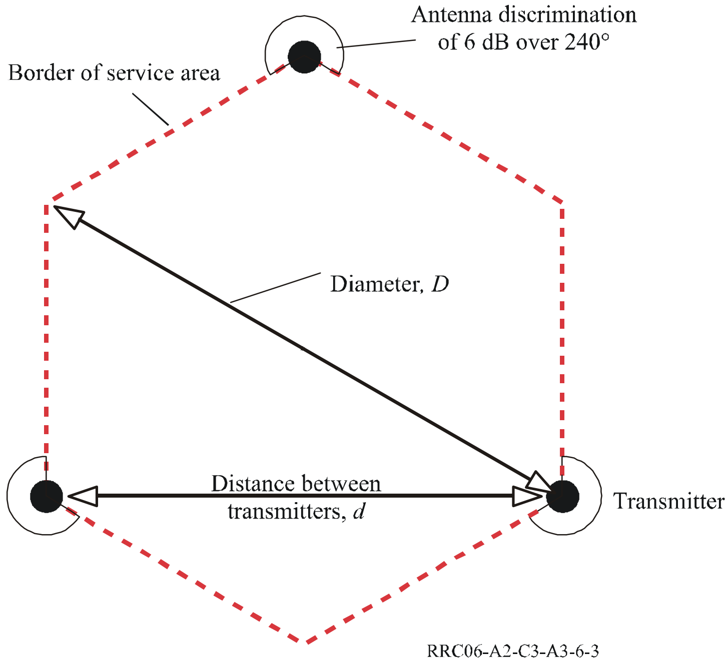


TABLE A.3.6-4

Parameters of RN 4 (semi-closed small service area SFN)

RPC		**RPC 1**	**RPC 2**	**RPC 3**
Type of network and reception type		Semi-closed Fixed antenna	Semi-closed Portable outdoor and mobile	Semi-closed Portable indoor
Geometry of service area		Hexagon	Hexagon	Hexagon
Number of transmitters		3	3	3
Geometry of transmitter lattice		Triangle	Triangle	Triangle
Distance between transmitters *d* (km)		40	25	25
Service area diameter *D* (km)		46	29	29
Tx effective antenna height (m)		150	150	150
Tx antenna pattern		Directional 6 dB reduction over 240°	Directional 6 dB reduction over 240°	Directional 6 dB reduction over 240°
e.r.p.*(dBW)	Band III	22.0	24.0	32.5
	Bands IV/V	29.4	37.2	44.8

The e.r.p. is given for 200 MHz in Band III and 650 MHz in Bands IV/V; for other frequencies (f in MHz) the frequency correction factor to be added is: 20 $\log_{10}$ (f/200 or f/650) for RPC 1 and 30 $\log_{10}$ (f/200 or f/650) for RPC 2 and RPC 3.

* The e.r.p. values indicated in this table incorporate an additional power margin of 3 dB.

The difference between RN 4 and RN 2 is the outgoing interference (interference potential). RN 4 has a lower interference potential as compared to that of RN 2. Because of this, the distance at which the same frequency can be reused is smaller when two allotments are both planned with RN 4.

There is a trade-off between this lower interference potential and the increased implementation costs to achieve the directional antennas. This should be kept in mind when choosing this RN for planning. There is also a reduction in the diameters of the service areas compared to those for RN 2.

The parameters and the power budgets of the RN 4 given in Table A.3.6-4 shall be used.

3.6.2 Reference networks for T-DAB

For T-DAB, two RPCs have been defined, RPC 4 for the mobile reception case and RPC 5 for the portable indoor reception case. Two corresponding reference networks have been designed which are identical apart from their power budget. They are directly connected to the two RPCs.

For RPC 4, the mobile reception case, the reference network consists of seven transmitters located at the centre and the vertices of a hexagon and is of the closed network type. The power of the central transmitter is reduced by 10 dB with respect to the peripheral transmitters, which have a power of 1 kW. The antenna patterns of the peripheral transmitters have a reduction of the outgoing field strength of 12 dB over 240°. A sharp transition from 0 dB to 12 dB reduction is assumed at the indicated bearings.

TABLE A.3.6-5

Parameters of RN 5 for RPC 4 and RN 6 for RPC 5

RPC	RPC 4	RPC 5
Reception type	Mobile	Portable indoor
Type of network	Closed	closed
Geometry of service area	Hexagon	Hexagon
Number of transmitters	7	7
Geometry of transmitter lattice	Hexagon	Hexagon
Distance between transmitters *d* (km)	60	60
Service area diameter *D* (km)	120	120
Tx effective antenna height (m)	150	150
Peripheral Tx antenna pattern	Directional 12 dB reduction over 240°	Directional 12 dB reduction over 240°
Central Tx antenna pattern	Non-directional	Non-directional
Peripheral Tx e.r.p. (dBW)	30.0	39.0
Central Tx e.r.p. (dBW)	20.0	29.0

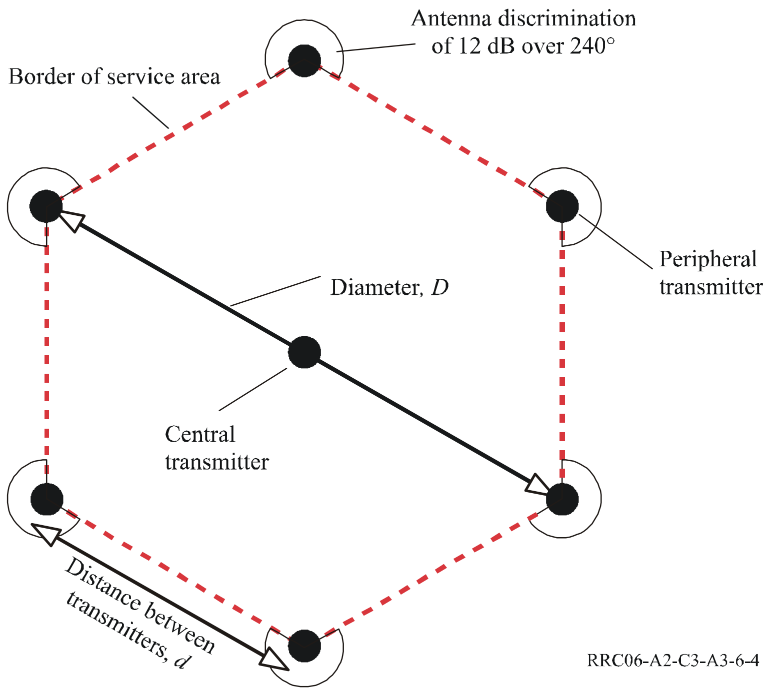
The e.r.p. is given for 200 MHz; for other frequencies (f in MHz) the frequency correction factor to be added is: $30 \log_{10} (f/200)$ for RPC 4 and RPC 5.

For RPC 5, the portable indoor reception case, the same reference network characteristics are used as for RPC 4, apart from the transmitter powers which are increased by 9 dB, corresponding to the higher minimum field strength needed for this reception mode.

The parameters and the power budgets of the RN 5 for RPC 4 and RN 6 for RPC 5 given in Table A.3.6-5 shall be used. Fig. A.3.6-4 shows the geometry of the RNs.

FIGURE A.3.6-4

Geometry of the RNs for T-DAB



ANNEX 3.7

Calculation of interference for single-frequency networks and allotments

The interference for single-frequency networks (SFNs) and allotments is aggregated, in order to ensure equitable treatment between the different combinations of allotment and assignments. The following calculation methods shall be used by BR and by the administrations unless otherwise mutually agreed by the concerned administrations for the different cases of allotment and assignments as shown in the table below.

Case	Description	Calculation methods
1	A number of digital assignments that make up a SFN, notified with the same SFN-ID.	Separate coverage contours are calculated for each individual digital assignment. No overall contour enclosing all these digital assignments will be established. Incompatibilities between these digital assignments are not taken into account. Incompatibilities with other digital requirements are calculated as the power sum of the individual digital assignments. Interference to assignments within the SFN is calculated to their individual coverage contours.
2	One or many digital assignments linked to an allotment. All digital assignments are notified with the same allotment ID and the same SFN-ID.	Interference from the requirement is the higher value of either: – the power sum of interference from the individual digital assignments; or – the interference from the reference network associated with the allotment (the latter being treated as in case 4, below). Interference to the allotment is calculated at the test points that define the allotment area of the allotment (see also case 4).
3	A single digital assignment linked to an allotment with no SFN identification. It is not possible to add another assignment to the allotment unless the allotment is modified.	Interference from the requirement is that from the digital assignment. Interference to the allotment is calculated at the test points that define the allotment area of the allotment.
4	An allotment with no linked assignments notified.	Interference from the allotment is calculated using the reference network associated with the allotment and located at the test points that define the allotment area of the allotment. Interference to the allotment is calculated at the test points that define the allotment area of the allotment.

CHAPTER 4
TO ANNEX 2

Compatibility with other primary services

4 Introduction

This chapter contains technical parameters and protection criteria for the compatibility analysis of other primary services with broadcasting services, which were used in the development of the Plan and shall be used for its implementation.

These technical parameters and protection criteria could be used during the coordination process in respect to the new or modified assignments/allotments, if no other mutual Agreements covering this issue between administrations concerned exists.

Additional technical parameters and protection criteria, which were not used in the development of the Plan, are also contained in annexes to this chapter. These technical parameters and protection criteria may be used during the coordination process in respect to the new or modified assignments/allotments, if no other mutual Agreements covering this issue between administrations concerned exist.

With regard to other services, the GE06 Agreement only deals with other primary terrestrial services. Sharing between broadcasting and space services is subject to the relevant provisions of the Radio Regulations (RR).

4.1 Compatibility with other primary terrestrial services in the planned bands

4.1.1 Other primary services and sharing situations in the bands 174-230 MHz and 470-862 MHz

Most countries from the planning area use the broadcasting service in the bands 174-230 MHz and 470-862 MHz; however, the broadcasting service does not have exclusive access to these bands. At the time when this Agreement was prepared the following sharing situations exist.

4.1.1.1 Sharing situations with other terrestrial primary services

In the VHF band, the following primary allocations exist for other services in the Planning Area in the band 174-230 MHz:

– the **fixed service** in the Islamic Republic of Iran, in the band 174-230 MHz;
– the **mobile service** in the Islamic Republic of Iran, in the band 174-230 MHz;
– the **aeronautical radionavigation service** in the Islamic Republic of Iran and in the countries of Region 1 listed in RR No. 5.247, in the band 223-230 MHz;
– the **land mobile service** in the band 174-223 MHz, allocated to countries listed in RR No. 5.235. Protection is required only between the countries mentioned in that provision.

In the UHF band, the following primary allocations exist in the Planning Area in the band 470-862 MHz:

– the **fixed service** in Region 1 and in the Islamic Republic of Iran in the band 790-862 MHz, and in the Islamic Republic of Iran in the band 470-790 MHz;

– the **mobile service** in the Islamic Republic of Iran, in the band 470-862 MHz;

– the **mobile, except aeronautical mobile, service** in the band 790-862 MHz, allocated to the countries of Region 1 listed in RR No. 5.316. Protection is required only between countries mentioned in that provision;

– the **radionavigation service** in the Islamic Republic of Iran, in the band 585-610 MHz;

– the **aeronautical radionavigation service** in the United Kingdom in the band 590-598 MHz according to RR No. 5.302 and in the countries of Region 1 listed in RR No. 5.312 in the band 645-862 MHz;

– the **radio astronomy service**, which could be used in the whole of the African Broadcasting Area, in the band 606-614 MHz, according to RR No. 5.304.

4.1.2 Protection of terrestrial services, including aeronautical stations of other primary terrestrial services, against transmissions of digital terrestrial broadcasting

4.1.2.1 Protection criteria for other primary services interfered with by digital terrestrial broadcasting

Protection criteria for other primary services are given in Annexes 4.1 and 4.2 to this chapter. This includes some generic information as well as default values for field strengths to be protected, protection ratios (PR) as a function of frequency separation, and receiving antenna heights for some typical systems.

Annex 4.1 to this chapter supplies protection criteria for other primary services interfered with by digital terrestrial sound broadcasting (T-DAB), and Annex 4.2 to this chapter supplies protection criteria for other primary services interfered with by digital terrestrial television broadcasting (DVB-T).

4.1.2.2 Calculations required to protect other primary terrestrial services from digital terrestrial broadcasting

When preparing the Plan, a calculation was made for all fixed locations and all test points defining the boundary of the service area of the other primary service using the following steps:

Calculate the interfering field strength (50% of the location value and the appropriate percentage time value) caused by the digital terrestrial broadcasting assignment or allotment, taking into account the directivity of the transmitting antenna if relevant.

Calculate from this the nuisance field strength caused by the digital terrestrial broadcasting assignment or allotment, taking into account the protection ratio and, if relevant, receiving antenna discrimination (directivity, polarization).

Subtract the nuisance field strength (caused by the broadcasting assignment or allotment) and the combined location correction factor from the minimum field strength (50% of the location value), to give the protection margin which was used for the coordination process.

Information on the propagation models used for the calculations can be found in Chapter 2 of Annex 2 of the Agreement.

Additional assumptions concerning other services, e.g. antenna heights, which have been used in the calculations are provided in Annex 4.5 to this chapter.

An allowance has been made for interference in the preparation of the Plan. For this purpose a concept of limiting margin has been introduced. The term "limiting margin" is to be interpreted in the sense that any calculated margin which is less than the relevant limiting margin indicates a compatible situation. For the development of the Plan in the case of wanted other primary terrestrial assignments, the limiting value of the margin has been taken to be 1.0 dB. This 1 dB limiting margin will result in a 6 dB difference between the minimum median field strength and the nuisance field strength.

However, in many cases administrative declarations allowing a higher level of interference have been agreed during the development of the Plan.

4.1.3 Protection of digital terrestrial broadcasting against transmissions of stations of other primary terrestrial services

4.1.3.1 Protection criteria for digital terrestrial broadcasting interfered with by other primary terrestrial services

In Annexes 4.3 and 4.4 to this chapter, protection criteria for digital terrestrial broadcasting are given, such as minimum field strength to be protected and protection ratios as a function of frequency separation.

Annex 4.3 to this chapter supplies protection criteria for T-DAB interfered with by other primary services, and Annex 4.4 to this chapter supplies protection criteria for DVB-T interfered with by other primary services.

4.1.3.2 Calculations required to protect digital terrestrial broadcasting from other primary terrestrial services

When preparing the Plan, a calculation was made for each of the test points defining the coverage area of a digital terrestrial broadcasting requirement using the following steps:

Calculate the interfering field strength (50% of the location value and the appropriate time percentage value) caused by the other primary service, taking into account the directivity of the transmitting antennas if relevant.

Calculate from this the nuisance field strength caused by the other primary service, taking into account the protection ratio and, if relevant, receiving antenna discrimination (directivity, polarization).

Subtract the nuisance field strength (caused by the other primary service) and the combined location correction factor from the minimum field strength to be protected (50% of the location value) to give the protection margin which was used for the coordination process.

Information on the propagation models to be used for the calculations can be found in Chapter 2.

Additional assumptions concerning other services, e.g. antenna heights, which have been used in the calculations are provided in Annex 4.5 to this chapter.

An allowance has been made for multiple interference in the preparation of the Plan. For this purpose a concept of limiting margin has been introduced. The term "limiting margin" is to be interpreted in the sense that any calculated margin which is less than the relevant limiting margin indicates a compatible situation. For the development of the Plan in the case of wanted digital terrestrial broadcasting, the limiting value of the margin has been taken to be 1.25 dB. The value of 1.25 dB is based on the assumption that there can be six separate interfering sources, each producing the same value of nuisance field strength. This 1.25 dB limiting margin will result in 4.771 dB more stringent criteria for the single-entry interference.

However, in many cases administrative declarations allowing a higher level of interference have been agreed during the development of the Plan, as well as for the case of planning between broadcasting applications.

4.2 Sharing situations with primary space services

In the UHF band there are primary allocations to the mobile-satellite service (MSS) and the broadcasting-satellite service (BSS):

– the **broadcasting-satellite service** in the band 620-790 MHz (see RR No. 5.311* (WRC-03));

– the **mobile-satellite, except aeronautical mobile-satellite (R), service** in the bands 806-840 MHz (Earth-to-space) and 856-862 MHz (space-to-Earth) used only by countries listed in RR No. 5.319.

Relationships between broadcasting and space services are subject to the relevant provisions of the RR.

Note to Annexes 4.1-4.5 to this chapter – The term "system type code" corresponds to the term "service type code" used for other primary services in the development of the digital Plan.

---

* See also Resolution COM5/1 (RRC-06).

ANNEX 4.1

Protection criteria for other primary services interfered with by T-DAB

Values for field strength to be protected for other primary services interfered with by T-DAB are provided in Table A.4.1-1, and the related protection ratio tables for these other services are provided in Tables A.4.1-2 to A.4.1-12.

TABLE A.4.1-1

System type code	Type of system	Field strength to be protected (dB(μV/m))	Receiver height (m)	Protection ratio table
AL**	Aeronautical mobile (OR) system AL	26	10 000	A.4.1-2
CA**	Fixed system CA	15	10	A.4.1-5
DA**	Aeronautical mobile (OR) system DA	26	10 000	A.4.1-11
DB**	Aeronautical mobile (OR) system DB	26	10 000	A.4.1-12
IA**	Fixed system IA	48	10	A.4.1-6
MA	Land mobile system MA	4	10	A.4.1-3
MT	Mobile and fixed systems MT (transportable)	20	10	A.4.1-4
MU**	Mobile system MU (low power)	54	10	A.4.1-7
M1	Mobile system M1 (narrow-band FM, 12.5 kHz) interfered with by a single T-DAB block(1) (private mobile radio)	15	10	A.4.1-5
M2**	Mobile system M2 (narrow-band), interfered with by two or more T-DAB blocks	36	10	A.4.1-5
RA1**	Mobile system RA1 (narrow-band FM, 12.5 kHz) interfered with by a single T-DAB block(1)	15.0	1.5	A.4.1-5
RA2**	Mobile system RA2 (narrow-band FM, 12.5 kHz) interfered with by a single T-DAB block(1)	7.0	20.0	A.4.1-5
R1**	Land mobile system R1 (medical telemetry)	32.0	10.0	A.4.1-8
R3**	Mobile system R3 (remote control)	30.0	10.0	A.4.1-7
R4**	Mobile system R4 (remote control)	30.0	10.0	A.4.1-7
XA**	Land mobile system XA (private mobile radio)	15.0	10.0	A.4.1-5
XB**	Fixed system XB (alarm system)	37.0	10.0	A.4.1-9
XE**	Aeronautical mobile (OR) system XE	0.0	0.0	A.4.1-10
XM**	Land mobile system XM (radio microphones, VHF)	48.0	10.0	A.4.1-6

** The protection criteria for this system were not used during the development of the Plan due to the absence of corresponding assignments in the reference situation (see also the introduction to this chapter).

(1) The T-DAB frequency is assumed to be always higher than the private mobile radio frequency.

Notes to Table A.4.1-1:

1) For systems AL, DA and DB a separation distance of 1 000 m between the AL receiver and the T-DAB transmitter was assumed.

2) In the following tables:

Δf: frequency difference (MHz), i.e. interfering T-DAB block centre frequency minus centre frequency of interfered-with other primary service

PR 1%: protection ratio (dB) required for tropospheric interference.

