

**GUIDELINES TO ESTABLISH AGREEMENTS FOR SPECTRUM
USE IN COORDINATION AREAS**

The XXV Meeting of Permanent Consultative Committee II: Radiocommunications (PCC.II),

CONSIDERING:

- a) That the nature of radiocommunication waves, whose propagation does not stop at countries' borders, makes it necessary to have coordination processes between Administrations in order to minimize interferences which may be harmful for telecommunication systems;
- b) That all Administrations have the sovereign right to spectrum use within their national territory;
- c) That careful planning of frequency assignment to land fixed and mobile stations will improve spectrum use, thereby minimizing harmful interference caused against operations in adjacent or shared frequency bands;
- d) That several OAS/CITEL countries' Administrations have entered into agreements for spectrum use in border areas by land fixed and mobile services;
- e) That massification of use of telecommunication services creates increasing spectrum demand by land fixed and mobile services, thus increasing likelihood of interference in border areas where there are no agreements for spectrum use;
- f) That harmful interferences coming from other countries may affect the proper operation of telecommunication applications intended for people's safety and attention to emergencies,

RECOGNIZING:

- a) That Recommendation ITU-R SM.1049-1, "A method of spectrum management to be used for aiding frequency assignment for land services in border areas", provides definitions and examples of spectrum use agreements in coordination areas;
- b) That Recommendation ITU-R SM.1132-2, "General principles and methods for sharing between radiocommunication services or between radio stations", provides general principles and methods to facilitate efficient and effective spectrum sharing by multiple telecommunication services or radio stations;
- c) That the 2014 Declaration of Santo Domingo agrees: "To promote, in the framework of CITEL, the drafting of recommendations and best practices/principles that promote issues for the benefit of telecommunication service users";
- d) That Radio Regulations Article 11 contains provisions for notifications of stations before the International Telecommunications Union and the inscription in the international frequency register,

RECOMMENDS:

¹ CCP.II-RADIO/doc. 3848/15

That Administrations bear in mind the guidelines submitted in Annex 1 when establishing or updating agreements for spectrum use in coordination areas.

INVITES:

Any Administrations that have not entered into this kind of agreements for land fixed and mobile service bands as per Annex 1, to do so at their earliest convenience, and taking the guidelines presented in Annex 1 as a reference.

ANNEX 1 TO RECOMMENDATION PCC.II/REC. 46 (XXV-15)

**GUIDELINES TO ESTABLISH AND TO UPDATE AGREEMENTS AIMED AT
FACILITATING COORDINATION OF SPECTRUM USE BY LAND FIXED AND MOBILE
SERVICES IN COORDINATION AREAS.**

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1. INTRODUCTION

Growth in spectrum use has brought increasing complexities related to spectrum use management in coordination areas, especially in border areas. Aware of this need, Member Administrations of CITEI/PCC.II agreed at the Sub-Working Group on Spectrum Management to start carrying out works toward the preparation of a document with guidelines to facilitate spectrum use coordination for land fixed and mobile services in coordination areas. This agreement to start carrying out works is set forth in Resolution PCC.II/RES. 94 (XXII-13), whose resolves provide as follows:

- “1. To start carrying out works aimed at compiling all current Coordination Agreements that describe the conditions of usage and coordination of the different frequency bands for various services.
2. To encourage the Administrations to actively participate in sending agreements currently in force they had signed for their subsequent examination and review of the results that would make it possible to fine-tune and update them, to draft additional documents, and to set the basis for future coordination agreements.
3. To instruct the Sub-Working Group on Spectrum Management to start work aimed at drafting a document of guidelines to facilitate coordination of spectrum use for land fixed and mobile services in coordination areas.”

According to the above, the proposal for the structure of the document was submitted and approved at the XXIII Meeting of the PCC.II, held in Cartagena, Colombia.

This document takes several principal concepts of the HCM Agreement’s latest version², which is the agreement for frequency coordination of land fixed and mobile services of several European countries. Most definitions and coordination procedures are taken from the aforesaid agreement, as they provide a fast and efficient guideline for proper spectrum use in border areas of the abovementioned countries; additionally, many of the agreements entered into by CITEI member countries and which have been analyzed for the development of this document have been found to include these same concepts, albeit they are not explained in an explicit fashion.