TABLE A.4.1-2

AL

Δf (MHz)	–10.000	–9.000	–0.800	–0.600	–0.400	–0.200	0.000	0.200	0.400	0.600	0.800
PR 1% (dB)	–66.0	–6.6	–6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	–6.6
Δf (MHz)	9.000	10.000									
PR 1% (dB)	–6.6	–66.0									

TABLE A.4.1-3

MA

Δf (MHz)	–1.000	–0.900	0.000	0.900	1.000
PR 1% (dB)	–60.0	–40.0	12.0	–40.0	–60.0

TABLE A.4.1-4

MT

Δf (MHz)	–2.000	–1.000	0.000	1.000	2.000
PR 1% (dB)	–5.0	15.0	25.0	15.0	–5.0

TABLE A.4.1-5

CA, M1, M2, RA1, RA2, XA

Δf (MHz)	–0.920	–0.870	–0.820	–0.795	–0.782	–0.770	0.00	0.770	0.782	0.795	0.820	0.870	0.920
PR 1% (dB)	–58.0	–49.0	–41.0	–37.0	–34.0	–14.0	–12.0	–14.0	–34.0	–37.0	–41.0	–49.0	–58.0

TABLE A.4.1-6

IA, XM

Δf (MHz)	–1.00	–0.900	–0.800	0.000	0.800	0.900	1.000				
PR 1% (dB)	–22.0	–16.0	18.0	18.0	18.0	–16.0	–22.0				

TABLE A.4.1-7

MU, R3, R4

Δf (MHz)	–1.000	–0.900	–0.800	0.000	0.800	0.900	1.000				
PR 1% (dB)	–12.0	5.0	38.0	38.0	38.0	5.0	–12.0				

TABLE A.4.1-8

R1

Δf (MHz)	–1.800	–1.600	0.000	1.600	1.800						
PR 1% (dB)	–60.0	–6.0	–6.0	–6.0	–60.0						

TABLE A.4.1-9

XB

Δf (MHz)	–0.600	–0.500	0.000	0.500	0.600						
PR 1% (dB)	–60.0	10.0	10.0	10.0	–60.0						

TABLE A.4.1-10

XE

Δf (MHz)	–0.100	0.000	0.100								
PR 1% (dB)	–60.0	–60.0	–60.0								

TABLE A.4.1-11

DA

Δf (MHz)	–10.20	–6.550	–6.350	–6.150	–5.930	–5.770	0.000	10.000			
PR 1% (dB)	–56.0	–56.0	–54.0	–49.0	–33.0	6.0	6.0	6.0			

TABLE A.4.1-12

DB

Δf (MHz)	–5.250	–4.470	–4.270	0.000	9.770	9.970	10.750				
PR 1% (dB)	–81.0	–46.0	–1.0	–1.0	–1.0	–46.0	–81.0				

ANNEX 4.2

Protection criteria for other primary services interfered with by DVB-T

This annex contains system-specific protection criteria for certain systems of other primary services operating in the bands 174-230 MHz and 470-862 MHz as well as generic protection criteria for the fixed and mobile services operating in the bands 174-230 MHz and 470-862 MHz. The systems for which protection criteria are provided are listed in Table A.4.2-1.

TABLE A.4.2-1

System type code	Secondary code implemented in the planning software	Type of system	Field strength to be protected (dB(μV/m))	Receiver height (m)	Protection ratio table
AA8	BL8	Aeronautical radionavigation system BL8 (RSBN, 0.7 or 0.8 MHz)	42.0	10 000.0	A.4.2-24
AA8	BN8	Aeronautical radionavigation system BN8 (RSBN, 3 MHz)	42.0	10.0	A.4.2-24
AA8	BY8	Aeronautical radionavigation system BY8 (RSBN, 0.7 MHz)	42.0	10.0	A.4.2-24
AA8	BX8	Aeronautical radionavigation system BX8 (RSBN, 3 MHz)	42.0	10 000.0	A.4.2-24
AB	AB8N	Aeronautical radionavigation system AB8N (RLS 1 Type 1, 6 MHz)	13.0	10.0	A.4.2-16
AB	AB8C	Aeronautical radionavigation system AB8C (RLS 1 Type 1, 6 MHz)	13.0	10.0	A.4.2-17
AB	AC8N	Aeronautical radionavigation system AC8N (RLS 1 Type 2, 3 MHz)	13.0	10.0	A.4.2-18
AB	AC8C	Aeronautical radionavigation system AC8C (RLS 1 Type 2, 3 MHz)	13.0	10.0	A.4.2-19
BA	BA8N	Aeronautical radionavigation system BA8N (RLS 2 Type 1)	29.0	10.0	A.4.2-20
BA	BA8C	Aeronautical radionavigation system BA8C (RLS 2 Type 1)	29.0	10.0	A.4.2-21

TABLE A.4.2-1 (*continued)*

System type code	Secondary code implemented in the planning software	Type of system	Field strength to be protected (dB(μV/m))	Receiver height (m)	Protection ratio table
AA2	BB8N	Aeronautical radionavigation system BB8N (RLS 2 Type 2, airborne transmission, 8 MHz)	24.0	10.0	A.4.2-22
AA2	BB8C	Aeronautical radionavigation system BB8C (RLS 2 Type 2, airborne transmission, 8 MHz)	24.0	10.0	A.4.2-23
BC	BC8N	Aeronautical radionavigation system BC8N (RLS 2 Type 2, ground transmission, 3 MHz)	73.0	10 000.0	A.4.2-18
BC	BC8C	Aeronautical radionavigation system BC8C (RLS 2 Type 2, ground transmission, 3 MHz)	73.0	10 000.0	A.4.2-19
BD	BD8N	Aeronautical radionavigation system BD8N (RLS 2 Type 1, ground transmission, 4 MHz)	52.0	10 000.0	A.4.2-20
BD	BD8C	Aeronautical radionavigation system BD8C (RLS 2 Type 1, ground transmission, 4 MHz)	52.0	10 000.0	A.4.2-21
FF	FF7	Fixed system FF7 (transportable, 7 MHz)	35.0	10.0	A.4.2-2
FF	FF8	Fixed system FF8 (transportable, 8 MHz)	35.0	10.0	A.4.2-3
FH	FH8	Fixed system FH8 (P-MP)	18.0	10.0	A.4.2-4
FK7	FK7N	Generic fixed non-critical mask	–	10.0	(See Note)
FK7	FK7C	Generic fixed sensitive mask	–	10.0	(See Note)
FK8	FK8N	Generic fixed non-critical mask	–	10.0	(See Note)
FK8	FK8C	Generic fixed sensitive mask	–	10.0	(See Note)
NX**	NX8	Land mobile system NX8	27.0	20.0	A.4.2-7
NR**	NR7	Land mobile system NR7 (radio microphone, 7 MHz)	68.0	1.5	A.4.2-8
NR**	NR8	Land mobile system NR8 (radio microphone, 8 MHz)	68.0	1.5	A.4.2-9
NS**	NS7	Mobile system NS7 (OB link, stereo, non-companded)	86.0	10.0	A.4.2-10
NS**	NS8	Mobile system NS8 (OB link, stereo, non-companded)	86.0	10.0	A.4.2-11

** The protection criteria for this system were not used during the development of the plan due to the absence of corresponding assignments in the reference situation (see also the introduction to this chapter).

TABLE A.4.2-1 (*continued)*

System type code	**Secondary code implemented in the planning software**	**Type of system**	**Field strength to be protected (dB(µV/m))**	**Receiver height (m)**	**Protection ratio table**
NT**	NT7	Mobile system NT7 (talkback, non-companded)	31.0	1.5	A.4.2-12
NT**	NT8	Mobile system NT8 (talkback, non-companded)	31.0	1.5	A.4.2-13
NA	NA8N	Digital land mobile system NA8N (non-critical)	13.0	20.0	A.4.2-14
NA	NA8C	Digital land mobile system NA8C (sensitive)	13.0	20.0	A.4.2-15
NB	NB7N	Generic mobile non-critical mask	–	10.0	(See Note)
NB	NB7C	Generic mobile sensitive mask	–	10.0	(See Note)
NB	NB8N	Generic mobile non-critical mask	–	10.0	(See Note)
NB	NB8C	Generic mobile sensitive mask	–	10.0	(See Note)
XG	XG8	Aeronautical radionavigation system XG8 (on channel 36, 4 MHz airport radars, UK)	–12.0	7.0	A.4.2-25
PL	PL8	Aeronautical radionavigation system PL8 (radars, artificial values)	0.0	1.5	A.4.2-25
NY	X7N	Land mobile system X7N (VHF)	28.0	1.5	A.4.2-26
NY	X7C	Land mobile system X7C (VHF)	28.0	1.5	A.4.2-27
NY	X8N	Land mobile system X8N (VHF)	28.0	1.5	A.4.2-28
NY	X8C	Land mobile system X8C (VHF)	28.0	1.5	A.4.2-29
NY	Y8N	Land mobile system Y8N at 480 MHz	31.0	1.5	A.4.2-28
NY	Y8C	Land mobile system Y8C at 480 MHz	31.0	1.5	A.4.2-29
NY	Z8N	Land mobile system Z8C at 620 MHz	33.0	1.5	A.4.2-28
NY	Z8C	Land mobile system Z8C at 620 MHz	33.0	1.5	A.4.2-29

** The protection criteria for this system were not used during the development of the plan due to the absence of corresponding assignments in the reference situation (see also the introduction to this chapter).

TABLE A.4.2-1 (*end)*

System type code	**Secondary code implemented in the planning software**	**Type of system**	**Field strength to be protected (dB(µV/m))**	**Receiver height (m)**	**Protection ratio table**
XA8**	ZA8C	Radio astronomy single dish telescope sensitive DVB-T mask	–39.0	50.0	A.4.2-5
XA8**	ZA8N	Radio astronomy single dish telescope non-critical DVB-T mask	–39.0	50.0	A.4.2-6
XB8**	ZB8C	Radio astronomy VLBI sensitive DVB-T mask	2.0	50.0	A.4.2-5
XB8**	ZB8N	Radio astronomy VLBI non-critical DVB-T mask	2.0	50.0	A.4.2-6
	ZC8C**	Radio astronomy interferometry sensitive DVB-T mask	–22.0	50.0	A.4.2-5
	ZC8N**	Radio astronomy interferometry non-critical DVB-T mask	–22.0	50.0	A.4.2-6

Note to Table A.4.2-1 – See the appendix to this annex for calculations of the field strength (dB(µV/m)) of the allowed interfering television signal for generic cases of the fixed and the mobile services.

** The protection criteria for this system were not used during the development of the plan due to the absence of corresponding assignments in the reference situation (see also the introduction to this chapter).

TABLE A.4.2-2

Transportable 7 MHz system in Netherlands FF7

Δf (MHz)	–5.5	–4.5	–3.5	0	3.5	4.5	5.5
PR (dB)	–46	–39	7	11	7	–39	–46

TABLE A.4.2-3

Transportable 8 MHz system in Netherlands FF8

Δf (MHz)	–6	–5	–4	0	4	5	6
PR (dB)	–46	–39	7	11	7	–39	–46

TABLE A.4.2-4

P-MP system in Ukraine FH8

Δf (MHz)	–6.0	–4.2	–3.9	–3.4	0.0	3.4	3.9	4.2	6.0
PR (dB)	–65.0	–54.0	–4.0	–1.0	–1.0	–1.0	–4.0	–54.0	–65.0

TABLE A.4.2-5

Radio astronomy sensitive DVB-T mask ZA8C, ZB8C, ZC8C

Abs(Δf) (MHz)	9.0	8.0	7.0	6.0	5.0	4.0	3.0	2.0	1.0	0.0
PR (dB)	–71.0	–66.0	–41.0	–9.0	–6.0	–4.0	–3.0	–2.0	–1.0	–1.0

TABLE A.4.2-6

Radio astronomy non-critical DVB-T mask ZA8N, ZB8N, ZC8N

Abs(Δf) (MHz)	9.0	8.0	7.0	6.0	5.0	4.0	3.0	2.0	1.0	0.0
PR (dB)	–61.0	–56.0	–37.0	–9.0	–6.0	–4.0	–3.0	–2.0	–1.0	–1.0

TABLE A.4.2-7

Land mobile systems – NX8

Abs(Δf) (MHz)	10.0	9.0	8.0	7.0	6.0	5.0	4.0	3.9	3.8	3.7	3.0	1.0	0.0
PR (dB)	–70.5	–67.9	–65.8	–64.3	–63.0	–61.8	–61.2	–52.3	–24.0	–23.2	–23.2	–23.2	–23.2

TABLE A.4.2-8

Radio microphone – NR7

Abs(Δf) (MHz)	10.5	8.8	7.0	5.2	3.7	3.3	3.2	0.0
PR (dB)	–49.0	–49.0	–44.0	–39.0	–34.0	8.0	13.0	13.0

TABLE A.4.2-9

Radio microphone – NR8

Abs(Δ*f*) (MHz)	12.0	10.0	8.0	6.0	4.2	3.8	3.6	0.0
PR (dB)	–50.0	–50.0	–45.0	–40.0	–35.0	7.0	12.0	12.0

TABLE A.4.2-10

OB link (stereo, non-companded) – NS7

Abs(Δ*f*) (MHz)	10.5	8.8	7.0	5.2	3.7	3.3	3.2	0.0
PR (dB)	–17.0	–16.0	–11.0	–8.0	–4.0	37.0	44.0	44.0

TABLE A.4.2-11

OB link (stereo, non-companded) – NS8

Abs(Δ*f*) (MHz)	12.0	10.0	8.0	6.0	4.2	3.8	3.6	0.0
PR (dB)	–18.0	–17.0	–12.0	–9.0	–5.0	36.0	43.0	43.0

TABLE A.4.2-12

Talkback – NT7

Abs(Δ*f*) (MHz)	10.5	8.8	7.0	5.2	3.7	3.3	3.2	0.0
PR (dB)	–96.0	–91.0	–84.0	–79.0	–69.0	–19.0	–13.0	–13.0

TABLE A.4.2-13

Talkback – NT8

Abs(Δ*f*) (MHz)	12.0	10.0	8.0	6.0	4.2	3.8	3.6	0.0
PR (dB)	–97.0	–92.0	–85.0	–80.0	–70.0	–20.0	–14.0	–14.0

TABLE A.4.2-14

Digital land mobile NA8N (non-critical)

Abs(Δ*f*) (MHz)	7.5	6.2	5.0	3.8	2.5	1.2	0.0
PR (dB)	–63.0	–57.0	–50.0	–7.0	–5.0	–5.0	–5.0

TABLE A.4.2-15

Digital land mobile NA8C (sensitive)

Abs(Δ*f*) (MHz)	7.5	6.2	5.0	3.8	2.5	1.2	0.0
PR (dB)	–73.0	–67.0	–60.0	–7.0	–5.0	–5.0	–5.0

TABLE A.4.2-16

RLS 1 Type 1 AB8N (non-critical)

Abs(Δ*f*) (MHz)	17	15	9	7.5	6.5	6	4	1	0
PR 10% (dB)	–80.6	–63.79	–47.1	–44.4	–11.7	–8.8	–4.1	–1.1	–1

TABLE A.4.2-17

RLS 1 Type 1 AB8C (sensitive)

Abs(Δ*f*) (MHz)	17	15	9	7.5	6.5	6	4	1	0
PR 10% (dB)	–90.66	–63.9	–47.3	–45.4	–11.8	–8.8	–4.1	–1.1	–1

TABLE A.4.2-18

RLS 1 Type 2 AC8N (non-critical)
RLS 2 Type 2 BC8N (non-critical)

Abs(Δ*f*) (MHz)	16	14	8	6.5	6	5	4	2	0
PR 10% (dB)	–82.8	–64	–49.2	–45.8	–45.39	–12.1	–7.25	–4	–4

TABLE A.4.2-19

RLS 1 Type 2 AC8C (sensitive)
RLS 2 Type 2 BC8C (sensitive)

Abs(Δ*f*) (MHz)	16	14	8	6.5	6	5	4	2	0
PR 10% (dB)	–92.4	–64.3	–49.4	–46.28	–46.26	–12.2	–7.27	–4	–4

TABLE A.4.2-20

RLS 2 Type 1 BA8N (non-critical)
RLS 2 Type 1 BD8N (non-critical)

Abs(Δ*f*) (MHz)	16	15	6.5	6	5.5	5	4	2.5	0
PR 10% (dB)	–81.3	–66.4	–44.1	–34	–12	–9	–5.9	–3.5	–2.8

TABLE A.4.2-21

RLS 2 Type 1 BA8C (sensitive)
RLS 2 Type 1 BD8C (sensitive)

Abs(Δ*f*) (MHz)	16	15	6.5	6	5.5	5	4	2.5	0
PR 10% (dB)	–90.9	–66.5	–44.9	–39	–12	–9	–6	–3.5	–2.8

TABLE A.4.2-22

RLS 2 Type 2 BB8N (non-critical)

Abs(Δ*f*) (MHz)	17	15	10	9	8.5	8	7	4	0
PR 10% (dB)	–79.4	–61.2	–46.3	–43.2	–43	–19.9	–8.7	–2.9	0

TABLE A.4.2-23

RLS 2 Type 2 BB8C (sensitive)

Abs(Δ*f*) (MHz)	17	15	10	9	8.5	8	7	4	0
PR 10% (dB)	–89.4	–61.3	–46.5	–43.4	–43	–20.2	–8.7	–2.9	0

TABLE A.4.2-24

Aeronautical navigation RSBN BL8
Aeronautical navigation RSBN BN8
Aeronautical navigation RSBN BY8
Aeronautical navigation RSBN BX8

Abs(Δ*f*) (MHz)	12.0	10.0	8.0	6.0	4.0	2.0	0.0
PR 10% (dB)	–65.0	–50.0	–27.0	–16.0	–5.0	0.0	0.0

TABLE A.4.2-25

CH36 airport radars (UK) XG8
Radars (POL) artificial values PL8

Abs(Δ*f*) (MHz)	5.0	4.0	3.0	0.0
PR (dB)	–79.0	–40.0	0.0	0.0

TABLE A.4.2-26

Land mobile at VHF X7N

Abs(Δ*f*) (MHz)	3.7	3.3	0.0
PR (dB)	–55.0	–17.0	–10.0

TABLE A.4.2-27

Land mobile at VHF X7C

Abs(Δ*f*) (MHz)	3.7	3.3	0.0
PR (dB)	–65.0	–17.0	–10.0

TABLE A.4.2-28

Land mobile at VHF X8N
Land mobile at 480 MHz Y8N
Land mobile at 620 MHz Z8N

Abs(Δ*f*) (MHz)	4.2	3.8	0.0
PR (dB)	–55.0	–17.0	–10.0

TABLE A.4.2-29

Land mobile at VHF X8C
Land mobile at 480 MHz Y8C
Land mobile at 620 MHz Z8C

Abs(Δ*f*) (MHz)	4.2	3.8	0.0
PR (dB)	–65.0	–17.0	–10.0

APPENDIX
TO ANNEX 4.2

Calculation of field strength of the allowed interfering television signal for generic cases of the fixed and mobile services used for the production of the Plan

The field strength, E, of the allowed interfering television signal for generic cases of the fixed and the mobile services is calculated using the formula:

$$E = -37 + F - G_i + L_F + 10 \log (B_i) + P_o + 20 \log f - K \qquad \text{dB}(\mu\text{V/m}) \qquad (1)$$

where:

- F: receiver noise figure land mobile service (LMS) base or mobile station receivers (dB)
- B_i: the bandwidth of the terrestrial broadcasting station (MHz)
- G_i: the receiver antenna gain (dBi)
- L_F: antenna cable feeder loss (dB)
- f: centre frequency of the interfering station (MHz)
- P_o: man-made noise (dB) (typical value is 1 dB for VHF band and 0 dB for UHF band)
- K: overlap correction factor (in DVB-T) given in the Tables AP4.2-4 and AP4.2-5 below (dB).

For the generic case of the fixed service, based on the information in Recommendations ITU-R F.758-4, ITU-R F.1670-1 and ITU-R SM.851-1, the following values of F, G_i , L_F and P_o were used:

TABLE AP4.2-1

Frequency (MHz)	174-230	500	800
F (dB)	5	5	5
G_i (dBi)	9	14	16
L_F (dB)	4	5	5
P_o (dB)	1	0	0
$F - G + L_F + P_o$	1	–4	–6

In the UHF band, the variation of ($F - G + L_F + P_o$) with frequency relative to the value at 500 MHz is given by using the formula: 10 log (f/500).

For the generic case of the land mobile service (base stations), the following values of F, G_i, L_F and P_o were used:

TABLE AP4.2-2

Frequency (MHz)	174	230	470	790	862
F (dB)	8	8	4	3	3
G_i (dBi)	6	8	12	17	17
L_F (dB)	2	2	2	4	4
P_o (dB)	1	1	0	0	0
$F - G_i + L_F + P_o$	5	3	–6	–10	–10

For the generic case of the land mobile service (mobile stations), the following values of F, G_i, L_F and P_o were used:

TABLE AP4.2-3

Frequency (MHz)	174	230	470	790	862
F (dB)	11	11	7	7	7
G_i (dBi)	0	0	0	0	0
L_F (dB)	0	0	0	0	0
P_O (dB)	1	1	0	0	0
$F - G_i + L_F + P_o$	12	12	7	7	7

Calculation of the overlap correction factor *K*

The overlap correction factor is K (dB). When calculating interference with the victim receiver this factor must be added in equation (1).

In order to calculate the overlap correction factor K:

– Calculate the overlapped bandwidth B_o

$$B_o = \text{Min}\ (B_v, (B_v + B_i)/2 - \Delta f) \qquad (2)$$

where:

B_v: the bandwidth of the victim receiver

B_i: the bandwidth of the interfering signal

Δf: the difference between the centre frequency of the fixed service system and the centre frequency of the interfering (DVB-T) signal.

TABLE AP4.2-4

For the DVB-T mask non-critical cases

Overlapped bandwidth, B_o	Overlapping factor, K (dB)
$B_o = B_v$	0
$B_v > B_o > 10^{-4}\ B_v$	$10 \log_{10} (B_o/B_v)$
$10^{-4}\ B_v > B_o > -0.5$	–40
$B_o = -1$	–45
$B_o = -2$	–52
$B_o = -4$	–60
$B_o = -8$	–77

TABLE AP4.2-5

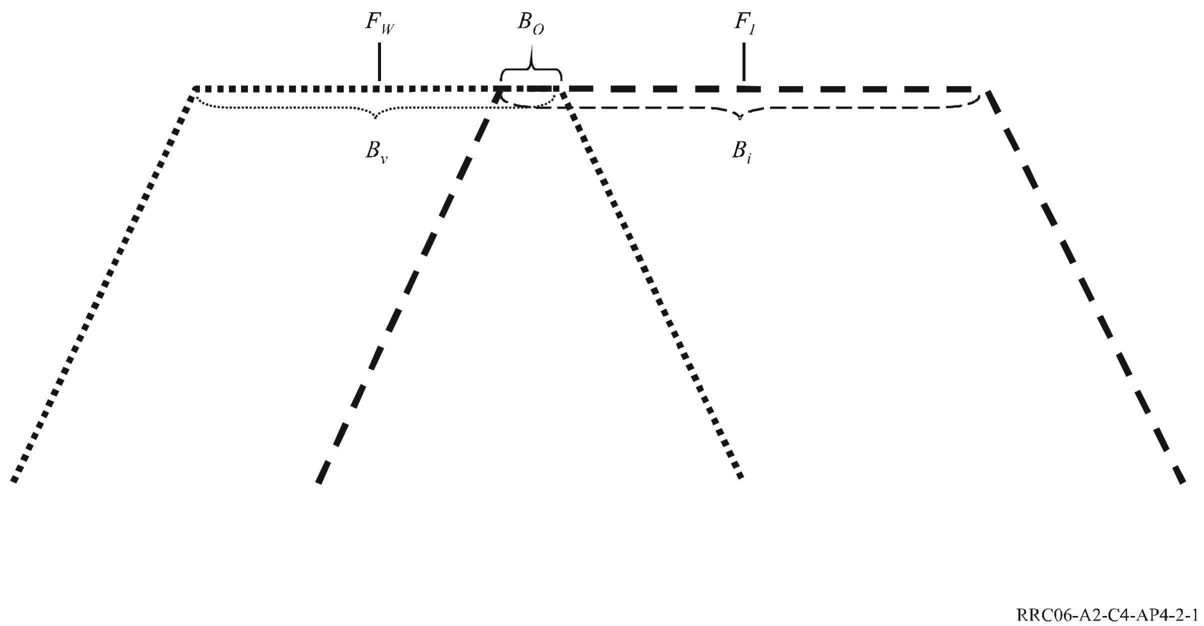
For the DVB-T mask – sensitive cases

Overlapped bandwidth, B_o	Overlapping factor, K (dB)
$B_o = B_v$	0
$B_v > B_o > 10^{-5} B_v$	$10 \log_{10} (B_o/B_v)$
$10^{-5} B_v > B_o > -0.5$	–50
$B_o = -1$	–55
$B_o = -2$	–62
$B_o = -4$	–70
$B_o = -8$	–87

It should be noted that the overlapping factor, K, is calculated taking into account the break points of the DVB-T mask as defined in Chapter 3 of Annex 2 to this Agreement.

Where B_o, B_i and B_v are as shown in the figure below.

FIGURE AP4.2-1



F_W: centre frequency of the wanted signal

F_I: centre frequency of the interfering signal

Examples

It is assumed that:

$B_v = 0.2$ MHz

$B_i = 8$ MHz

DVB-T case is non-critical

Δf (MHz)	3.8	4.0	4.1	4.8
B_o (MHz)	0.3	0.1	0	–0.7
K (dB)	0	10 log(0.1/0.2) = 3 dB	–40	See below K = –42

Interpolation example

F = 4.8 MHz from example above

Offset = $-B_o$ = 0.7 MHz

From non-critical Table AP4.2-4:

0.5 MHz –40 dB

1 MHz –45 dB

$K = ((0.7 - 0.5)/(1.0 - 0.5))*(-45 - (-40)) - 40$

$K = -42$ dB

ANNEX 4.3

Protection criteria for T-DAB interfered with by other primary services

Protection ratios for T-DAB interfered with by the other primary services listed in Table A.4.3-1 are available in Tables A.4.3-2 to A.4.3-5 of this annex and have been derived from Recommendation ITU-R BS.1660-2 – Technical basis for planning of terrestrial digital sound broadcasting in the VHF band (§ 3.5 of Appendix 1 to Annex 1 to the Recommendation, T-DAB interfered with by services other than broadcasting).

The field strength to be protected for T-DAB in Band III is 58 dB(μV/m). Additional information on minimum field strength for T-DAB can be found in Chapter 3.

TABLE A.4.3-1**

System type code	Type of system	Protection ratio table
AL**	Aeronautical mobile (OR) system AL	A.4.3-2
CA**	Fixed system CA	A.4.3-3
DA**	Aeronautical mobile (OR) system DA	A.4.3-2
DB**	Aeronautical mobile (OR) system DB	A.4.3-3
IA**	Fixed system IA	A.4.3-3
MA	Land mobile system MA	A.4.3-3
MT	Mobile and fixed systems MT (transportable)	A.4.3-3
MU**	Mobile system MU (low power)	A.4.3-4
M1	Mobile systems M1 (narrow-band FM, 12.5 kHz)(2)	A.4.3-3
M2**	Mobile system M2 (narrow-band)	A.4.3-3
RA1**, RA2**	Mobile systems RA1 and RA2 narrow-band FM (12.5 kHz)(2)	A.4.3-3
R1**	Land mobile system R1 (medical telemetry)	A.4.3-5
R3**	Mobile system R3 (remote control)	A.4.3-3
R4**	Mobile system R4 (remote control)	A.4.3-3
XA**	Land mobile system XA (private mobile radio)	A.4.3-3
XB**	Fixed system XB (alarm)	A.4.3-3
XE**	Aeronautical mobile (OR) system XE	A.4.3-3
XM**	Land mobile system XM (radio microphones VHF)	A.4.3-3

** The protection criteria for this system were not used during the development of the plan due to the absence of corresponding assignments in the reference situation (see also the introduction to this chapter).

(2) The T-DAB frequency is assumed to be always higher than the private mobile radio frequency.

For all the following tables in this annex:

Δf: frequency difference (MHz), i.e. interfering other service centre frequency minus centre frequency of interfered-with T-DAB block

PR: required protection ratio (dB).

TABLE A.4.3-2

AL, DA

Δf (MHz)	**–0.9**	**–0.8**	**–0.6**	**–0.4**	**–0.2**	**0**	**0.2**	**0.4**	**0.6**	**0.8**	**0.9**
PR 1% (dB)	–66	–6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	–6.6	–66

TABLE A.4.3-3

CA, DB, IA, MA, MT, M1, M2, RA1, RA2, R3, R4, XA, XB, XE, XM

Δf (MHz)	**–0.9**	**–0.8**	**–0.6**	**–0.4**	**–0.2**	**0**	**0.2**	**0.4**	**0.6**	**0.8**	**0.9**
PR 1% (dB)	–60	–6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	–6.6	–60

TABLE A.4.3-4

MU

Δf (MHz)		**–2.0**	**–1.9**	**–1.8**	**–1.7**	**–1.6**	**–1.5**	**–1.4**	**–1.3**	**–1.2**	**–1.1**
PR 1% (dB)		–48.0	–47.9	–47.1	–46.7	–46.4	–46.0	–45.4	–45.1	–43.9	–38.4
Δf (MHz)	**–1.0**	**–0.9**	**–0.8**	**–0.8**	**–0.7**	**–0.6**	**–0.5**	**–0.4**	**–0.3**	**–0.2**	**–0.1**
PR 1% (dB)	–37.5	–28.9	–12.9	–4.9	–1.0	2.1	3.5	4.3	4.1	4.4	4.1
Δf (MHz)	**0.0**	**0.1**	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**	**0.8**	**0.9**
PR 1% (dB)	4.0	4.1	4.4	4.1	4.3	3.5	2.1	–1.0	–4.9	–12.9	–28.9
Δf (MHz)	**1.0**	**1.1**	**1.2**	**1.3**	**1.4**	**1.5**	**1.6**	**1.7**	**1.8**	**1.9**	**2.0**
PR 1% (dB)	–37.5	–38.4	–43.9	–45.1	–45.4	–46.0	–46.4	–46.7	–47.1	–47.9	–48.0

TABLE A.4.3-5

R1

Δf (MHz)	–0.8	0	0.8
PR 1% (dB)	–66	–66	–66

ANNEX 4.4

Protection criteria for DVB-T interfered with by other primary services

Protection ratios for DVB-T (64-QAM 2/3 Gaussian channel) interfered with by the other primary services listed in Table A.4.4-1 are available in Tables A.4.4-2 to A.4.4-14 of this annex. They have been derived from Recommendation ITU-R BT.1368-6 (Planning criteria for digital terrestrial television services in the VHF/UHF bands). Information about the values for field strength to be protected for the different DVB-T variants can be found in the above-mentioned Recommendation. In addition, information about values for field strength to be protected and *C*/*N* for the different DVB-T variants and reception modes can be found in Chapter 3.

Table A.4.4-15 provides correction factors for different DVB-T system variants and reception modes relative to a DVB-T 64-QAM 2/3 Gaussian channel. The values provided in Table A.4.4-15 are to be added to the protection ratios for a DVB-T 64-QAM 2/3 Gaussian channel.

TABLE A.4.4-1

Protection criteria for DVB-T interfered with by other primary services

System type code (STC)	Secondary code implemented in the planning software	Type of system	Protection ratio for 64-QAM 2/3 DVB-T Gaussian channel signal: Table
AA2	BB	Aeronautical radionavigation system BB (RLS 2, Type 2, airborne transmission, 8 MHz)	A.4.4-5
AA8	BL	Aeronautical radionavigation system BL (RSBN, ground transmission, 0.7 or 0.8 MHz)	A.44-6
AA8	BN	Aeronautical radionavigation system BN (RSBN, airborne transmission, 3 MHz)	A.4.4-3
AA8	BX	Aeronautical radionavigation system BX (RSBN, ground transmission, 3 MHz)	A.4.4-3
AA8	BY	Aeronautical radionavigation system BY (RSBN, airborne transmission, 0.7 MHz)	A.4.4-6
AB	AB	Aeronautical radionavigation system AB (RLS 1, Type 1 ground transmission, 6 MHz)	A.4.4-2
AB	AC	Aeronautical radionavigation system AC (RLS 1, Type 2 ground transmission, 3 MHz)	A.4.4-3
BA	BA	Aeronautical radionavigation system BA (RLS 2, Type 1 airborne transmission, 4 MHz)	A.4.4-4
BC	BC	Aeronautical radionavigation system BC (RLS 2, Type 2 ground transmission, 3 MHz)	A.44.4-3
BD	BD	Aeronautical radionavigation system BD (RLS 2, Type 1 ground transmission, 4 MHz)	A.4.4-4
FF	FF	Fixed system FF (transportable, 1.2 MHz)	A.4.4-9
FI	FI	Fixed system FI (transportable, 2 MHz)	A.4.4-7
FH	FH	Fixed system FH (bandwidth more than 250 kHz)	A.4.4-8, A.4.4-9
FH	FJ	Fixed system FJ (bandwidth up to 250 kHz)	A.4.4-11, A.4.4-12
FK	FK	Generic fixed system FK (bandwidth more than 250 kHz)	A.4.4-8, A.4.4-9
FK	FL	Generic fixed system FL (bandwidth up to 250 kHz)	A.4.4-11, A.4.4-12
NA	NA	Land mobile system NA (digital, 3 MHz)	A.4.4-3
NA	NC	Land mobile system NC (digital, 5 MHz)	A.4.4-10
NB	NB	Generic mobile system NB	A.4.4-11,A.4.4- 12
NY	OX	Land mobile system OX in VHF band	A.4.4-11, A.4.4-12
NY	OY	Land mobile system OY at 480 MHz	A.4.4-12
NY	OZ	Land mobile system OZ at 620 MHz	A.4.4-12
XG	XG	Aeronautical radionavigation system XG (on channel 36, 4 MHz Airport Radars, UK)	A.4.4-4
–	–	Land mobile system (CDMA-1X)	A.4.4-13
–	–	Land mobile system (CDMA-3X)	A.4.4-14

TABLE A.4.4-2

Protection ratios for DVB-T 8 MHz 64-QAM code rate 2/3 Gaussian channel signal interfered with by AB system

Δf (MHz)	**−13**	**−5.5**	**−4.75**	**0**	**4.75**	**5.5**	**13**
PR (dB)	−40	10	11	16	11	10	−40

TABLE A.4.4-3

Protection ratios for DVB-T 8 MHz 64-QAM code rate 2/3 Gaussian channel signal interfered with by AC, BC, BN, BX and NA systems

Δf (MHz)	**−12**	**−4**	**−3.25**	**0**	**3.25**	**4**	**12**
PR (dB)	−37	9	14	19	14	9	−37

TABLE A.4.4-4

Protection ratios for DVB-T 8 MHz 64-QAM code rate 2/3 Gaussian channel signal interfered with by BA, BD and XG systems

Δf (MHz)	**−12**	**−4.5**	**−3.75**	**0**	**3.75**	**4.5**	**12**
PR (dB)	−38	8	13	18	13	8	−38

TABLE A.4.4-5

Protection ratios for DVB-T 8 MHz 64-QAM code rate 2/3 Gaussian channel signal interfered with by BB system

Δf (MHz)	**−14**	**−6.5**	**−5.75**	**0**	**5.75**	**6.5**	**14**
PR (dB)	−41	5	10	15	10	5	−41

TABLE A.4.4-6

Protection ratios for DVB-T 8 MHz 64-QAM code rate 2/3 Gaussian channel signal interfered with by BL and BY systems

Δf (MHz)	**−12**	**−4.5**	**−3.9**	**0**	**3.9**	**4.5**	**12**
PR (dB)	−38	−33	−3	−3	−3	−33	−38

TABLE A.4.4-7

Protection ratios for DVB-T 8 MHz 64-QAM code rate 2/3 Gaussian channel signal interfered with by FI system

Δ*f* (MHz)	**−12**	**−4.5**	**−3.75**	**0**	**3.75**	**4.5**	**12**
PR (dB)	−45	−27	1	4	1	−27	−45

TABLE A.4.4-8

Protection ratios for DVB-T 7 MHz 64-QAM code rate 2/3 Gaussian channel signal interfered with by FH and FK systems

Δ*f* (MHz)	**−10.5**	**−4**	**−3.25**	**0**	**3.25**	**4**	**10.5**
PR (dB)	−44	−26	1	3	1	−26	−44

TABLE A.4.4-9

Protection ratios for DVB-T 8 MHz 64-QAM code rate 2/3 Gaussian channel signal interfered with by FF, FH and FK systems

Δ*f* (MHz)	**12**	**−4.5**	**−3.9**	**0**	**3.9**	**4.5**	**12**
PR (dB)	−45	−27	0	2	0	−27	−45

TABLE A.4.4-10

Protection ratios for DVB-T 8 MHz 64-QAM code rate 2/3 Gaussian channel signal interfered with by NC system

Δ*f* (MHz)	**−12**	**−5**	**−4.25**	**0**	**4.25**	**5**	**12**
PR (dB)	−39	7	12	17	12	7	−39

TABLE A.4.4-11

Protection ratios for DVB-T 7 MHz 64-QAM code rate 2/3 Gaussian channel signal interfered with by OX, FJ, FL and NB systems

Δ*f* (MHz)	**−10.5**	**−4**	**−3.4**	**0**	**3.4**	**4**	**10.5**
PR (dB)	−37	−32	−2	−2	−2	−32	−38

TABLE A.4.4-12

Protection ratios for DVB-T 8 MHz 64-QAM code rate 2/3 Gaussian channel signal interfered with by OX, OY, OZ, FJ, FL and NB systems

Δf (MHz)	**−12**	**−4.5**	**−3.9**	**0**	**3.9**	**4.5**	**12**
PR (dB)	−38	−33	−3	−3	−3	−33	−38

TABLE A.4.4-13

Protection ratios for DVB-T 8 MHz 64-QAM code rate 2/3 Gaussian channel signal interfered with by emissions of CDMA-1X (measured)

Δf (MHz)	–12	–4.5	–3.75	0	3.75	4.5	12
PR (dB)	–38	–20	–3	10	–3	–20	–38

Characteristics of the interfering signal:

Modulation: QPSK

Bandwidth: 1.25 MHz (99%)

TABLE A.4.4-14

Protection ratios for DVB-T 8 MHz 64-QAM code rate 2/3 Gaussian channel signal interfered with by emissions of CDMA-3X (measured)

Δf (MHz)	–12	–4.5	–3.75	0	3.75	4.5	12
PR (dB)	–38	8	13	18	13	8	–38

Characteristics of the interfering signal:

Modulation: QPSK

Bandwidth: 4 MHz (99%)

TABLE A.4.4-15

Correction factors for protection ratios (dB) for different system variants relative to 64-QAM 2/3 DVB-T signal and for different reception conditions interfered with by other primary services

DVB-T system variant	Gaussian channel	Fixed reception	Portable outdoor reception	Portable indoor reception	Mobile reception
QPSK 1/2	−13.5	−12.5	−10.3	−10.3	−7.3
QPSK 2/3	−11.6	−10.5	−8.2	−8.2	−5.2
QPSK 3/4	−10.5	−9.3	−6.9	−6.9	−3.9
QPSK 5/6	−9.4	−8.1	−5.6	−5.6	−2.6
QPSK 7/8	−8.5	−7.1	−4.5	−4.5	−1.5
16-QAM 1/2	−7.8	−6.8	−3.6	−3.6	−1.6
16-QAM 2/3	−5.4	−4.3	−2.0	−2.0	1.0
16-QAM 3/4	−3.9	−2.7	−0.3	−0.3	2.7
16-QAM 5/6	−2.8	−1.5	1.0	1.0	4.0
16-QAM 7/8	−2.3	−0.9	1.7	1.7	4.7
64-QAM 1/2	−2.2	−1.2	1.0	1.0	4.0
64-QAM 2/3	0.0	1.1	3.4	3.4	6.4
64-QAM 3/4	1.6	2.8	5.2	5.2	8.2
64-QAM 5/6	3.0	4.3	6.8	6.8	9.8
64-QAM 7/8	3.9	5.3	7.9	7.9	10.9

ANNEX 4.5

Working assumptions concerning the other primary terrestrial services used for the development of the GE06 Plan for digital broadcasting

This annex is a collection of the working assumptions which were used in the establishment of the GE06 digital Plan.