Over 30 current agreements were analyzed for the development of this document regarding the use of the spectrum allocated to land fixed and mobile services; these agreements have been established by several CITEI member Administrations. This analysis sought to find common points in general definitions, establish interfering signal levels, coordination procedures and other relevant points in order to establish or update an agreement for spectrum use in coordination areas.

The objective of this document is to provide guidelines to establish or update agreements for spectrum use in border areas, taking into account the fact that although several countries in the region have been creating these agreements for many years, other countries in the region are currently beginning to establish their own agreements; therefore a guideline in this regard would facilitate said tasks and would establish a starting point for negotiating these agreements between countries with no experience in these matters.

2. DEFINITIONS

² http://www.hcm-agreement.eu/http/englisch/verwaltung/index_berliner_vereinbarung.htm

The definitions contained in the coordination arrangements will be those contained in Article 1 of the Radio Regulations of the International Telecommunication Union (ITU), as well as those shown below:

2.1. Harmful Interference.

Harmful interference shall mean any emission causing important deterioration in quality of traffic of a radiocommunication service, or which repeatedly interrupts said service by exceeding the maximum power flux or maximum field intensity as specified in the land mobile service, or – in the case of fixed land service – maximum permitted threshold deterioration.

2.2. Coordination Area.

The geographical area established from a reference point or line, which is usually the border between two or more countries, wherein particular technical and procedural conditions are established for the use of a determined frequency band, in order to reduce the risk of harmful interference on communication systems and in order to promote efficient spectrum use.

2.3. Coordination Distance.

The distance as measured from a reference point or line, which is usually the border between two or more countries, wherein the coordination area is established. Coordination distance is established depending on the characteristics of communication systems, operation frequency and other technical factors deemed convenient by Administrations in order to protect their communication systems from eventual harmful interferences.

2.4. Frequencies which require coordination.

Frequencies subject to coordination with the Administration (s) with which a spectrum use agreement has been entered into before a station is commissioned.

2.5. Preferential frequencies.

Frequencies that Administrations, which enter into the agreement (s), could allocate without prior coordination, in accordance with the technical and procedural conditions provided therein.

2.6. Shared Frequencies.

Frequencies that Administrations, which enter into agreement (s), could share with no prior coordination, in accordance with the technical and procedural conditions provided therein.

2.7. Frequencies for future communication networks.

Frequencies which Administrations are obliged to coordinate in accordance with the technical and procedural conditions set forth in the spectrum use agreement signed for the future introduction of a radiocommunication network where the number of sites multiplied by the number of frequencies exceeds 36.

2.8. Frequencies used in accordance with network plans established in geographical areas.

Frequencies used for the land mobile service in signatory countries based on a network plan in a geographical area which has been prepared and adopted before, taking into account the technical characteristics set forth therein.

2.9. Frequencies using preferential frequencies.

Frequencies that Administrations, which enter into agreement (s), could assign with no prior coordination, in accordance with the technical and procedural conditions provided therein.

2.10. Frequencies used based on agreements between operators

Frequencies utilized based on agreements between operators may be used with no prior coordination, provided there is an agreement in effect signed by the Administrations interested in which said agreements area authorized. These agreements between operators may also include the use of codes.

2.11. Frequency registration

Frequency registration includes coordinated frequencies, preferential allocated frequencies, shared frequencies, coordinated frequencies for radiocommunication networks and the frequencies used in accordance with network plans established in geographical areas and frequencies using preferential codes.

3. TECHNICAL CONSIDERATIONS

Agreements entered into by two or more countries for spectrum use in coordination areas shall comply with the provisions of the radiocommunications regulation and other basic texts of the International Telecommunications Union (ITU).

It is desirable that the spectrum use agreements include a frequency registration indicating preferential assigned frequencies, shared frequencies, coordinated frequencies for radiocommunication networks and the frequencies used in accordance with network plans established in geographical areas and frequencies using preferential codes. Information details of frequency registration will be agreed upon by the Administrations. The objective of this registration is to use the information from communication systems within the coordination area established for tasks related to planning, technical feasibility analysis, coordination requirements and validation of results.