The following assumptions were used during the establishment of the digital Plan:

1 For planning purposes, it was assumed that transmitting and receiving sites for the aeronautical radionavigation system used in the United Kingdom in the band 590-598 MHz are co-sited, their antennas are non-directional and the receiving antenna is at 7 m above ground.

2 In the absence of notified values of the height above ground level, the following values were assumed as default effective antenna heights for transmitting stations in other primary services:

− aircraft station in the aeronautical radionavigation service: 10 000 m;

− land station in the aeronautical radionavigation service: 37.5 m;

− station in the fixed service: 37.5 m;

− base station in the land mobile service: 37.5 m.

3 In the absence of values in the RRC-04 Report, the following default receiving antenna heights were assumed for stations in other primary services:

− aircraft station in the aeronautical radionavigation service: 10 000 m;

− station in the fixed service: 10 m;

− base station in the mobile service: 20 m;

− mobile station in the mobile service: 1.5 m;

− receiving ground stations in the aeronautical radionavigation service: 10 m.

4 In the absence of notified values of the effective radiated power, the e.r.p. values were calculated as the sum of the power delivered to the antenna and the antenna gain.

5 Since the Master International Frequency Register (MIFR) does not contain information about the receiving antenna directivity for other primary services and the RRC-04 Report did not contain any information in this respect, it was assumed that no directivity discrimination was obtained in the case of receiving antennas, for any angle.

6 When the notified beamwidth was narrower than the calculated beamwidth by more than 10°, then the calculated beamwidth was used.

7 When the notified azimuth of the maximum radiation was different from the calculated azimuth by more than 3°, then the calculated azimuth was used.

8 An antenna was considered as non-directional if the antenna gain was less than 3.7 dB.

9 Polarization “U” (unspecified) was used if no polarization was given.

10 Since typical transmitting stations (using a T14 notice) did not contain information on their associated receivers, no calculation of interference from digital broadcasting requirements into the assignments notified in the form of typical stations and included in the reference situation were performed during the establishment of the Plan.

11 When MIFR did not contain information on the system type codes, a generic system type code was used for such assignments.

12 When the notified service area of a transmitting or a receiving station of other primary services overlapped with the territory of a neighbouring country, the service area of such stations was limited to the national border of the administrations responsible for the considered station.

ANNEX 3*

Basic characteristics to be submitted in application of the Agreement

Key to the symbols used in Tables A.1, A.2 and A.3

X	Mandatory information
+	Mandatory under the conditions specified in column 2
O	Optional information
C	Mandatory if used as a basis to effect coordination with another administration

Reading the Tables

The rules used to link the sign with the text are based on the Table column headings covering specific procedures and specific services.

1 If any data item has a condition attached to it, then it has a "+".

4	if the assignment or allotment is part of a single frequency network, the identification code for the SFN	+

2 Data items grouped under a common subheading that limits the range of procedures, services or frequency bands have an "X" as the conditional nature is shown in the subheading title.

	For a specific transmitting station operating at a single fixed location	
7	name of the location of the transmitting station	X

* Once the contents of this annex is incorporated in Appendix 4 of the *Radio Regulations*, administrations shall use that appendix when applying the relevant parts of the Agreement in lieu of Annex 3 (see Resolution COM5/2 (RRC-06)).

TABLE A.1

Data for a digital broadcasting assignment or allotment

No.	CHARACTERISTICS TO BE SUBMITTED FOR EACH DIGITAL BROADCASTING ALLOTMENT OR ASSIGNMENT	Article 4 T-DAB allotment	Article 4 T-DAB assignment	Article 5 T-DAB assignment	Article 4 DVB-T allotment	Article 4 DVB-T assignment	Article 5 DVB-T assignment
1	**GENERAL INFORMATION AND FREQUENCY CHARACTERISTICS**						
1.1	ITU symbol of the notifying administration (see the Preface)	X	X	X	X	X	X
1.2	Status code (Add, Modify, Suppress)	X	X	X	X	X	X
1.3	Unique identification code given by the administration to the allotment or assignment (AdminRefId)	X	X	X	X	X	X
1.4	Plan entry code (1 – Assignment, 2 – SFN, 3 – Allotment, 4 – Allotment with linked assignment(s) and SFN_id, 5 – Allotment with a single linked assignment and no SFN_id)	X	X	X	X	X	X
1.5	Assignment Code (L – Linked, C – Converted, S – Standalone)		X	X		X	X
1.6	If the assignment is associated with an allotment, the unique identification code for the associated allotment		+	+		+	+
1.7	If the assignment or allotment is part of a single frequency network, the identification code for the SFN	+	+	+	+	+	+
1.8	Call sign or other identification used in accordance with Article **19** of the RR			O			O
1.9	Assigned frequency (MHz)	X	X	X	X	X	X

No.	CHARACTERISTICS TO BE SUBMITTED FOR EACH DIGITAL BROADCASTING ALLOTMENT OR ASSIGNMENT	Article 4 T-DAB allotment	Article 4 T-DAB assignment	Article 5 T-DAB assignment	Article 4 DVB-T allotment	Article 4 DVB-T assignment	Article 5 DVB-T assignment
1.10	If the centre frequency of the emission is offset from the assigned frequency, the frequency offset (kHz)	+	+	+	+	+	+
1.11	Date (actual or foreseen, as appropriate) of bringing the frequency assignment (new or modified) into use		C	X		C	X
1.12	If the assignment or allotment is subject to § 4.1.5.4 of Article 4, the expiry date of that period	+	+	+	+	+	+
2	**LOCATION OF THE ANTENNA(S)**						
2.1	Name of the location of the transmitting station		X	X		X	X
2.2	Digital broadcasting allotment name	X			X		
2.3	Symbol for the country or geographical area (see the Preface)	X	X	X	X	X	X
2.4	Geographical coordinates of the transmitting antenna in:						
2.4.1	latitude (±DDMMSS)		X	X		X	X
2.4.2	longitude (±DDDMMSS)		X	X		X	X
2.5	**For an allotment:**						
2.5.1	If all the test points are on the country or geographical area boundary for this allotment, the symbol for the country or geographical area	+			+		
2.5.2	If not all the test points for the allotment are on the country or geographical area boundary, the number (up to 9) of sub-areas within this allotment (if there is no subdivision, enter 1 for the unique contour number)	+			+		

No.	CHARACTERISTICS TO BE SUBMITTED FOR EACH DIGITAL BROADCASTING ALLOTMENT OR ASSIGNMENT	Article 4 T-DAB allotment	Article 4 T-DAB assignment	Article 5 T-DAB assignment	Article 4 DVB-T allotment	Article 4 DVB-T assignment	Article 5 DVB-T assignment
2.5.3	**For each sub-area (up to 9):**						
2.5.3.1	A unique contour number	X			X		
2.5.3.2	The number of sub-area boundary test points (up to 99)	X			X		
2.5.3.3	The geographical coordinates of each sub-area boundary test point in:						
2.5.3.3.1	latitude (±DDMMSS)	X			X		
2.5.3.3.2	longitude (±DDDMMSS)	X			X		
3	**DIGITAL BROADCASTING SYSTEM CHARACTERISTICS**						
3.1	If the reference planning configuration is not provided, the digital television system (including DVB-T variant) (A, B, C, D, E, F and 1, 2, 3, 5, 7)					+	+
3.2	If the reference planning configuration is not provided, the reception mode (FX, PO, PI, MO)					+	+
3.3	Reference planning configuration (RPC 1, RPC 2, RPC 3, RPC 4 or RPC 5) In the case of a DVB-T assignment, required if the digital television system and the reception mode are not provided	X	X	X	X	+	+
3.4	Type of reference network (RN1, RN2, RN3 or RN4)				X		
3.5	Type of spectrum mask (for DVB-T: N = Non-critical, S = Sensitive. For T-DAB: 1, 2, 3 (see § 3.6 of this Agreement))	C	X	X	C	X	X

No.	CHARACTERISTICS TO BE SUBMITTED FOR EACH DIGITAL BROADCASTING ALLOTMENT OR ASSIGNMENT	Article 4 T-DAB allotment	Article 4 T-DAB assignment	Article 5 T-DAB assignment	Article 4 DVB-T allotment	Article 4 DVB-T assignment	Article 5 DVB-T assignment
3.6	If the polarization is horizontal or mixed, the maximum effective radiated power of the horizontally polarized component in the horizontal plane (dBW)		+	+		+	+
3.7	If the polarization is vertical or mixed, the maximum effective radiated power of the vertically polarized component in the horizontal plane (dBW)		+	+		+	+
3.8	Maximum effective radiated power in the plane defined by the beam tilt angle (dBW)					O	O
4	**ANTENNA CHARACTERISTICS**						
4.1	Antenna directivity (directional (D) or non-directional (ND))		X	X		X	X
4.2	Polarization (H – horizontal, or V – vertical, or M – mixed), or U[1] – unspecified, for allotments only	X	X	X	X	X	X
4.3	Height of transmitting antenna above ground level (m)		X	X		X	X
4.4	Altitude of the site above sea level (m) measured at the base of the transmitting antenna		X	X		X	X
4.5	Maximum effective antenna height (m)		X	X		X	X

[1] Unspecified – This can be horizontal (H), or vertical (V), or mixed (M). At all times during assessment for the RPC and RN, all the power in the horizontal polarization, or all the power in the vertical polarization, or in the case of mixed polarization the power sum of the horizontal and vertical components, shall remain constant. For the reference network, the same pattern shall be used for both polarizations.

No.	CHARACTERISTICS TO BE SUBMITTED FOR EACH DIGITAL BROADCASTING ALLOTMENT OR ASSIGNMENT	Article 4 T-DAB allotment	Article 4 T-DAB assignment	Article 5 T-DAB assignment	Article 4 DVB-T allotment	Article 4 DVB-T assignment	Article 5 DVB-T assignment
4.6	Effective antenna height (m) at 36 different azimuths in 10° intervals, measured in the horizontal plane from True North in a clockwise direction		X	X		X	X
4.7	If the polarization is horizontal or mixed, the value of the antenna attenuation (dB) of the horizontally polarized component, normalized to 0 dB, at 36 different azimuths in 10° intervals, measured in the horizontal plane from True North in a clockwise direction		+	+		+	+
4.8	If the polarization is vertical or mixed, the value of the antenna attenuation (dB) of the vertically polarized component, normalized to 0 dB, at 36 different azimuths in 10° intervals, measured in the horizontal plane from True North in a clockwise direction		+	+		+	+
4.9	Beam tilt angle (degrees)					O	O
5	**HOURS OF OPERATION**						
5.1	Regular hours (UTC) of operation of the frequency assignment:						
5.1.1	start time			X			X
5.1.2	stop time			X			X
6	**COORDINATION AND AGREEMENT**						
6.1	If coordination is necessary and agreement has been obtained:						

No.	CHARACTERISTICS TO BE SUBMITTED FOR EACH DIGITAL BROADCASTING ALLOTMENT OR ASSIGNMENT	Article 4 T-DAB allotment	Article 4 T-DAB assignment	Article 5 T-DAB assignment	Article 4 DVB-T allotment	Article 4 DVB-T assignment	Article 5 DVB-T assignment
6.1.1	the ITU symbol of the administration with which coordination has been effected	+	+	+	+	+	+
6.1.2	the provision (No. of the Radio Regulations, regional agreement or other arrangement) requiring such coordination	+	+	+	+	+	+
6.2	If the assignment is subject to § 5.1.2 of Article 5, a declaration by the notifying administration that all conditions associated with the remark are fully met for the submitted assignment for recording in the MIFR			+			+
6.3	If the assignment is subject to § 5.1.8 of Article 5, a signed commitment from the notifying administration that the submitted assignment for recording in the MIFR shall not cause unacceptable interference and shall not claim protection			+			+
7	**OPERATING ADMINISTRATION OR AGENCY**						
7.1	Symbol for the operating agency (see the Preface)			O			O
7.2	Symbol for the address of the administration (see the Preface) responsible for the station and to which communication should be sent on urgent matters regarding interference, quality of emissions and questions referring to the technical operation of the circuit (see Article **15** of the RR)			X			X
8	**REMARKS**						
8.1	Any comment designed to assist the Bureau in processing the notice	O	O	O	O	O	O

TABLE A.2

Data for a VHF/UHF analogue television broadcasting assignment
(to be used during the transition period)

No.	CHARACTERISTICS TO BE PROVIDED FOR EACH ANALOGUE BROADCASTING ASSIGNMENT	Article 4 (GE06)	Article 5 (GE06)
1	**GENERAL INFORMATION AND FREQUENCY CHARACTERISTICS**		
1.1	ITU symbol of the notifying administration (see the Preface)	X	X
1.2	Status code (Add, Modify, Suppress)	X	X
1.3	Unique identification code given by the administration to the assignment (AdminRefId)	X	X
1.4	Call sign or other identification used in accordance with Article **19** of the RR		O
1.5	Assigned frequency (MHz)	X	X
1.6	Vision carrier frequency offset, expressed as a multiple of 1/12 of the line frequency of the television system concerned, expressed by a number (positive or negative) or kHz	X	X
1.7	If the sound carrier frequency offset is different from the vision carrier frequency offset, the sound carrier frequency offset expressed as a multiple of 1/12 of the line frequency of the television system concerned, expressed by a number (positive or negative) or kHz	+	+
1.8	Date (actual or foreseen, as appropriate) of bringing the frequency assignment (new or modified) into use	C	X
1.9	If the assignment is subject to § 4.1.5.4 of Article 4, the expiry date of that period	+	+
2	**LOCATION OF THE TRANSMITTING ANTENNA(S)**		
2.1	Name of the location of the transmitting station	X	X
2.2	ITU symbol of the country or the geographical area	X	X
2.3	Geographical coordinates of the transmitting antenna:		
2.3.1	latitude (±DDMMSS)	X	X
2.3.2	longitude (±DDDMMSS)	X	X

No.	CHARACTERISTICS TO BE PROVIDED FOR EACH ANALOGUE BROADCASTING ASSIGNMENT	Article 4 (GE06)	Article 5 (GE06)
3	**ANALOGUE BROADCASTING SYSTEM CHARACTERISTICS**		
3.1	Frequency stability indicator (RELAXED, NORMAL or PRECISION)	X	X
3.2	Symbol corresponding to the television system (B, B1, D, D1, G, H, I, K, K1, L or M)	X	X
3.3	Symbol corresponding to the colour system (P = PAL, S = SECAM)	X	X
3.4	If the polarization is horizontal or mixed, the maximum effective radiated power of the horizontally polarized component (dBW)	+	+
3.5	If the polarization is vertical or mixed, the maximum effective radiated power of the vertically polarized component (dBW)	+	+
3.6	Vision/sound carrier power ratio	X	X
4	**ANTENNA CHARACTERISTICS**		
4.1	Antenna directivity (directional (D) or non-directional (ND))	X	X
4.2	Polarization (H – horizontal, or V – vertical, or M – mixed)	X	X
4.3	Height of antenna above ground level (m)	X	X
4.4	Altitude of the site above sea level (m) measured at the base of the transmitting antenna	X	X
4.5	Maximum effective height of the antenna (m)	X	X
4.6	Effective antenna height (m) at 36 different azimuths in 10° intervals, measured in the horizontal plane from True North in a clockwise direction	X	X
4.7	If the polarization is horizontal or mixed, the value of the antenna attenuation (dB) of the horizontally polarized component, at 36 different azimuths in 10° intervals, measured in the horizontal plane from True North in a clockwise direction	+	+
4.8	If the polarization is vertical or mixed, the value of the antenna attenuation (dB) of the vertically polarized component, at 36 different azimuths in 10° intervals, measured in the horizontal plane from True North in a clockwise direction	+	+

No.	CHARACTERISTICS TO BE PROVIDED FOR EACH ANALOGUE BROADCASTING ASSIGNMENT	Article 4 (GE06)	Article 5 (GE06)
5	**HOURS OF OPERATION**		
5.1	Regular hours (UTC) of operation of the frequency assignment:		
5.1.1	start time	C	X
5.1.2	stop time	C	X
6	**COORDINATION AND AGREEMENT**		
6.1	If coordination is necessary and agreement has been obtained:		
6.1.1	the ITU symbol of the administration with which coordination has been effected	+	+
6.1.2	the provision (No. of the Radio Regulations, regional agreement or other arrangement) requiring such coordination	+	+
6.2	If the assignment is subject to § 5.1.8 of Article 5, a signed commitment from the notifying administration that the submitted assignment for recording in the MIFR shall not cause unacceptable interference and shall not claim protection		+
7	**OPERATING ADMINISTRATION OR AGENCY**		
7.1	Symbol for the operating agency (see the Preface)		O
7.2	Symbol for the address of the administration (see the Preface) responsible for the station and to which communication should be sent on urgent matters regarding interference, quality of emissions and questions referring to the technical operation of the circuit (see Article **15** of the RR)		X
8	**REMARKS**		
8.1	Any comment designed to assist the Bureau in processing the notice	O	O

TABLE A.3

Data for assignments to stations of other primary terrestrial service

No.	CHARACTERISTICS TO BE SUBMITTED FOR EACH ASSIGNMENT TO OTHER PRIMARY TERRESTRIAL SERVICE	App. 4 RR	Article 4 (GE06)	Article 5 (GE06)
1	**GENERAL INFORMATION AND FREQUENCY CHARACTERISTICS**			
1.1	ITU symbol of the notifying administration (see the Preface)	B	X	X
1.2	Status code (Add, Modify, Suppress)		X	X
1.3	Unique identification code given by the administration to the assignment (AdminRefId)		X	X
1.4	Call sign or other identification used in accordance with Article **19** of the RR	3A		O
1.5	Assigned frequency (MHz)	1A	X	X
1.6	If the modulation envelope is asymmetric or composite, the reference frequency (MHz)	1B	+	+
1.7	Date of bringing the frequency assignment into use	2C	C	X
1.8	If the assignment is subject to § 4.2.5.5 of Article 4, the expiry date of that period		+	+
2	**LOCATION OF THE TRANSMITTING ANTENNA(S)**			
2.1	**For a specific transmitting station operating at a single fixed location:**			
2.1.1	Name of the location of the transmitting station	4A	X	X
2.1.2	ITU symbol of the country or the geographical area	4B	X	X
2.1.3	Geographical coordinates of the transmitting antenna in:	4C		
2.1.3.1	latitude (±DDMMSS)		X	X
2.1.3.2	longitude (±DDDMMSS)		X	X
2.2	**For a circular or defined area containing either typical transmitting stations or mobile transmitting stations:**			
2.2.1	If the symbol of a country or geographical area is not provided, the geographical coordinates of the centre of the circular area in:	4C		
2.2.1.1	latitude (±DDMMSS)		+	+
2.2.1.2	longitude (±DDDMMSS)		+	+