The Administrations shall agree on the mathematical models or propagation curves to be used for propagation calculations, in order to have a common framework for evaluating requests or planning stations in coordination areas. It is likewise recommended to take into account the Sector of Radiocommunications of the ITU (ITU-R) recommendations and reports from the P and SM series, in relation to modeling radiowave propagation from communication systems and spectrum management.

Depending of the extension of the coordination areas recommended herein, as well as on the needs regarding the use of communication frequencies subject to an eventual agreement of use between two or more countries, it will be necessary to define a set of preferential frequencies for each of the parties, based on spectrum needs on each side of the border. Nevertheless, it is recommended to establish frequency sharing conditions inasmuch as possible, in order to make more efficient and flexible use of the spectrum in the aforesaid coordination areas.

In the case of land mobile use, it is desirable to have parameters such as effective radiated power and the effective height of stations selected for power radiation to be confined to the area intended to cover. It is recommended to avoid excessive station heights and excessive power levels by using several stations and low effective antenna heights. Likewise, the use of directional radiation patterns must be promoted so as to minimize potential interferences.

Likewise, it is recommended for effective radiated power and antenna height at land fixed service stations to be selected in accordance with the required distance from links and service quality conditions. It is recommended to avoid excessive antenna heights and excessive transmitting power, as well as authorizing new antennas with low directivity so as to minimize the risk of potential harmful interference.

4. LAND MOBILE SERVICE BANDS INCLUDED IN THIS DOCUMENT.

146	-	174	MHz
330	-	450	MHz
450	-	470	MHz
698	-	806	MHz
806	-	894	MHz
894	-	960	MHz
1710	-	1780	MHz
1805	-	1880	MHz
1910	-	1990	MHz
2110	-	2180	MHz
2500	-	2690	MHz
3400	-	3600	MHz

5. LAND FIXED SERVICE BANDS INCLUDED IN THIS DOCUMENT.

1427	-	1452	MHz
2200	-	2290	MHz
3700	-	4200	MHz
4400	-	5000	MHz
5925	-	6425	MHz
6425	-	7125	MHz
7125	-	7725	MHz
7725	-	7975	MHz
8025	-	8275	MHz
8275	-	8500	MHz
10.15	-	10.68	MHz
10.7	-	11.7	MHz
12.75	-	13.25	MHz
14.4	-	14.62	MHz
15.23	-	15.35	MHz
17.7	-	19.7	MHz
22	-	22.6	MHz
23	-	23.6	MHz
24.5	-	26.5	MHz

6. COORDINATION PROCEDURES

6.1 Frequencies that warrant coordination.

In the case of land mobile service, a transmission frequency should be coordinated if the transmitter produces field intensity or power flux density within the coordination area of the Administration involved which, at a height of 10 meters above ground level, exceeds the limit established for each band in each particular agreement. A reception frequency should be coordinated in case the receiver requires protection.

It is recommended to perform coordination of the fixed links in bands allocated to land fixed service if the shortest distance of at least one of the stations is less than or equal to the distance defined in section 7

hereto. Any station which, in accordance with link calculations, may cause harmful interference in the coordination area established, or which may need protection, should be coordinated regardless of the distance from the country's border or the reference point for the establishment of the coordination area.

It is recommended that agreements for spectrum use in coordination areas establish the mechanisms to submit a coordination requirement to the other party (ies) of said agreement in the event that one of the signatory Administrations should wish to commission a station. Both the establishment of the aforesaid mechanisms and the type of information required must be agreed upon in order to facilitate analysis by the Administrations to whom the requirement is submitted.

Likewise, should the Administrations to whom the requirement is submitted need any additional data in order to conduct the corresponding analyses on the coordination process, it is recommended to submit a request within 30 calendar days after receipt of the initial coordination request. After this request for additional data, the coordination requesting Administration shall submit the corresponding response to said request within 30 calendar days after the request. Contrariwise, the request or coordination shall be understood as null and void.