No.	CHARACTERISTICS TO BE SUBMITTED FOR EACH ASSIGNMENT TO OTHER PRIMARY TERRESTRIAL SERVICE	App. 4 RR	Article 4 (GE06)	Article 5 (GE06)
2.2.2	If the symbol of a country or geographical area is not provided, the nominal radius (km) of the circular area	4D	+	+
2.2.3	If geographical coordinates and a nominal radius are not provided, the ITU symbol of the country or geographical area	4E	+	+
3	**LOCATION OF THE RECEIVING ANTENNA**			
3.1	**For a specific receiving station operating at a single fixed location:**			
3.1.1	Name of the location of the receiving station	5A	X	X
3.1.2	ITU symbol of the country or geographical area	5B	X	X
3.1.3	Geographical coordinates of the receiving antenna:	5C		
3.1.3.1	latitude (±DDMMSS)		X	X
3.1.3.2	longitude (±DDDMMSS)		X	X
3.2	**For a defined area of reception associated with a specific transmitting station:**			
3.2.1	If a circular receiving area is not provided, the ITU symbol of the country or geographical area of reception	5D	+	+
3.2.2	If a geographical area is not provided, the geographical coordinates of the centre of the circular receiving area in:	5E		
3.2.2.1	latitude (±DDMMSS)		+	+
3.2.2.2	longitude (±DDDMMSS)		+	+
3.2.3	If a geographical area is not provided, the nominal radius (km) of the circular receiving area	5F	+	+
3.2.4	If a receiving station in the fixed service and the characteristics under 3.1 above are not provided, the geographical coordinates (between 3 and 6 sets) defining the area in which the receiving stations are located in:	5C		
3.2.4.1	latitude (±DDMMSS)		+	+
3.2.4.2	longitude (±DDDMMSS)		+	+
4	**CLASS OF STATION AND NATURE OF SERVICE**			
4.1	Class of station, using the symbols from the Preface	6A	X	X
4.2	Nature of service performed, using the symbols from the Preface	6B	X	X
5	**SYSTEM CHARACTERISTICS**			
5.1	Class of emission, in accordance with Article **2** and Appendix **1** of the RR	7A	X	X

No.	CHARACTERISTICS TO BE SUBMITTED FOR EACH ASSIGNMENT TO OTHER PRIMARY TERRESTRIAL SERVICE	App. 4 RR	Article 4 (GE06)	Article 5 (GE06)
5.2	Necessary bandwidth, in accordance with Article **2** and Appendix **1** of the RR	7A	X	X
5.3	System type code		X	X
5.4	If the transmitter output power is supplied, the symbol describing, as appropriate, the type of power (X, Y or Z)	8	+	+
5.5	If the radiated power is not supplied, the transmitter output power (dBW)	8A	+	+
5.6	Maximum power density (dB(W/Hz)) averaged over the worst 4 kHz band supplied to the antenna transmission line	8AB	O	X
5.7	If the transmitter output power is not supplied, the maximum effective radiated power expressed in dBW	8B	+	+
6	**ANTENNA CHARACTERISTICS**			
6.1	If the maximum effective radiated power is not supplied, the maximum antenna gain, relative to a half-wave dipole, in the direction of maximum radiation	9G	+	+
6.2	**For an assignment to a specific transmitting/receiving station operating at a single fixed location (excluding typical stations):**			
6.2.1	Polarization	9D	X	X
6.2.2	Height of antenna above ground level (m)	9E	X	X
6.2.3	Antenna directivity (directional (D) or non-directional (ND))	9	X	X
6.2.4	**For a directional transmitting/receiving antenna operating at a fixed location:**			
6.2.4.1	The total angular width of the radiation main lobe (*beamwidth*) measured horizontally in a plane containing the direction of maximum radiation (degrees), within which the power radiated in any direction does not fall more than 3 dB below the power radiated in the direction of maximum radiation	9C	O	O
6.2.4.2	Antenna gain towards the local horizon		O	O
6.2.5	**For a transmitting antenna operating from a fixed location:**			
6.2.5.1	Altitude of the site above sea level measured at the base of the antenna (m)	9EA	X	X
6.2.5.2	Maximum effective antenna height (m)	9EB	X	X
6.2.5.3	Effective antenna height (m) at 36 different azimuths in 10° intervals, measured in the horizontal plane from True North in a clockwise direction	9EC	X	X

No.	CHARACTERISTICS TO BE SUBMITTED FOR EACH ASSIGNMENT TO OTHER PRIMARY TERRESTRIAL SERVICE	App. 4 RR	Article 4 (GE06)	Article 5 (GE06)
6.2.5.4	**For a directional transmitting antenna operating at a fixed location:**			
6.2.5.4.1	If the antenna beam is not rotating or swept, the azimuth of maximum radiation of the antenna in degrees (clockwise) from True North	9A	+	+
6.2.5.4.2	If the antenna beam is rotating or swept, the azimuthal sector swept by the antenna's main beam axis:	9AB		
6.2.5.4.2.1	start azimuth, in degrees, clockwise from True North		+	+
6.2.5.4.2.2	end azimuth, in degrees, clockwise from True North		+	+
7	**HOURS OF OPERATION**			
7.1	Regular hours (UTC) of operation of the frequency assignment:	10B		
7.1.1	start time		C	X
7.1.2	stop time		C	X
8	**COORDINATION AND AGREEMENT**			
8.1	If coordination is necessary and agreement has been obtained, the ITU symbol of the administration with which coordination has been successfully effected	11	+	+
8.2	If the assignment is subject to § 5.2.6 of Article 5, a signed commitment from the notifying administration that the submitted assignment for recording in the MIFR shall not cause unacceptable interference and shall not claim protection			+
9	**OPERATING ADMINISTRATION OR AGENCY**			
9.1	Symbol for the operating agency (see the Preface)	12A		O
9.2	Symbol for the address of the administration (see the Preface) responsible for the station and to which communication should be sent on urgent matters regarding interference, quality of emissions and questions referring to the technical operation of the circuit (see Article **15** of the RR)	12B	X	X
10	**REMARKS**			
10.1	Any comment designed to assist the Bureau in processing the notice		O	O

ANNEX 4

Section I
of Annex 4

Limits and methodology for determining when agreement with another administration is required

1 Introduction

If an administration proposes to modify the Plan or to coordinate an assignment to a station in another primary terrestrial service it is necessary to determine if any administration(s) from the planning area might be affected, i.e. identify the administration(s) with which agreement has to be sought. This annex contains the coordination limits and the appropriate technical methodology that shall be used to identify the administrations with which coordination is required.

The methodology defines an area within which a trigger field-strength value is exceeded. By selecting the appropriate trigger field-strength value in the attached appendices, it is possible to identify the total area within which the relevant trigger field strength is exceeded for a range of services, and hence determine the administration(s) with which coordination is required.

The process of identification of administrations potentially affected is based on the determination of coordination contours associated with the proposed modifications (see § 2 of this Section). Affected administrations are those administrations whose national boundaries, for broadcasting, or service areas of other primary terrestrial services, are intersected by or enclosed within these contours.

2 Method for identifying potentially affected administrations

The total area within which the relevant trigger field strength is exceeded is determined on the basis of known characteristics for the proposed modification. However, the details of operation of the potentially affected stations are unknown, and hence it is necessary to assume worst-case parameters for the propagation path and for the system parameters of the unknown receiving stations.

Although the determination of the area within which coordination is required is based on technical criteria, it is important to note that it represents a regulatory concept, for the purpose of identifying the area within which detailed evaluations of the interference potential needs to be performed.

Hence, the coordination area is not an exclusion zone within which the sharing of frequencies is prohibited, but a means for determining the area within which more detailed calculations need to be performed.

In most cases, a more detailed analysis will show that sharing within the coordination area is possible, since the procedure for the determination of the coordination area is based on unfavourable assumptions with regard to the interference potential.

The methodology allows for the determination of the distance for each azimuth around the proposed new or modified station, or the area within which the station is located, beyond which the interfering field strength is expected to be less than a specific value for all but a specified percentage of the time. When this distance is determined for each azimuth, it defines a field-strength contour, called the coordination contour, which encloses the coordination area. Separate coordination contours are produced for each trigger field strength required.

The determination of the field strength is based on the propagation model in Chapter 2 of Annex 2 to the Agreement. This propagation model is not valid beyond 1 000 km, and therefore the calculation of interference from any transmitter is limited to the 1 000 km maximum distance of the propagation model.

2.1 Identification of administrations potentially affected by modifications to the Plans

In order to identify those administrations potentially affected by a proposed modification to the Plans, it is necessary to identify the relevant trigger field strength(s) to be used in the calculations.

For an intended modification to the Plan, the characteristics of the assignment or allotment are known. In particular, the geographical coordinates defining the allotment area or the location of the transmitter(s) are given. Based on this information, a list of countries within 1 000 km of the allotment area or the transmitter site under consideration is drawn up. This list can be developed by intersecting a corresponding contour with the national boundaries of administrations as given by the IDWM.

The method for identifying potentially affected administrations consists of the five following steps:

Step 1 – Establishment of the 1 000 km contour

In order to identify any potentially affected service, all countries whose boundaries lie inside or are intersected by the 1 000 km contour are taken into consideration.

Step 2 – Selection of administrations whose broadcasting service is potentially affected

A contour is developed based, for each frequency range, based on the trigger coordination value corresponding to the broadcasting service to be protected specified in Table AP1.1 and following the procedure developed in § 3 of this Section.

Step 3 – Selection of assignments of other services located in the 1 000 km contour

In this step, assignments in other primary services are selected, based on the following criteria:

– assignment belongs to an administration within the 1 000 km contour;

– assignment is contained in the List of assignments to other primary terrestrial services given in Annex 5 to this Agreement or for which the procedure of Article 4 of this Agreement has already been initiated.

The result of this selection process will be a list of countries/assignments for which the corresponding trigger values have to be extracted from the Tables of trigger values in Appendix 1 to this Section.

Step 4 – Construction of coordination contours

For each unique trigger value in the above list, a coordination contour is developed. In this way, there will be always one coordination contour for the protection of the broadcasting service identified in Step 2 and, for each frequency range, possibly several coordination contours for every type of other service selected in Step 3.

The methods of calculating coordination contours for different coordination scenarios are described in § 4 of this Section. The technical assumptions to be used are specified in § 5.1 of this Section. The coordination trigger values are given in Appendix 1 to this Section.

Step 5 – Identification of potentially affected administrations

The administrations with which coordination is required are identified by the coordination contours intersecting with or enclosing:

– the national boundaries of those administrations identified in Step 2 in relation to broadcasting;

– the locations of receiving stations/service areas of other primary services identified in Step 3.

2.2 Identification of administrations potentially affected by assignments of other primary terrestrial services

The starting point is the intended modifications or additions to the List in Annex 5 to this Agreement whose characteristics are known. Based on this information, and using the methods described in § 2.1 of this Section, the assignments and the administrations with which coordination is required are identified.

The analysis is finalized by explicitly calculating the field-strength values at the national boundaries of the identified countries.

When an assignment in another primary service is notified, the coordination contours for the transmitting stations and for associated receiving stations at specified locations or service areas are constructed. The larger of the two is to be taken into account for the identification of affected administrations.

The details of calculating coordination contours for different coordination scenarios are described in § 3 and 4 of this Section. The technical assumptions to be used are specified in § 5.2 of this Section. The coordination trigger values are given in Appendix 1 to this Section.

3 Construction of coordination contours

The coordination contour is developed using equally spaced radials 1° apart, over 360° around the allotment/assignment or the service area, centred on a single reference point, the location of which is defined in § 4 of this Section for each coordination scenario.

The coordination contour is calculated for each radial by starting at a distance of 1 000 km from the location of the station or the boundary of the area where it is located as defined in § 4 of this Section for each coordination scenario. Calculation is then performed by moving along the radial towards the reference point in 10 km steps.

In this Annex, the procedures determine for each one degree step in azimuth around the coordinating broadcasting station or station in another terrestrial service, the distance at which the trigger field strength is reached and hence the distance used to create the coordination contour. All field-strength calculations are based on the propagation model described in Chapter 2 of Annex 2 to this Agreement.

However, if the trigger field strength has not been reached at the 1 000 km limit of the propagation model, the coordination contour on that radial/azimuth should have a distance of 1 000 km from the location of the station or the boundary of the area where it is located.

The resulting coordination contours may be drawn on a map in order to facilitate the coordination process.

3.1 Coordination contour requirements

The coordination scenarios and the various procedures contained in this annex are based on different assumptions. Hence, the size of the coordination contours will depend on the coordination scenario. Separate coordination contours are therefore required for each sharing scenario described in § 4 of this Section. Furthermore, the coordination contour developed for one coordination scenario cannot be used to determine the extent of any impact on the radiocommunication services covered by a different coordination scenario.

3.2 Additional contours

In addition to the coordination contour, administrations may draw additional contours to facilitate more detailed coordination discussions. These additional contours may be based on less onerous sharing criteria (e.g. the inclusion of polarization, antenna discrimination at the affected receiver) than that used for developing the coordination area. These additional contours may be developed by the same method used to determine the coordination contour, or by other methods as agreed on a bilateral basis between administrations.

4 Different coordination scenarios

The following subsections describe the basic assumptions made about interference assessment and the location of the point of reference to be used for the construction of the coordination contours for the various frequency sharing scenarios.

4.1 Individual stations operating from a fixed and determined location

For a broadcasting station or a station in another primary terrestrial service operating from a fixed location, the coordination contours are calculated in all directions of azimuth from the geographical location of the transmitting or receiving antenna and taking into consideration any variation in the antenna gain (if available).

4.2 Typical transmitting stations operating from a fixed location within a specified service area

For typical transmitting stations, the point of reference is the centre of gravity of the specified service area confined to the national territory, if it is located within this service area. If that is not the case, the point of reference is taken at the closest point from the centre of gravity that will be included in the service area. The coordination contour is constructed around the boundaries of the specified service area within which the typical stations are operating.

No allowance is made for antenna discrimination and polarization.

4.3 Broadcasting stations operating in a single-frequency network

For a broadcasting station operating in a single-frequency network (SFN), coordination contours are calculated by using as point of reference, the centre of gravity of the geographical coordinates of all transmitter locations in the SFN. The individual field-strength contributions of the transmitters are combined by means of the power sum method (see Chapter 3 of Annex 2 to the Agreement).

4.4 Broadcasting allotments

In the case of an allotment, the point of reference is the centre of gravity of the allotment area if it is located within this area. If that is not the case, the point of reference is taken at the point closest to the centre of gravity that will be included in the allotment area. The characteristics of the associated reference network (RN) and reference planning configuration (RPC) are used as the source of the interfering field strength. Each boundary test point of the allotment will be considered as a source of potential interference of the allotment (see Appendix 3 to this Section for detailed description). The largest field strength obtained, at each calculation point under consideration, from each allotment boundary test point is taken as the value of field strength to be used.

In the case of an allotment with linked assignments and a SFN identifier, the two calculations described below shall be performed.

– In the first calculation the characteristic properties of the associated reference network and reference planning configuration are used as the source of potential interference as described above.
– In the second calculation the characteristic properties of each of the linked assignments are used to calculate the power sum of the interference potential at the calculation point.

The higher field strength from the two calculations above is taken as the relevant field strength.

For an assignment linked to an allotment with no SFN identifier, the characteristic properties of the assignment will be used to calculate the field strength as described in § 3.1 of this Section.

4.5 Mobile (except aeronautical mobile) stations

For a mobile (except aeronautical mobile) station, the point of reference is the centre of gravity of the specified service area and the coordination contour is constructed around the boundaries of the specified service area, within which the mobile (except aeronautical mobile) stations are operating. In addition, the specified area in which the mobile station operates should be confined to the national territory. No allowance is made for antenna discrimination.

4.6 Aeronautical radionavigation stations

For ground-based aeronautical radionavigation stations, the point of reference is the geographical location of the station.

For air-based aeronautical radionavigation stations, the point of reference is the centre of gravity of the specified service area within which the aeronautical radionavigation stations operates if it is located within this service area. If that is not the case, the point of reference is taken at the point closest to the centre of gravity that will be included in the service area. For the air-based station, no allowance is made for antenna discrimination.

For air-based stations, the specified service area should be confined to the national territory.

5 Determination of the coordination trigger field strength

5.1 Modifications to the Plans

5.1.1 Protection of the broadcasting service

The construction of coordination contours and calculation of the interfering field strength are based on the propagation model described in the Chapter 2 of Annex 2 to the Agreement. The following characteristics for the determination of interference into the broadcasting receiver are used:

– notified values of the radiated power and the effective antenna height;
– coordination trigger field-strength values in Table AP1.1 of Appendix 1 to this Section;
– the propagation curves for the tropospheric case (i.e. 1% time and 50% locations);
– the receiving antenna height of 10 m above ground level.

5.1.2 Protection of other primary terrestrial services

The construction of coordination contours is based on the propagation prediction method included in the Chapter 2 of Annex 2 to the Agreement.

For ground-to-ground calculations, propagation curves for 10% of the time and 50% of locations are used.

For ground-to-air calculations, the free-space model should be used. The coordination contour is limited to a line-of-sight distance of 420 km.

The field strength is calculated for the receiving antenna heights provided in the relevant Tables in § A.2, A.3 or A.4 of Appendix 1 to this Section.

For systems of other primary services the coordination trigger field-strength values are given in Tables AP1.2 to AP1.8 of Appendix 1 to this Section.

5.2 Coordination of an assignment to a station in another primary terrestrial service

5.2.1 Coordination of an assignment to a transmitting station in another primary terrestrial service

Construction of coordination contours and calculation of the interfering field strength are based on the propagation model described in Chapter 2 of Annex 2 to the Agreement.

For ground-to-ground calculations, the propagation curves for 1% of the time and for 50% of locations should be used.

For air-to-ground, the free-space model should be used. The coordination contour is limited to a line-of-sight distance of 420 km.

In the case of aeronautical services for airborne stations the height of the transmitting antenna above the ground is 10 000 m.

For the protection of the Plan, the coordination trigger field-strength values are given in Table AP1.10 of Appendix 1 to this Section.

5.2.2 Coordination of an assignment to a receiving station in another primary terrestrial service

For the coordination of an assignment to a receiving station, it is necessary to assume the following figures for the operation of a broadcasting station:

– total maximum radiated power 53 dBW;

– maximum effective antenna height 600 m and mixed polarization.

If the use of these assumed figures does not result in the identification of an administration operating, or planning to operate, a station that exceeds these values then the administration responsible for the receiving station agrees that there will be no claim for protection from the administration responsible for the broadcasting station, unless otherwise agreed in the coordination process.

The maximum coordination distance for aircraft receivers is set at 500 km.

For the construction of the coordination contours under § 5 of this Section, the point of reference for the construction of the equally-spaced radials is the location of the receiving station or the centre of gravity of the area where the receiving stations operate. The coordination contour is calculated for each radial by placing the broadcasting station referred to above at a distance of 1 000 km from the reference point and determining the field strength at the reference point. If the field strength is below the required threshold for the receiving station, the potential broadcasting station is moved along the radial towards the reference point in 10 km steps until the required threshold value is reached. The distance at which the threshold value is reached is determined for each radial and these distances are joined together to form the coordination contour.

Appendix 1
to Section I

A Coordination trigger field strengths for the protection of the broadcasting and other primary services from a modification to the Plan

A.1 Coordination trigger field strengths for the identification of administrations for the protection of the broadcasting service from modifications to the Plan

This Agreement deals with various broadcasting systems. Therefore, different trigger field-strength values have to be taken into account.

The basis for the determination of these values are given in Appendix 2 to Section I.

Table AP1.1 shows the proposed coordination trigger field strengths to be used for the identification of affected administrations for the protection of broadcasting from modifications of the Plan.

TABLE AP1.1

Coordination trigger field-strength values to protect systems in the broadcasting service from modifications to the Plan

Broadcasting system modifying the Plan	**Trigger field strength (dB(μV/m))**			
	Band III (174-230 MHz)	**Band IV (470-582 MHz)**	**Band V (582-718 MHz)**	**Band V (718-862 MHz)**
DVB-T	17	21	23	25
T-DAB	12	–	–	–
Analogue TV	10	18	20	22

A.2 Coordination trigger field strengths to protect the mobile service in the bands 174-230 MHz and 470-862 MHz

The trigger field-strength levels to protect systems in the mobile service from T-DAB and DVB-T systems are provided in Tables AP1.2 and AP1.3 respectively, with their corresponding system type codes.

TABLE AP1.2

Coordination trigger field-strength values to protect systems in the mobile service in the band 174-230 MHz from T-DAB

System to be protected	System type code (see Annex 2, Chapter 4)	Trigger field strength (dB(μV/m))[1]	Height of the receiving antenna (m)
Mobile system MU (low power)	MU	16	10
Mobile system M1 (narrow-band FM, 12.5 kHz) (private mobile radio) Mobile systems RA1 and RA2 (narrow-band FM, 12.5 kHz)	M1 and RA	19 (base station) 27 (mobile station)	20 (base station) 1.5 (mobile station)
Mobile system M2 (narrow-band)	M2	48	10
Land mobile system XA (private mobile radio)	XA	27	10
Land mobile system XM (radio microphones VHF)	XM	30	10
Land mobile system MA	MA	21	10
Mobile and fixed systems (transportable)	MT	5	10

(1) The trigger field-strength values are related to 1.5 MHz T-DAB bandwidth.

TABLE AP1.3

Coordination trigger field-strength values to protect systems of the mobile service from DVB-T

System to be protected	System type code (see Annex 2, Chapter 4)	Frequency range	Trigger field strength (dB(μV/m))[(1)]	Height of the receiving antenna (m)
Analogue private mobile radio, 12.5 kHz	NV	Band III	30 (base stations) 38 (mobile stations)	20 (base station) 1.5 (mobile station)
Land mobile system NR (radio microphone)	NR	790-862 MHz/Band III	58 (UHF)/50 (VHF)	1.5
Mobile system NS (OB link, stereo, non-companded)	NS	790-862 MHz/Band III	45 (UHF)/37 (VHF)	10
Mobile system NT (Talk-back)	NT	790-862 MHz/Band III	47 (UHF)/39 (VHF)	1.5
Digital land mobile system NA (e.g. CDMA)	NA	470-862 in Region 3, 790-862 MHz in accordance with RR No. 5.316	18 (base station)	20 (base station)
Generic mobile system NB	NB	174-230 MHz/ 470-862 MHz	See equation (AP1.1) and Table AP1.4 (base station) See equation (AP1.1) and Table AP1.5 (mobile station)	20.0 (base station) 1.5 (mobile station)
Land mobile system XN (VHF)	XN	Band III	38	1.5
Land mobile system YN (480 MHz)	YN	480 MHz	41	1.5
Land mobile system ZC (620 MHz)	ZC	620 MHz	43	1.5

(1) The trigger field-strength values are related to the DVB-T bandwidth.

For the generic case (type code NB) in the mobile service, i.e. when there is no value of protection ratio available, the following equation must be used:

$$F_{trigger} = -37 + F - G_i + L_F + 10\ \log(B_i) + P_o + 20\ \log f + I/N \qquad \text{(AP1.1)}$$

where:

F: receiver noise figure of the mobile service base or mobile station receivers (dB)

B_i: the bandwidth of the terrestrial broadcasting station (MHz)

G_i: the receiver antenna gain of the station in the mobile service (dBi)

L_F: antenna cable feeder loss (dB)

f: centre frequency of the interfering station (MHz)

P_o: man-made noise (dB) (typical value is 1 dB for the VHF band and 0 dB for the UHF band)

I/N: interference to noise ratio, which must not exceed the threshold (margin) applicable when developing the Plan ($I/N = -6$ dB).

For the generic case of the land mobile service, the following typical values of F, G_i, L_F and P_o to be used (see Recommendation ITU-R M.1767 as an informative source) are provided in Tables AP1.4 and AP1.5 for the base stations and mobile stations respectively:

TABLE AP1.4

Typical values of the parameters when applying equation (AP1.1) to derive coordination trigger field-strength values to protect the base stations for the generic case (type code NB) of the mobile service from DVB-T

Frequency (MHz)	174	230	470	790	862
F (dB)	8	8	4	3	3
G_i (dBi)	6	8	12	17	17
L_F (dB)	2	2	2	4	4
P_o (dB)	1	1	0	0	0
$F - G_i + L_F + P_o$	5	3	–6	–10	–10

TABLE AP1.5

Typical values of the parameters when applying equation (AP1.1) to derive coordination trigger field-strength values to protect the mobile stations for the generic case (type code NB) of the mobile service from DVB-T

Frequency (MHz)	174	230	470	790	862
F (dB)	11	11	7	7	7
G_i (dBi)	0	0	0	0	0
L_F (dB)	0	0	0	0	0
P_o (dB)	1	1	0	0	0
$F - G_i + L_F + P_o$	12	12	7	7	7

A.3 Coordination trigger field strengths for the aeronautical radionavigation service in the bands 223-230 MHz, 590-598 MHz and 645-862 MHz and the radionavigation service in the band 585-610 MHz

No assignments to stations of the aeronautical radionavigation service operating in the band 223-230 MHz in Region 3 and in some countries of Region 1 in accordance with RR No. 5.247 have been notified to ITU. Therefore, there are no trigger values in that situation.

The trigger field-strength levels to protect the aeronautical radionavigation and the radionavigation services from DVB-T are provided in Table AP1.6.

For the coordination trigger field-strength value to protect the aeronautical radionavigation service in the band 223-230 MHz from T-DAB and DVB-T, the recent ITU-R Recommendations, or values mutually agreed by the administrations concerned, are to be used.

TABLE AP1.6

Coordination trigger field-strength values to protect the radionavigation and the aeronautical radionavigation services from DVB-T[(2)]

System to be protected	System type code (see Annex 2, Chapter 4)	RR allocation	Application	Frequency (MHz)	Trigger field strength (dB(μV/m))[(1)]	Height of the receiving antenna (m)
Aeronautical radionavigation system XG (on channel 36, 4 MHz airport radars, UK)	XG	Countries in No. 5.302	Airport radar	590-598	–12	7
Aeronautical radionavigation system AB (RLS 1)	AB	Region 3	Type 1 Ground-to-ground	Appropriate channels in the band 585-610 MHz	13	10
Aeronautical radionavigation system AA8 (RSBN)	AA8	Countries in No. 5.312	Air-to-ground component	Appropriate channels in band 645-862 MHz	36	10
Aeronautical radionavigation system AA8 (RSBN)	AA8	Countries in No. 5.312	Ground-to-air component	Appropriate channels in band 645-862 MHz	42	10 000
Aeronautical radionavigation system AB (RLS)	AB	Countries in No. 5.312	Ground-to-ground	Appropriate channels in band 645-862 MHz	13	10
Aeronautical radionavigation system BD (RLS 2, Type 1, ground transmission, 4 MHz)	BD	Countries in No. 5.312	Ground-to-air component	Appropriate channels in band 645-862 MHz	49	10 000
Aeronautical radionavigation system BA (RLS 2, Type 1, airborne transmission, 4 MHz)	BA	Countries in No. 5.312	Type 1 Air-to-ground component	Appropriate channels in band 645-862 MHz	29	10

TABLE AP1.6 (*end*)

System to be protected	System type code (see Annex 2, Chapter 4)	RR allocation	Application	Frequency (MHz)	Trigger field strength (dB(μV/m))[1]	Height of the receiving antenna (m)
Aeronautical radionavigation system BC (RLS 2, Type 2, ground transmission, 3 MHz)	BC	Countries in No. 5.312	Type 2 Ground-to-air component	Appropriate channels in band 645-862 MHz	71	10 000
Aeronautical radionavigation system BB (RLS 2, Type 2, airborne transmission, 8 MHz)	AA2	Countries in No. 5.312	Type 2 Air-to-ground component	Appropriate channels in band 645-862 MHz	21	10

(1) The trigger field-strength values are related to the DVB-T bandwidth.

(2) See also text in § A.3.

A.4 Coordination trigger field strengths for the fixed service in the bands 174-230 MHz and 470-862 MHz

The trigger field-strength levels to protect systems in the fixed service from T-DAB and DVB-T are provided in Table AP1.7 with their corresponding service type codes.

TABLE AP1.7

Coordination trigger field-strength values to protect systems of the fixed service from T-DAB and DVB-T

Service, system to be protected	System type code (see Annex 2, Chapter 4)	Frequency range (MHz)	Trigger field strength (dB(μV/m))	Height of the receiving antenna (m)
Fixed system FF (transportable, 1.2 MHz)	FF	790-862	24[1]	37.5
Fixed system FH	FH	790-862	13[1]	37.5
Generic fixed system FK	FK	174-230 and 470-862	See equation (AP1.2) and Table AP1.8	37.5

(1) The trigger field-strength values are related to the DVB-T bandwidth.

For the generic case (type code FK), i.e. when there is no value of protection ratio available, the following equation should be used:

$$F_{trigger} = -37 + F - G_i + L_F + 10 \log(B_i) + P_o + 20 \log f + I/N \qquad \text{(AP1.2)}$$

where:

F: receiver noise figure of the FS station receiver (dB)

B_i: the bandwidth of the terrestrial broadcasting station (MHz)

G_i: the FS station receiver antenna gain (dBi)

L_F: antenna cable feeder loss (dB)

f: centre frequency of the interfering broadcasting station (MHz)

P_o: man-made noise (dB) (typical value is 1 dB for VHF band and 0 dB for UHF band)

I/N: interference to noise ratio, which must not exceed the threshold (margin) applicable when developing the plan ($I/N = –6$ dB).

Based on the information in Recommendations ITU-R F.758-4, ITU-R F.1670-1 and ITU-R SM.851-1, the following typical values of F, G_i, L_F and P_o to be used are provided in Table AP1.8:

TABLE AP1.8

Typical values of the parameters obtained when applying equation (AP1.2) to derive trigger field-strength values to protect the stations for the generic case (type code FK) of the fixed service from DVB-T

Frequency (MHz)	174-230	500	800
F (dB)	5	5	5
G_i (dBi)	9	14	16
L_F (dB)	4	5	5
P_o (dB)	1	0	0
$F - G_i + L_F + P_o$	1	–4	–6

For other frequencies in the UHF band, the interpolation should be made by applying a correction of 10 log (f/500).

B Coordination trigger field strengths for the protection of the Plan from stations of other primary terrestrial services

B.1 Representative broadcasting systems

See Appendix 2 to Section I for the broadcasting system variants.

B.2 Derivation of trigger levels

There have been some detailed investigations on protection of DVB-T system against interference from systems in the fixed and mobile services. Their operational frequency range lies either within the bandwidth of the digital television signal or partially overlaps with it. Therefore, a more general case of interference from other services to digital terrestrial broadcasting can be covered by using the trigger criteria for digital broadcasting interfered with by digital broadcasting.

No detailed studies on analogue television interfered with by all systems with which sharing occurs, i.e. ARNS, mobile service, fixed service have been made. Therefore, it is suggested to use the same trigger criteria for analogue television interfered with by terrestrial broadcasting for this purpose.

B.3 Coordination trigger field strengths for the protection of the Plan from stations of other primary terrestrial services

Table AP1.9 gives the trigger field strengths for the representative broadcasting systems as described in Appendix 2 to Section I for the frequencies 200 MHz and 650 MHz.

TABLE AP1.9

Coordination trigger field strengths for representative broadcasting systems

Broadcasting service to be protected	**Trigger field strength (dB(μV/m))[1]**			
	Band III (174-230 MHz)	**Band IV (470-582 MHz)**	**Band V (582-718 MHz)**	**Band V (718-862 MHz)**
DVB-T	17	21	23	25
T-DAB	27	–	–	–
Analogue TV	10	18	20	22

(1) The trigger field-strength values are related to the bandwidth of the system to be protected.

It is proposed to take the most critical case for the wanted systems, since it is *a priori* not known which system may be used by the affected administration. However, analogue television is expected to be switched off after a transition period. Therefore, probably two sets of values need to be kept. Table AP1.10 gives the final result of the proposed trigger field strengths to be used in coordination.

TABLE AP1.10

Coordination trigger field strengths for the protection of the Plan from other primary terrestrial services

Broadcasting system to be protected	**Trigger field strength (dB(μV/m))[1]**			
	Band III (174 -230 MHz)	**Band IV (470-582 MHz)**	**Band V (582-718 MHz)**	**Band V (718-862 MHz)**
Analogue and digital[2]	10	18	20	22
Digital	17	21	23	25

(1) The trigger field-strength values are related to the 7 or 8 MHz bandwidth of the system to be protected.

(2) To be applicable during the transition period.

Appendix 2
to Section I

Basis for the determination of the coordination trigger field strengths for the broadcasting service

The purpose of this Appendix is to provide background information on the derivation of the trigger coordination field strengths to protect the broadcasting service.

1 Representative broadcasting systems

This appendix deals with various broadcasting systems. Therefore, different trigger field-strength values have to be taken into account. However, for determination of the affected administration, the trigger field strengths are evaluated for the following representative system variants of T-DAB, DVB-T and analogue TV, including the respective reception modes and target location probabilities:

– DVB-T: 64-QAM 3/4, fixed roof-level reception, 95% location probability
– T-DAB: mobile reception, 99% location probability (Mode I, PL 3, see Recommendation ITU-R BS.1114-5)
– Analogue TV: SECAM L, fixed roof-level reception, 50% location probability.

These variants are regarded as the most sensitive variants which will be used in practice.

2 Determination of the coordination trigger field strengths for the protection of the broadcasting service

The coordination trigger field strength $F_{trigger}$ is calculated as follows:

$$F_{trigger} = F_{med} + f_{corr} - PR - CF \tag{AP2.1}$$

where:

F_{med}: minimum median field strength of the relevant (victim) broadcasting system

f_{corr}: frequency correction, as described below

PR: relevant protection ratio provided in Chapter 3 of Annex 2 to the Agreement

CF: relevant combined location correction factor as described in Chapter 3 of Annex 2 to the Agreement.

If the protection ratios distinguish between tropospheric and continuous interference, the tropospheric case is to be taken. In order to account for the worst reception case, no receiving antenna discrimination for fixed roof-level reception is taken into account.

In Chapter 3 of Annex 2 to the Agreement, the minimum median field strengths for the reference planning configurations are calculated for 200 MHz (Band III) and 650 MHz (Bands IV/V). For other frequencies the following interpolation rule is used:

– for fixed reception, $f_{corr} = 20 \log_{10} (f/f_r)$, where f is the actual frequency and f_r the reference frequency of the relevant band quoted above;

– for portable reception and mobile reception, $f_{corr} = 30 \log_{10} (f/f_r)$ where f is the actual frequency and f_r the reference frequency of the relevant band quoted above.

3 Coordination trigger field strengths for the broadcasting service

Tables AP2.1 and AP2.2 give the trigger field strengths for the representative broadcasting systems as described above for the frequencies 200 MHz and 650 MHz. The most critical trigger field strengths are indicated in bold in Tables AP2.1 and AP2.2.

TABLE AP2.1

Coordination trigger field strengths[(1)] for representative broadcasting systems at 200 MHz

	Broadcasting system to be protected		
	DVB-T	**T-DAB**	**Analogue TV**
Minimum median field strength	F_{med} = 51 dB(μV/m)	F_{med} = 60 dB(μV/m)	F_{med} = 55 dB(μV/m)
Interfering system			
DVB-T	*PR* = 21 dB $\boldsymbol{F_{trigger}}$ **= 17 dB(μV/m)**	*PR* = 9 dB $F_{trigger}$ = 33 dB(μV/m)	*PR* = 35 dB $F_{trigger}$ = 20 dB(μV/m)
T-DAB	*PR* = 26 dB $\boldsymbol{F_{trigger}}$ **= 12 dB(μV/m)**	*PR* = 15 dB $F_{trigger}$ = 27 dB(μV/m)	*PR* = 42 dB $F_{trigger}$ = 13 dB(μV/m)
Analogue TV	*PR* = 9 dB $F_{trigger}$ = 29 dB(μV/m)	*PR* = 2 dB $F_{trigger}$ = 40 dB(μV/m)	*PR* = 45 dB $\boldsymbol{F_{trigger}}$ **= 10 dB(μV/m)**

(1) The trigger field-strength values are related to the bandwidth of the system to be protected.

TABLE AP2.2

Coordination trigger field strengths[1] for representative broadcasting systems at 650 MHz

	Broadcasting system to be protected	
	DVB-T	**Analogue TV**
Minimum median field strength	F_{med} = 57 dB(μV/m)	F_{med} = 65 dB(μV/m)
Interfering system		
DVB-T	*PR* = 21 dB **$F_{trigger}$ = 23 dB(μV/m)**	*PR* = 35 dB $F_{trigger}$ = 30 dB(μV/m)
Analogue TV	*PR* = 9 dB $F_{trigger}$ = 35 dB(μV/m)	*PR* = 45 dB **$F_{trigger}$ = 20 dB(μV/m)**

[1] The trigger field-strength values are related to the 8 MHz bandwidth of the system to be protected.

It is proposed to distinguish between the analogue and digital broadcasting systems that are to be coordinated but to take the most critical case for the wanted systems, since it is *a priori* not known which system may be used by the affected administration.

Appendix 3
to Section I

Position and orientation of the reference network for allotment

For the calculation of the outgoing interference of the reference network each boundary test point of the allotment is regarded as a source of outgoing interference. For this calculation it is necessary to know how the reference network is positioned and oriented with regard to the boundary test point.

All reference networks can be characterized by hexagons. One edge (the "starting edge") of the hexagon is set perpendicular to a line between the boundary test point and the calculation point. The centre of the starting edge is then positioned at the boundary test point.

In this position the other vertices and the centre of the hexagon are further away from the calculation point than the vertices of the starting edge. This fixes the position of the reference network and its transmitters. The field strength is then determined.

The reference network is then moved around the allotment boundary to the next test point, where the field strength is again determined for the same calculation point. This procedure is repeated until the reference network is back in the starting position.

The field strength at the calculation point is evaluated separately for each transmitter of the reference network using the characteristics of the associated reference planning configuration. For this purpose, the e.r.p. for the DVB-T reference networks should include a power margin of 3 dB.

The resulting interfering sum field strength is evaluated by applying the power sum method. Mixed land-sea path propagation is calculated on the basis of Chapter 2 of Annex 2 to the Agreement.

In the case of a 3-transmitter hexagon, the transmitter closest to the boundary test point lies on the right-hand side, looking from the boundary test point to the calculation point.