Upon receipt of the complete information with regard to the coordination process, the Administration shall evaluate the information in pursuance of the provisions under the agreement for spectrum use. Having concluded the analysis, the Administration to whom the requirement is submitted shall notify the response to the request for coordination within 45 working days starting from the date of receipt of the complete information.

If the Administration to whom the request is submitted has not responded within 45 days, a reminder may be submitted. The Administration shall respond to said reminder within 20 days after receipt thereof.

If the Administration to whom the request is submitted has not responded after the term to do so, the request for coordination shall be construed as approved and the station shall be construed as coordinated.

It must be clarified that the terms proposed above are a guideline and shall be established by the signatory Administrations of the agreements for spectrum use in coordination zones.

Assignment of satisfactorily coordinated frequencies shall be notified to the Administration to whom the request was submitted for the coordination process as soon as the corresponding station is commissioned, but no later than 180 days starting from the approval or understanding of approval of coordination. If the Administration requesting coordination, which received approval, has not notified allocation of the coordinated frequency within 180 days, the Administration to whom the request has been submitted may submit a reminder. If the Administration, which submitted the request for coordination, has not submitted the allocation notification of the coordinated frequency after 30 days, the request and the whole coordination process shall be understood as null and void.

Should an Administration wish to change the technical parameters of stations, which have previously been coordinated, a notification shall be submitted to the other Administration bound by the agreement for said purpose. Coordination could be requested if said change increases the likelihood of interference with stations located in the neighboring country (ies) signing the agreement. If the changes to the technical parameters do not increase – or even decrease – potential interference to stations of the other country (ies) signing the agreement, the change shall only be notified. It is recommended to define the manner in which updates will be made to the frequency registration.

Likewise, periods of temporary use of shared frequency can be defined (e.g. 30 days) without conducting the coordination process. The Administration planning to use a shared frequency in a temporary manner

shall notify the other Administration bound by the agreement at its earliest convenience. Should temporary use of a shared frequency cause interference in a station of the other country (ies) signing the agreement, the station using the temporary frequency shall cease its emissions forthwith. It is recommended that use of temporary frequency be made in the preferential frequencies inasmuch as possible.

Whenever temporary frequency is no longer in use, the Administration which made use of said frequencies shall notify the other country (ies) signing the agreement and proceed to update the frequency registry.

6.2. Preferential frequencies

As part of the agreement for spectrum use in coordination areas, signatory Administrations may define frequencies of preferential use for one of the Administrations involved in the agreement. Allocation of preferential frequencies assigned to one Administration shall have priority over assignments made on the same frequencies in the other country signing the agreement. At any rate it is recommended to define the protection conditions of preferential frequencies in the agreement for spectrum use in coordination areas.

The commissioning of a station using a preferential frequency shall be notified to the other country (ies) signing the agreement in order to update the frequency registry.

Should an Administration wish to assign preferential frequencies under conditions different from those agreed upon under the agreement for spectrum use in coordination areas, these assignments shall be subject to the coordination process provided in the previous section.

Unless otherwise provided in the agreement, if the coordination procedure is completed successfully as set out in the previous section, an Administration will be able to make use of a preferential frequency of another Administration with the same rights and obligations set forth for a coordinated frequency.

6.3. Frequencies for future communication networks

Prior to the coordination of a future radiocommunication network, the Administrations will be able to undertake a consultative proceeding in order to facilitate the commissioning of said network. The consultative proceeding shall include planning criteria, as well as the following information:

Planned Frequencies

Coverage area for the whole communications network.

Station Type

Coverage area for each station

Effective radiated power

Maximum effective height of the antenna

Designation of emission

Network implementation plan

Characteristics of the networks' antennas

Polarization of the antenna

The Administration to whom the request was submitted shall acknowledge receipt of the information and the request for consultation, and submit the relevant response within 60 calendar days.

Consultation meetings may be necessary in some cases due to the complexity of the networks planned in order to expedite the process.

Should there be no prior consultation, the Administration to whom the request for coordination was submitted shall respond to the request for coordination within 180 days after receipt thereof. The requesting

Administration shall notify the other signatory Administration (s) as to the date whereupon the network will be commissioned.

Stations, which are part of a coordinated communications network, shall be registered in the frequency registration, including date of termination of the coordination proceeding, and they shall have the same rights as coordinated stations under the coordination proceedings explained in previous sections.

Coordination of communication networks shall be understood as null and void if the stations in the communications network are not commissioned within 30 months after termination of the coordination process.

6.4. Frequencies using preferential codes.

Agreements for spectrum use in coordination areas may include the agreement between Administrations for the exclusive use of code or code packages to be transmitted in the same central frequencies. The Administrations may make use of said codes under the technical and operational conditions defined in each particular agreement without the need for coordination processes.

The Administrations will have priority over the use of codes or code blocks granted under the spectrum use agreement.

It is recommended to establish mechanisms for the proper notification of the commissioning of stations which use these preferential codes or code blocks, in order to update the frequency registration.

If an Administration wishes to assign frequencies which use preferential codes or code blocks under different conditions from those agreed upon under the agreement for spectrum use in coordination areas, these assignments shall be subject to the coordination process described in section 6.1.

Unless otherwise provided in the agreement, if the coordination procedure provided in the previous section is successfully completed, an Administration may make use of a frequency that uses preferential codes or code blocks of another Administration with the same rights and obligations set forth for a coordinated frequency.

6.5. Frequencies used deriving from agreements between operators.

Operators in neighboring countries are authorized to enter into mutual agreements under the condition that the interested Administrations previously sign an agreement authorizing said agreements.

Agreements between operators may or may not adhere to the technical parameters or to other conditions set forth in the agreements signed between the interested Administrations.

6.6. Evaluation of requests for coordination.

The Administrations to whom the request for coordination was submitted shall take into account at least the following frequencies evaluation requests for coordination:

- * Frequencies in the frequency registration.
- * Frequencies used in accordance with the agreements for spectrum use in coordination areas.
- * Frequencies in the process of responding to a request for coordination (chronologically organized from the oldest to the latest request).

Initially, a request for coordination of a station to operate land mobile service may be rejected only if the station:

- a. Produces an interfering field intensity or power flux density which exceeds the maximum levels established in the agreement for the specific band at a station within the frequency registration,
- b. Proposes the use of a frequency without meeting the conditions agreed upon in the agreement for spectrum use in coordination areas signed,
- c. Produces an interfering field intensity or power flux density which exceeds the maximum levels established in the agreement for the specific band at a station in process of coordination,
- d. Produces an interfering field intensity or power flux density which exceeds the maximum levels established in the agreement for the specific band at a distance greater than the coordination distance.

Likewise, the protection requirement of a receiver may be rejected in the case of land mobile services, only if:

- a. At least one of the coordinated transmitters of the Administration to whom the request was submitted produces a field intensity interference in the corresponding receiver which exceeds the maximum field intensity interference or power flux density levels established in the agreement,
- b. Protection to the receiver limits the use of a preferential frequency of the Administration to whom the request was submitted under the conditions set forth in the agreement,
- c. One of the transmitters awaiting response to a request for coordination from the Administration to whom the request was submitted produces a field intensity interference in the corresponding receiver which exceeds the maximum field intensity interference or power flux density levels established in the agreement,
- d. Interfering field intensity or power flux density conditions are not met for the specific band at a distance greater than the coordination distance.

On the other hand, a request for coordination from a station operating in the land fixed service may be rejected only if:

- a. The station produces receiver threshold deterioration which exceeds the maximum permitted value in section 7 hereto, at a station pertaining to the frequency registration,
- b. Is intended for the use of a frequency without meeting the conditions agreed upon in the agreement,
- c. Produces receiver threshold deterioration, which exceeds the maximum permitted value in section 7 hereto, at a station awaiting response to a request for coordination.

In Fixed Service, protection to a receiver may only be rejected if:

- a. The request for coordination for an associated transmitter has been denied,
- b. Protection to the receiver limits the use of a preferential frequency of the Administration to whom the request was submitted under the conditions set forth in the agreement.