A sketch of the situation is given for both possible reference network configurations (3 transmitters and 7 transmitters) in Figs AP3-1 and AP3-2.

Due to the movement of a notional hexagon around a national border, it is possible that one or more transmitters of the reference network could lie outside the territory of the administration for whose allotment the calculation is performed.

FIGURE AP3-1

3-transmitter hexagon RN

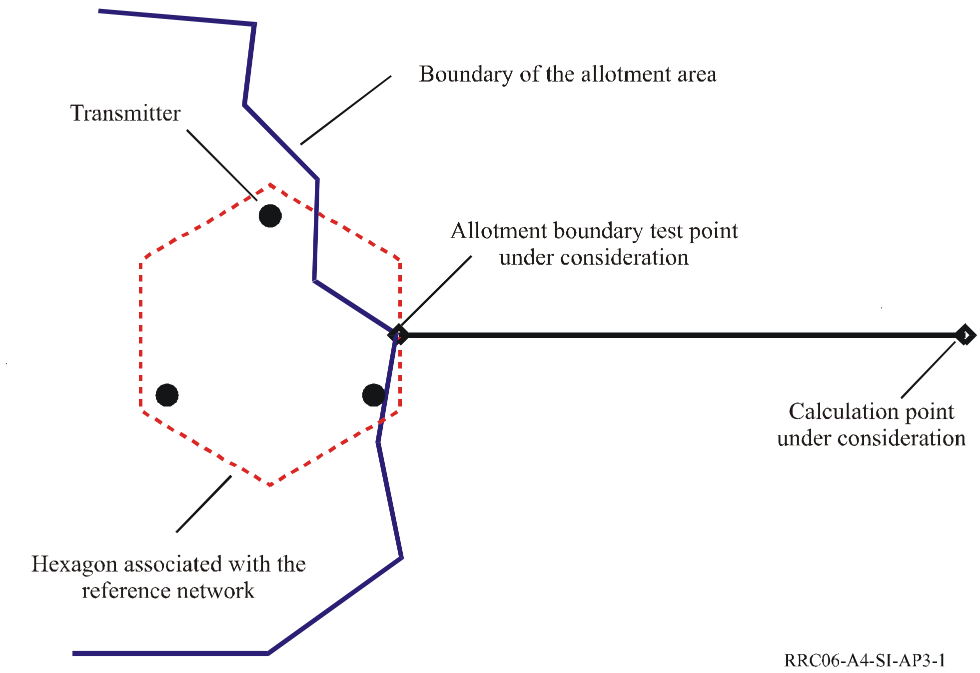
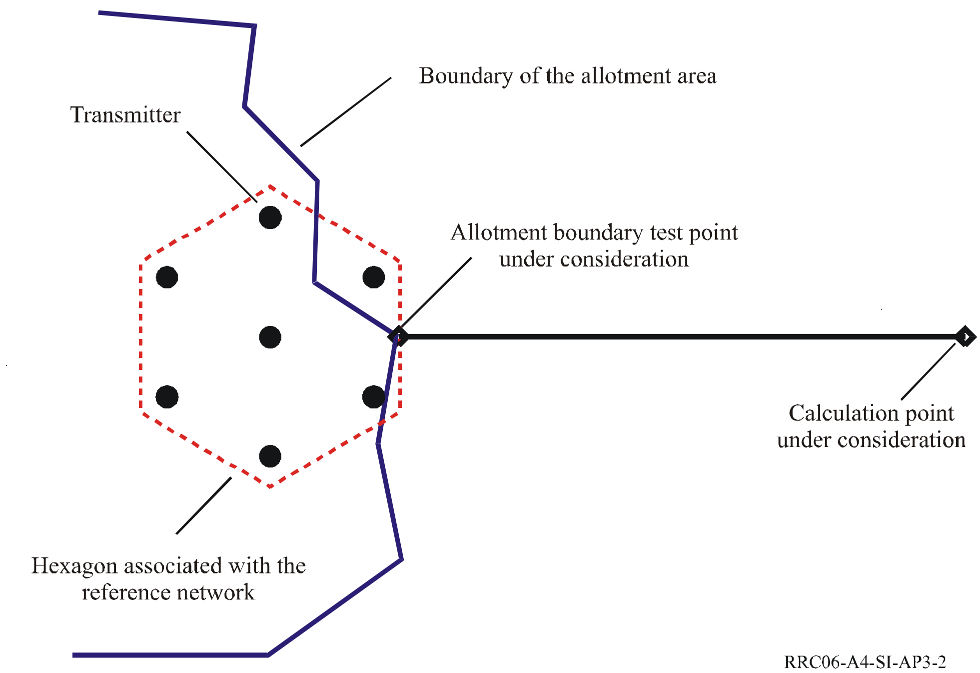


FIGURE AP3-2

7-transmitter hexagon RN



Section II
of Annex 4

Examination of conformity with the digital Plan entry

1 Introduction

This Section describes the method to be used by the Bureau in the application of Articles 4 and 5 of this Agreement.

This method shall be applied in the following cases:

– when one or more assignments are derived from the conversion of a digital Plan entry comprising an allotment or from the conversion of a digital Plan entry comprising an allotment with linked assignments as in § 4.1.2.7 of Article 4 of the Agreement;

– when a digital Plan entry is modified without increasing the level of interference of the digital Plan entry as in § 4.1.2.4 *b)* of Article 4 of the Agreement; and

– when one or several assignments are notified under Article 5 for recording in the MIFR.

The main terms used in this annex are explained in Appendix 4 to this Section.

2 General principles

In the following, the term "*digital Plan entry implementation*" is used:

– in the application of Article 4, to designate all assignments corresponding to the digital Plan entry which are already included in the Plan or proposed for inclusion in the Plan;

– in the application of Article 5, to designate all assignments corresponding to the digital Plan entry which are already recorded in the MIFR, or proposed for recording in the MIFR.

The conformity examination method comprises the following:

a) verification that the channel or block of the digital Plan entry implementation is the same as that of the associated digital Plan entry and that the geographical location of the digital Plan entry implementation is within the set limits; and

b) comparison of the interference envelope arising from the digital Plan entry with the aggregate interference from the digital Plan entry implementation. The area within which this comparison is performed is bounded by a cut-off field-strength contour on which a final comparison of the total interfering field strengths is performed.

The *digital Plan entry implementation* is in conformity with the Plan when verification by the Bureau under *a)* is confirmed and when under *b)* the interference of the digital Plan entry implementation does not exceed the interference envelope derived from the characteristics of the digital Plan entry at any relevant calculation point.

3 Features of the method applicable to all digital Plan entries

The cut-off field-strength contour provides the mechanism that scales the number of calculation points in the conformity examination to the values of the effective radiated power and trigger field-strength values. The cut-off criterion is the relevant trigger field-strength value under Section I of Annex 4 of the Agreement.

If the proposed assignments are in a frequency band where there is no assignment of another primary terrestrial service within 1 000 km which is recorded in the List or for which the procedure of Article 4 of this Agreement has been initiated, and the cut-off field-strength contour based on the broadcasting trigger field strengths does not extend beyond the national boundary of the notifying administration, the conformity examination is favourable.

If the proposed assignments are in a frequency band where there are assignments of another primary terrestrial service within 1 000 km which are recorded in the List or for which the procedure of Article 4 of this Agreement has been initiated, and the cut-off field-strength contour based on the broadcasting trigger field strengths does not extend beyond the national boundary of the notifying administration, the cut-off field-strength contour is redrawn using the appropriate trigger value field strengths for the assignments of other primary terrestrial services to be protected over the range of azimuths corresponding to the direction of the potentially affected service area, restricted to the national territory of the administration whose other primary terrestrial services may be affected. If the cut-off field-strength contours resulting from this process still do not extend beyond the national boundary of the notifying administration, the conformity examination is favourable.

If the cut-off field-strength contours exceed the limits of the territory of the notifying administration at any location, a series of geometrical contours are created. These contours are created for the purpose of verifying that, at each of their points, the aggregate interference field strength from the proposed conversion of a digital entry in the Plan, and from the assignments in the MIFR (including the linked assignments) which are associated to the digital entry in the Plan, where applicable, does not exceed the interference envelope of the digital entry in the Plan.

On these contours, calculation points are located at 1° steps along the geometrical contours surrounding the allotment area or the assignment(s). Not all points are taken into account: only those calculation points lying outside the territory of the notifying administration and inside the cut-off field-strength contour(s) around the allotment or assignment(s) are used.

A *digital Plan entry implementation* is in conformity when at every calculation point the interference of the *digital Plan entry implementation* does not exceed the interference envelope derived from the characteristics of the digital Plan entry.

3.1 Field-strength calculations

The field-strength calculations are based on the propagation model in Chapter 2 of Annex 2 of the Agreement (propagation curves for the tropospheric case, i.e. 1% of time and 50% of locations, shall be used). The calculation of interference from any transmitter is limited to 1 000 km. The calculated values are rounded to the first decimal place.

In case the field strengths from several signal sources need to be aggregated the power sum method is used. The individual field strengths obtained at the calculation points from all transmitting stations of an allotment are processed in decreasing order. The power sum is obtained as follows:

– starting from the highest, the power values equivalent to the interfering field strengths are added, one after the other;

– at each summation, the result is compared to the previous one;

– if the increase in power is greater than or equal to 0.5 dB, the summation process continues;

– if the increase in power would be less than 0.5 dB, the summation process is stopped and 0.5 dB is added, giving the result of the power sum.

3.2 Construction of the geometrical contours and of the calculation points

The geometrical contours are at distances of 60, 100, 200, 300, 500, 750 and 1 000 km from the location of the station(s) or the boundary of the digital Plan entry.

The construction of the geometrical contours depends on the type of digital Plan entry.

For each type of digital Plan entry a point of reference is defined. From this point of reference 360 radials are developed at 1° steps starting from True North. The point where the radial crosses the cut-off field-strength contour and any geometrical contours lying outside the national boundary of the notifying administration is the location of the calculation points.

4 Application of the method to each type of digital Plan entries

The Plan is built on two fundamental planning objects, namely assignments and allotments. Both assignments and allotments are characterized by the general set of technical characteristics listed in Annex 1 of the Agreement. These two objects can be combined into five different types of Plan entry that can be recorded in the Plan. The features of each of the five different types of digital Plan entry have an impact on the method for the examination of conformity.

4.1 Digital Plan entry that comprises only an allotment

This digital Plan entry is characterized by an allotment boundary, an assigned frequency, a type of reference network (RN) and a reference planning configuration (RPC).

4.1.1 Location of the assignments derived from the digital Plan entry

Such assignments must be located inside the allotment area or not more than 20 km outside the allotment boundary. These locations shall be within the territory of the notifying administration, unless otherwise agreed by the administration concerned (see RR No. 18.2).

4.1.2 Geometrical contours for the digital Plan entry

The point of reference of an allotment Plan entry is the centre of gravity of the allotment polygon(s), and the construction of the geometrical contour is described in Appendix 1 to this Section.

4.1.3 Interference envelope of the digital Plan entry

The characteristics of the reference network associated with the allotment are used as the source for calculating the interference envelope. The reference network located at each allotment boundary point acts as a source of interference. The positioning of the reference network is described in Appendix 2 to this Section. The largest field-strength value obtained, at the calculation point under consideration, from each allotment boundary point is the value of interference field strength to be used.

4.1.4 Interference field strength from *digital Plan entry implementation*

a) Application of Article 4

In the case of the conversion of an allotment Plan entry into an assignment where it is intended to include that assignment in the Plan, the aggregate interference is calculated using the power sum method, as described in § 3.1 above, of the interference contributions from:

– assignments already included in the Plan as a result of the conversion of the allotment; and

– the new assignment(s) resulting from the conversion of the allotment and submitted under Article 4 for inclusion in the Plan.

b) Application of Article 5

In the case of the conversion of an allotment Plan entry into an assignment where it is intended to record that assignment in the MIFR, the aggregate interference is calculated using the power sum method, as described in § 3.1 above, of the interference contributions from:

– assignments already recorded in the MIFR as a result of the conversion of the allotment; and

– the new assignment(s) resulting from the conversion of the allotment and submitted under Article 5 for recording in the MIFR.

4.1.5 Cut-off field-strength contour for the digital Plan entry

The reference point for the construction of the cut-off field-strength contour is the centre of gravity of the allotment polygon(s), and the method for the construction of the contour is described in Appendix 3 to this Section.

4.2 Digital Plan entry comprising one assignment only

The digital Plan entry consists of a single assignment. It is characterized by the required set of technical characteristics described in Annex 1 of the Agreement. Some of the technical characteristics may be described in terms of an RPC.

In the case that the characteristics of the *digital Plan entry implementation* are identical to those of the digital Plan entry, the assignment is automatically considered to be in conformity with the digital Plan entry and therefore it is not necessary to perform the conformity examination.

4.2.1 Location of the notified assignment

The location of the transmitting antenna must not be more than 20 km from the geographical location specified in the corresponding digital Plan entry. This location shall be within the territory of the notifying administration, unless otherwise agreed by the administration concerned (see RR No. 18.2).

4.2.2 Geometrical contours for the digital Plan entry

The point of reference is the geographical location of the transmitting antenna as recorded in the Plan, and the geometrical contours consist of concentric circles, centred around that point.

4.2.3 Interference envelope of the digital Plan entry

The characteristics of the assignment, as listed in the Plan, are used to calculate the digital Plan entry interference envelope.

4.2.4 Interference field strength from a *digital Plan entry implementation*

In the application of Article 5, the interference field strength from the *digital Plan entry implementation* is that produced by the notified assignment.

4.2.5 Cut-off field-strength contour for the digital Plan entry

The reference point for construction of the cut-off field-strength contour is the geographical location of the transmitting antenna as recorded in the Plan, and the method for the construction of the contour is described in Appendix 3 to this Section.

4.3 Digital Plan entry comprising an allotment with linked assignments

The digital Plan entry consists of an allotment and a set of linked assignments. The allotment is characterized by an allotment boundary, an assigned frequency, a type of RN and either an RPC or a system variant together with a reception mode. Each of the linked assignments is characterized by the required set of technical characteristics described in Annex 1 of the Agreement, and the link between the allotment and the assignments is established by the assignments having the same allotment and SFN identifier as the allotment.

4.3.1 Location of the assignments implementing the digital Plan entry

The assignments converted from the allotment must be located inside the allotment area or not more than 20 km outside the allotment area boundary. The location of the transmitting antenna for a linked assignment must not be more than 20 km from the geographical location specified in the digital Plan entry for the corresponding assignment.

These locations shall be within the territory of the notifying administration, unless otherwise agreed by the administration concerned (see RR No. 18.2).

4.3.2 Geometrical contours for the digital Plan entry

The point of reference is the centre of gravity of the allotment polygon, and the construction of the geometrical contours is described in Appendix 1 to this Section.

4.3.3 Interference envelope of the digital Plan entry

The interference envelope of the allotment with linked assignments digital Plan entry is calculated as the higher value, at each individual calculation point, of either:

– the power sum method, as described in § 3.1 above, of the interference from the linked digital assignments; or

– the interference from the reference network associated with the allotment (see Appendix 2 to this Section).

As the allotment is generally intended to be converted into assignments which would have an impact on the available digital Plan entry interference potential, the examination of conformity has to be performed also in the case where the characteristics of the notified linked assignment(s) are identical to those of the corresponding digital Plan entry.

4.3.4 Interference field strength from a *digital Plan entry implementation*

a) Application of Article 4

The interference field strength is calculated using the power sum method, as described in § 3.1 above, of the interference contributions from:

– assignments already included in the Plan as a result of the conversion of the allotment element of the digital Plan entry (i.e. excluding the linked assignments); and

– the new assignment(s) resulting from the conversion of the allotment element of the digital Plan entry and submitted under Article 4 for inclusion in the Plan.

b) Application of Article 5

The aggregate interference is calculated using the power sum method, as described in § 3.1 above, of the interference contributions from:

– assignments already recorded in the MIFR as a result of the conversion of the allotment element; and

– linked assignments corresponding to the digital Plan entry, which have already been recorded in the MIFR under § 5.1.4, 5.1.6 and 5.1.7[1] of Article 5; and

– the new assignments resulting from the conversion of the allotment element of the digital Plan entry and submitted under Article 5 for recording in the MIFR; and

– linked assignments corresponding to the digital Plan entry and submitted under Article 5 for recording in the MIFR.

4.3.5 Cut-off field-strength contour for the digital Plan entry

The point of reference is the centre of gravity of the allotment polygon, and the method for the construction of the cut-off field-strength contour is described in Appendix 3 to this Section.

4.4 Digital Plan entry comprising a set of assignments with a common SFN identifier

The digital Plan entry consists of a set of assignments with a common SFN identifier without an allotment being associated to this set. Each individual assignment is characterized by the technical characteristics in Annex 1 of the Agreement.

The number of assignments implementing the digital Plan entry cannot exceed the number of assignments in the set that comprises the digital Plan entry.

In the case that the characteristics of all the notified assignments are identical to those of the corresponding assignments in the digital Plan entry, it is not necessary to perform the conformity examination.

However, if any assignment is notified with different characteristics than those of the corresponding assignment of the digital Plan entry, then the examination of conformity has to be performed with respect to all the assignments implementing the digital Plan entry.

4.4.1 Location of the notified assignments

The locations of the notified assignments must be not more than 20 km away from the respective geographical locations specified in the digital Plan entry.

4.4.2 Geometrical contours for the digital Plan entry

The point of reference of the digital Plan entry is the centre of gravity of the geographical coordinates of all the locations of the individual transmitting antennas.

For each assignment of the digital Plan entry a series of concentric circles is constructed at the distances defined in § 3.2 above. Those circles at the same distance that intersect are then joined in order to result in one or several contours surrounding the locations of the assignments of the SFN at the corresponding distance.

---

[1] Inclusion of the assignment in the calculation of interference does not imply recognition or that any protection will be afforded to this assignment.

4.4.3 Interference envelope of the digital Plan entry

The characteristics of each of the assignments, as listed in the Plan, are used in order to calculate the aggregate interference envelope in accordance with the variation of the power sum method in § 3.1 above.

4.4.4 Interference field strength from a *digital Plan entry implementation*

In this case, verification of conformity is only conducted within Article 5. The interference field strength from the *digital Plan entry implementation* is the aggregate interference field strength, as described in § 3.1 above, produced by:

– all the assignments corresponding to the digital Plan entry and already recorded in the MIFR, including those recorded under § 5.1.4, 5.1.6 and 5.1.7[2] of Article 5; and

– all the assignments corresponding to the digital Plan entry and submitted under Article 5 for recording in the MIFR.

4.4.5 Cut-off contour for a set of assignments with common SFN identifier

The reference point for the construction of the cut-off field-strength contour is the centre of gravity of the geographical coordinates of all the locations of the individual transmitting antennas, and the method for the construction of the cut-off field-strength contour is described in Appendix 3 to this Section.

4.5 Digital Plan entry comprising an assignment linked to an allotment with no SFN identifier

The digital Plan entry consists of an allotment with one linked assignment but no SFN identifier. In that case the only source of interference is that from the assignment, and the allotment boundary only defines the area to be protected in the planning during RRC-06. For the latter, either an RPC is specified, or a system variant together with a reception mode. The assignment is characterized by the required set of technical characteristics described in Annex 1 of the Agreement.

It is not possible to convert the allotment into assignment(s) unless this digital Plan entry type is replaced by another type of digital Plan entry. The conversion into assignment(s) would require the allotment to have an SFN identifier, i.e. the assignment linked to an allotment with no SFN identifier digital Plan entry would have to be replaced by an allotment digital Plan entry.