6.6.1. Evaluation of requests including testing

In order to make more efficient use of the spectrum, avoid potential interference and facilitate growth of the existing networks, Administrations involved in the coordination process are likely to begin operation of

the communication networks during a testing period. Conditions of the testing period, measurements to be carried out and procedure conditions for data exchange shall be established on a case-by-case basis. It is recommended to provide this mechanism during the establishment of the agreement for spectrum use.

Once all testing is completed, the Administration to whom the request for coordination was submitted shall communicate its final decision within 30 days after termination of the testing period.

7. DATA EXCHANGE.

The Administrations shall agree upon the terms and conditions for data exchange and periodicity of said exchange.

It is recommended to exchange information of the assignments every three or six months in order to keep updated registries, even if no coordination actions have been required.

For matters relating to spectrum measurement data exchange, signatory Administrations may establish their procedures in accordance with the provisions of recommendation PCC.II/REC. 44 (XXIII-14) “Guidelines for the harmonization of measurement procedures for the technical verification of spectrum use for coordination in border areas”.

8. DETERMINING LAND MOBILE SERVICE COORDINATION NEEDS.

It is recommended to establish coordination needs for land fixed service stations in accordance with maximum levels of permitted interfering signal for each technology or technology group used in the bands that are the subject matter of the study. This level of permitted interfering signal established by the technology will allow to determine the coordination area and the maximum permitted relative height above ground level.

Values must be determined so that the maximum permitted interference levels are not exceeded outside the coordination area.

In practice, agreements have been signed establishing one or more frequency channels which are shared in the coordination area. These shared channels or ranges claim no protection from signals coming from the other end of the coordination area. This possibility provides Administrations with flexibility in allocation.

In case of land mobile networks using IMT³ technologies, it is recommended firstly to promote agreements between operators for the adequate provision of their services. Notwithstanding the agreements operators may reach, it is recommended that countries establish agreements for eventual dispute resolution between operators on each side of the border or in coordination areas. With certain technologies, it is possible to negotiate the use of preferential codes or code blocks in accordance with the provisions of section 6.2 hereto. These codes or code blocks shall be granted or negotiated in accordance with the particular needs of each Administration sharing the coordination area.

9. DETERMINING LAND FIXED SERVICE COORDINATION NEEDS.

³ See: Recommendation ITU-R M. 2012 Detailed specifications of the terrestrial radio interfaces of International Mobile Telecommunications Advanced (IMT-Advanced);
REC ITU-R M. 1034, Requirements for the radio interface(s) for International Mobile Telecommunications-2000 (IMT-2000)

It is recommended to establish the coordination needs for land fixed service in accordance with the threshold degradation produced by a station to a fixed service station.

Coordination distance⁴

Coordination distance depends on the frequency. The following table shows coordination distances according to reference ranges, as taken from annex 9 of the latest update of the agreement for spectrum use of several European countries⁵. Administrations can agree upon their own coordination distances depending on the particular conditions of each agreement.

Frequency range [GHz]	Coordination Distance [km]
1 - 5	200*
> 5 - 10	150*
> 10 - 12	100
> 12 - 20	80
> 20 - 24.5	60
> 24.5 - 30	40
> 30 - 39.5	30
> 39.5 - 43.5	20

* The coordination distance for frequencies under 10GHz is limited to 100 km for antenna heights below 300 meter above sea level.

Definition of threshold deterioration (TD)

A radio receiver's threshold deterioration is the required signal level in order to attain a specific bit error rate (BER). Due to presence of an interfering signal, it is necessary to increase the desired signal level in order to maintain the same bit error rate.

For a specific error rate, the difference between the increase in signal due to presence of an interfering signal and the value of the threshold without any interference is called threshold degradation (TD). Threshold deterioration is assumed to be equivalent to the increase in threshold noise caused by the presence of an interfering signal at the entrance of the receiver.

Acceptable threshold deterioration

Acceptable threshold degradation caused in a fixed link receiver by an external fixed link shall not exceed 1dB

⁴ Taken from annex 9 of the HCM Agreement http://www.hcm-agreement.eu/http/englisch/verwaltung/index_berliner_vereinbarung.htm

⁵ http://www.hcm-agreement.eu/http/englisch/verwaltung/index_berliner_vereinbarung.htm