In the case that the characteristics of the *digital Plan entry implementation* are identical to those of the digital Plan entry, the assignment is automatically considered to be in conformity with the digital Plan entry, and therefore it is not necessary to perform the conformity examination.

The method for the examination of conformity of the notified assignment corresponding to the assignment in the assignment linked to an allotment with no SFN identifier digital Plan entry is the same as the method described under § 4.2 above.

---

[2] Inclusion of the assignment in the calculation of interference does not imply recognition or that any protection will be afforded to this assignment.

Appendix 1
to Section II

Construction of the geometrical contour for allotment Plan entries and allotment with linked assignments Plan entries

The method to construct a set of geometrical contours for a given closed area requires the area to be defined as a set of boundary points, i.e. a polygon.

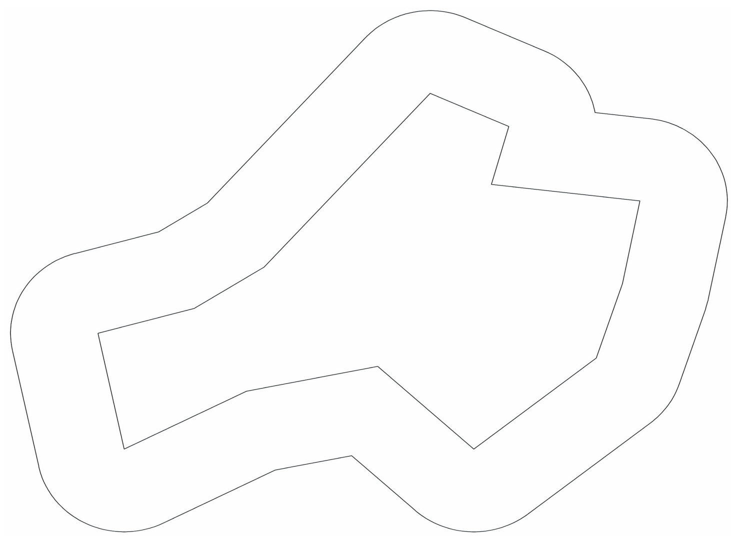
The first step of the geometrical contour construction is to sort the boundary points in a counter clockwise manner. Duplicated boundary points, i.e. boundary points connected by edges of length zero are eliminated. If two adjacent edges have the same direction, then the shared point is omitted.

In the next step the new edges are created which are separated by the distance given in § 3.2 of Annex 4, Section II from the polygon under consideration. These new "edges" are parallel lines and arcs, when convex boundary points are encountered. In the latter case the original boundary points act as centres for the arcs.

The resulting lines and arcs are connected together by calculating the intersection points of two consecutive lines or arcs. The intersection points make part of the set of vertices defining the geometrical contours. Along the remaining arcs additional points have to be located in order to appropriately approximate the arc by a polygon. Figure AP1-1 below shows the result.

FIGURE AP1-1

Geometrical contour for an allotment area



RRC06-A4-SII-API-1

Following this procedure it is possible to develop geometrical contours for any shape of allotment area, including those showing significant indentations. The indentations or concave sections of the polygon will be enclosed so that from any point on the allotment boundary the distance to the contour is equal to one of the required distances given in § 3.2 of Annex 4, Section II.

The above procedure allows the boundary points of the geometrical contour to be identified.

Appendix 2
to Section II

Positioning and orientation of the reference network for calculating the interference envelope of digital Plan entries comprising an allotment or an allotment with linked assignments

For the calculation of the outgoing interference of the reference network each boundary test point of the allotment is regarded as a source of outgoing interference. For this calculation it is necessary to know how the reference network is positioned and oriented with regard to the boundary point.

All reference networks can be characterized by hexagons. One edge (the "starting edge") of the hexagon is set perpendicular to a line between the boundary point and the calculation point. The centre of the starting edge is then positioned at the boundary point.

In this position the other boundary points and the centre of the hexagon are further away from the calculation point than the boundary points of the starting edge. This fixes the position of the reference network and its transmitters. The field strength is then determined.

The reference network is then moved around the allotment boundary to the next boundary point, where the field strength is again determined for the same calculation point. This procedure is repeated until the reference network is back in the starting position.

The field strength at the calculation point is evaluated separately for each transmitter of the reference network using the characteristics of the associated reference planning configuration. For this purpose, the e.r.p. for the DVB-T reference networks includes a power margin of 3 dB.

The resulting interfering sum field strength is evaluated by applying the ordinary power sum method. Mixed land-sea path propagation is calculated on the basis of Chapter 2 of Annex 2 to this Agreement.

In the case of a 3-transmitter hexagon the closest transmitter to the boundary point lies on the right hand side looking from the boundary point to the calculation point.

A sketch of the situation is given for both possible reference network configurations (3 transmitters and 7 transmitters) in Figs AP2-1 and AP2-2 below.

Due to the movement of a notional hexagon around a national border, it is possible that one or more transmitters of the reference network could lie outside the territory of the administration for whose allotment the calculation is performed.

FIGURE AP2-1

3-transmitter hexagon RN

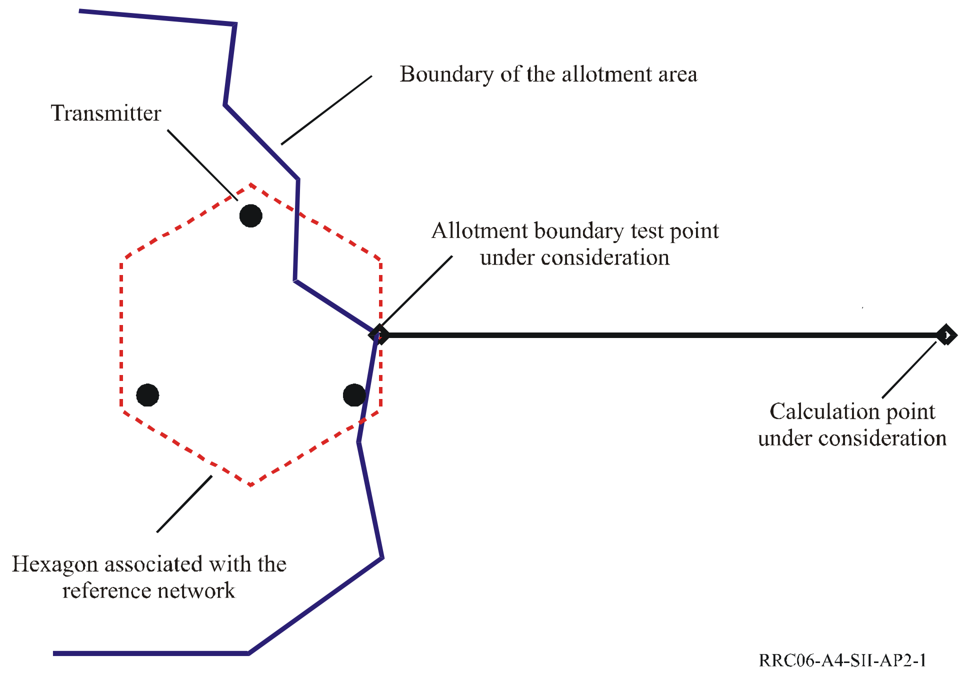
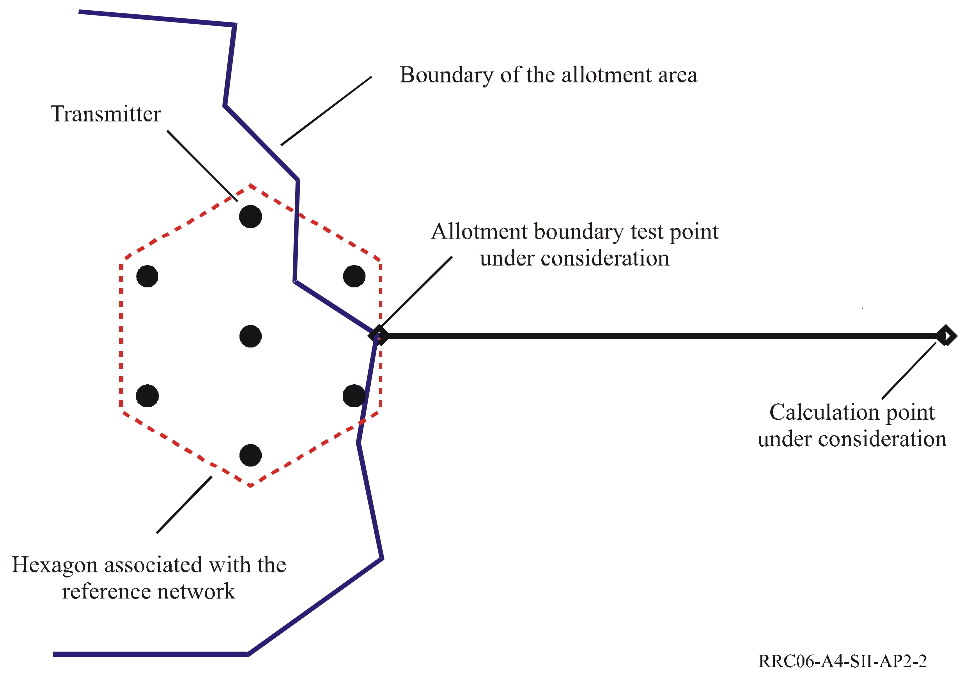


FIGURE AP2-2

7-transmitter hexagon RN



Appendix 3
to Section II

Construction of the cut-off field-strength contour

The cut-off field-strength values are the minimum trigger field-strength values in Annex 4, Section I of this Agreement.

The cut-off field-strength contour is developed using equally spaced radials 1° apart, over 360° centred on a single reference point, the location of which is defined for each type of digital Plan entry in § 4 of Annex 4, Section II.

Along these radials the aggregated field strength of the *digital Plan entry implementation* is calculated as described in § 3.1 of Annex 4, Section II (using values for 1% of time) by starting at a distance of 1 000 km, measured from the nearest transmitter of the *digital Plan entry implementation* or the allotment boundary, and moving towards the reference point until the cut-off field strength is reached.

Joining together the points on each radial where the cut-off field strength is reached forms the cut-off field-strength contour.

In some cases (e.g. areas of anomalous propagation, higher powered transmitters, sensitive coordination trigger value) it is possible that the cut-off field strength may be exceeded at the maximum distance of 1 000 km. In this case the point at 1 000 km will be the position of the cut-off field-strength contour on that radial.

Appendix 4
to Section II

Terms used in this annex

Calculation point: A point where field-strength calculations are performed.

Geometrical contour: A line at a constant distance from the digital Plan entry.

Cut-off field-strength contour: A line where the field-strength produced by a digital Plan entry implementation is equal to a specified value.

Digital Plan entry: An assignment, or an allotment, or a combination of assignments that may or may not be linked to a single allotment and that, for the purposes of the implementation of the *Plan* and its modifications, is treated as a single entity.

Digital Plan entry interference envelope: The aggregate field-strength level, at a calculation point, calculated based on the digital *Plan* entry characteristics.

Assignment derived (or converted) from an allotment: An assignment, recorded in the digital Plan and/or in the MIFR, that does not change the interference envelope of the associated digital Plan entry.

Linked assignment(s): One or several assignments, associated with an allotment, which appear in the digital Plan and may increase the overall interference envelope of the digital Plan entry beyond that caused by the reference network.

Digital Plan entry implementation:

In the application of Article 4, designates all assignments corresponding to the digital Plan entry which are already included in the Plan or proposed for inclusion in the Plan;

In the application of Article 5, designates all assignments corresponding to the digital Plan entry which are already recorded in the MIFR, or proposed for recording in the MIFR.

ANNEX 5

List of assignments to other primary terrestrial services as referred to in § 1.15 of Article 1 of the Agreement[1]

Information included in the data items of the List

No.	Description
1	ITU serial number
2	ITU symbol for the notifying administration
3	Unique identification code given by the administration for the assignment (AdminRefId)
4	Assigned frequency (MHz)
5	Reference frequency (MHz)
6	Date of entry into the List
7	Name of the location of the transmitting/receiving station
8	ITU symbol of the country or geographical area
9	Geographical coordinates of the site of the transmitting/receiving station:
	9a latitude (±DDMMSS)
	9b longitude (±DDDMMSS)
10	Nominal radius (km) of the circular transmission area
11	ITU symbol of the country or geographical area where transmitting stations are located
12	ITU symbol of the country or geographical area where receiving stations are located
13	Geographical coordinates of the centre of the circular receiving area:
	13a latitude (±DDMMSS)
	13b longitude (±DDDMMSS)
14	Nominal radius (km) of the circular receiving area
15	Class of station
16	Class of emission, in accordance with Article **2** and Appendix **1**
17	Necessary bandwidth, in accordance with Article **2** and Appendix **1**
18	System type code (see Annex 2, Chapter 4 of this Agreement)
19	Type of power (X, Y or Z)
20	Transmitter output power (dBW)
21	Maximum power density (dB(W/Hz)) averaged over the worst 4 kHz band supplied to the antenna transmission line
22	Maximum effective radiated power (dBW)
23	Antenna directivity (D or ND)

[1] A listing of the relevant characteristics for radio astronomy stations is not provided, as currently there are no radio astronomy stations recorded in the *List*. However, if in the future a radio astronomy station is entered into the *List*, the listing of characteristics will be based on parameters contained in Appendix 4 to the Radio Regulations.

No.	Description
24	Azimuth of maximum radiation of the transmitting antenna (degrees) clockwise from True North
25	Azimuthal sector for the antenna's main beam axis measured (degrees) clockwise from True North:
	25a Start azimuth
	25b Stop azimuth
26	Polarization
27	Height of antenna above ground level (m)
28	Altitude of site above sea level (m)
29	Maximum effective height of the antenna (m)
30	Effective antenna height (m) at 36 different azimuths in 10° intervals, measured in the horizontal plane from True North in a clockwise direction
31	Maximum antenna gain relative to a half-wave dipole
32	Symbol(s) of the administration with which coordination has been effected
33	Remarks

Note – A shortened version of the List is published in electronic format at: http://www.itu.int/md/R06-RRC.06-R-0001/. A recapitulative summary of the number of assignments included in this List, per administration, is provided in Table A5-1.

TABLE A5-1

Recapitulative summary of the number of assignments to other primary terrestrial services as they appear in the List in the frequency bands 174-230 MHz and 470-862 MHz

Member State	ITU symbol	No. of assignments to other primary terrestrial services included in the List
Saudi Arabia (Kingdom of)	ARS	339
Azerbaijani Republic	AZE	3
Belgium	BEL	4
Côte d'Ivoire (Republic of)	CTI	14
Egypt (Arab Republic of)	EGY	474
United Arab Emirates	UAE	4
Russian Federation	RUS	1 420
France	F	250
Georgia	GEO	7
Iran (Islamic Republic of)	IRN	551
Israel (State of)	ISR	372
Jordan (Hashemite Kingdom of)	JOR	2 017
Kazakhstan (Republic of)	KAZ	18
Morocco (Kingdom of)	MRC	70
Uzbekistan (Republic of)	UZB	27
Kyrgyz Republic	KGZ	10
United Kingdom of Great Britain and Northern Ireland	G	5 428
Tajikistan (Republic of)	TJK	2

RESOLUTIONS

RESOLUTION COM5/1 (RRC-06)

Broadcasting-satellite service in the band 620-790 MHz

The Regional Radiocommunication Conference for the planning of the digital terrestrial broadcasting service in Region 1 (parts of Region 1 situated to the west of meridian 170° E and to the north of parallel 40° S, except the territory of Mongolia) and in the Islamic Republic of Iran, in the frequency bands 174-230 MHz and 470-862 MHz (Geneva, 2006) (RRC-06),

considering

a) that the first session of the Conference adopted Resolution COM4/1 (RRC-04);

b) that it is necessary to effectively protect, *inter alia*, the terrestrial television broadcasting systems in this band;

c) that geostationary (GSO) broadcasting-satellite service (BSS) networks and non-geostationary (non-GSO) BSS networks or systems are at the stage of advance publication or coordination, or have been notified in the 620-790 MHz frequency band;

d) that the impact of these GSO BSS networks and non-GSO BSS networks or systems on digital and analogue television broadcasting systems has yet to be examined and that the sharing criteria, including the pfd limits required to protect the terrestrial services in this frequency band, are not known and depend on a possible decision of the 2007 World Radiocommunication Conference (WRC-07);

e) that many administrations have extensive infrastructure for the transmission and reception of analogue and digital television signals between 620 MHz and 790 MHz;

f) that this Conference has adopted an Agreement and associated Plans for digital terrestrial broadcasting, *inter alia*, in the band 620-790 MHz, and that it is necessary to effectively protect these Plans,

recognizing

a) that No. **5.311** of the Radio Regulations specifies the conditions under which the band 620-790 MHz may be used for assignments to television stations using frequency modulation in the BSS;

b) that use of the band 620-790 MHz by GSO and non-GSO BSS networks has been suspended by Resolution 545 (WRC-03) pending a decision by WRC-07, *further recognizing*

a) that pursuant to *resolves* 3 of Resolution 545 (WRC-03), GSO BSS networks and non-GSO BSS networks or systems in the band 620-790 MHz other than those notified, brought into use and with a date of bringing into use confirmed before the end of the World Radiocommunication Conference (Geneva, 2003) (WRC-03), shall not be brought into use before the end of WRC-07;

b) that pursuant to *resolves* 5 of Resolution 545 (WRC-03), the BSS systems referred to in *resolve*s 1 of that Resolution shall not be taken into account in the application of *resolves* 3.4 of Council Resolution 1185 (modified, 2003)[1],

resolves to invite the 2007 World Radiocommunication Conference

1 to take appropriate and necessary measures to effectively protect the broadcasting Plans adopted by this Conference and their subsequent evolution from the GSO-BSS and/or non-GSO BSS networks/systems which were not brought into use prior to 5 July 2003;

2 to take appropriate and necessary measures in order that the ground terminals of GSO and/or non-GSO BSS networks/systems which were not brought into use prior to 5 July 2003 shall not claim protection from the Plans adopted by this Conference and their subsequent evolution, nor put any constraint on the operation of the assignments of the Plans and their subsequent evolution,

instructs the Secretary-General

to bring this Resolution to the attention of the 2007 World Radiocommunication Conference.

---

[1] Resolution 1185 has been abrogated and superseded by Resolution 1224 adopted by the Council at its 2004 session, whose *resolves* 2.1.2 concerns the sharing with other primary services.

RESOLUTION COM5/2 (RRC-06)

Characteristics for the coordination and the notification of primary terrestrial services in the bands 174-230 MHz and 470-862 MHz in the planning area

The Regional Radiocommunication Conference for the planning of the digital terrestrial broadcasting service in Region 1 (parts of Region 1 situated to the west of meridian 170° E and to the north of parallel 40° S, except the territory of Mongolia) and in the Islamic Republic of Iran, in the frequency bands 174-230 MHz and 470-862 MHz (Geneva, 2006) (RRC-06),

considering

that this Conference has adopted the Regional Agreement (Geneva, 2006), which contains procedures for the coordination and notification of assignments to the broadcasting service and other primary terrestrial services, and whose Annex 3 contains characteristics to be submitted for the application of these procedures,

recognizing

that it may be desirable that all characteristics to be submitted to the Radiocommunication Bureau for the coordination and notification of assignments be included in Appendix **4** of the Radio Regulations,

resolves to invite the 2007 World Radiocommunication Conference

to review, as appropriate, Appendix **4** of the Radio Regulations with a view to incorporating the characteristics of Annex 3 of the Regional Agreement (Geneva 2006),

instructs the Secretary-General

to bring this Resolution to the attention of the 2007 World Radiocommunication Conference.