

Cross-border Frequency Coordination - Introduction



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Why is coordination important? 1

- A major factor influencing the legal approach to spectrum management is the country's physical and human geography. The priorities and consequent investments and the management structure will vary depending on whether or not the country has neighbours (border coordination), is landlocked (the risk of radio link interference from ships at sea), covers a large or small area, has a high or low population density (saturation, organization of spectrum monitoring), is mountainous or covered in vegetation.
- The greater the level of radio usage then the more likely it will be that the spectrum management authority will require dialogue with neighbouring countries and the international radio community.

Why is coordination important? 2

- A small country at the heart of Europe (e.g. Luxembourg) cannot have a spectrum policy that is independent of those of its neighbours. That is not the case of island countries (Australia, New Zealand) or countries covering a large area, whose border areas may be sparsely populated and have reduced economic activity and hence low frequency use.
- Independence can limit the potential benefits of economies of scale and the capacity for interoperability associated with regional or global harmonization of frequencies.
- developing effective bilateral or multilateral agreements on frequency use in border areas will aid long-term strategic planning, promote efficient spectrum utilisation and help avoid interference

Why to coordinate

- Avoiding radio interference
- RR do not meet all practical requirements
 - It should be noted that according to the decision of WARC-79, cross border coordination of frequency assignments between stations by interested Administrations is excluded from the Radio Regulations. (but see also Article 6!)
- All administrations have sovereign right to use the spectrum on the whole territory of their countries. However radiowaves do not stop at the border of the country
- Possible harmful interference from the stations of different services of one administration into the territory and stations of neighbour (affected) administration.

Why to coordinate

- Each country obliged to take account of other stations before putting own into operation
- Even with technically similar systems from different sides of the border there could be different deployments goals in which one administration may pursue more flexibility in system roll-out in the border area and other one would seek interference protection of existing stations
- Procedures agreed in agreements
- Bilateral preferential frequency agreements for frontier zones: who can operate what and with which interference ranges

Spectrum management policy and NTFA

- It is a government responsibility to develop spectrum management policies that conform to the international treaty obligations of the Radio Regulations while meeting national spectrum needs.
- Within the national legal framework for telecommunications a spectrum management organisation has the delegated authority to prepare spectrum plans that meet government policies.
 - National spectrum plans should be reviewed regularly and, when necessary, be updated to keep pace with technology and changing demands.
- One of the most important tools for effective spectrum management is the National Table of Frequency Allocation (NTFA). This shows how the spectrum can be used in the country.

Developing NTFA 1

- The NTFA is the published outcome of national spectrum planning.
- The NTFA is normally developed by the NRA.
 - The Regulator would normally establish working groups to undertake the detailed technical and regulatory work and provide the expertise in frequency assignment, spectrum engineering, monitoring and standardisation.
 - Representatives from relevant government departments would be group members to provide detailed advice on government spectrum use and requirements.
 - It is also beneficial to invite experts and practitioners from major non-government spectrum stakeholders to participate.

Developing NTFA 2

- The starting point for the NTFA should be the international Frequency Allocation Table (Article 5 of the RR)
 - Work through each frequency band to decide which service allocations are required nationally
 - In the case where there is more than one organisation responsible for frequency assignments (for example government and non-government use), decide how frequency bands should be shared between the organisations concerned.
- Some flexibility is possible with national allocations while maintaining conformity with the Radio Regulations.
 - Where a frequency band is allocated to several services, the regulator may select which of those services may operate in its territory or may decide to split the band into sub-bands, each allocated to one or more services.

Why coordination agreement

- Analog and digital modulation techniques have been reviewed and classified to understand their differences and advantages. The importance of interference has been recognized to support efficient spectrum planning in terms of frequency assignments for the different radio communication services, and for cross border radio frequency coordination.

Why agreements are useful 1

- Coordinating frequencies among administrations before assigning them
- Optimizing spectrum usage by accurate interference field strength calculations.
- Establishment of models for computer-aided interference range calculations

Why agreements are useful 2

- Harmonized parameters: Objectively predictable and transparent decisions
- Quick assessment of interference through data exchange
- Quick assignment of preferential frequencies
- Optimizing turnaround times

How to resolve interference between stations

The following steps may be useful guidance for concerned administrations to resolve compatibility/sharing between stations of fixed and/or land mobile services in the border area:

1) Definition of the technical parameters which may be considered as a sufficient condition for starting the process of bilateral/multilateral discussions between administrations.

1.1) Development of the interference scenario to be considered between administrations when the conditions of the defined technical parameters precipitate review by affected administrations. Determination of the necessity and the extent of radio propagation, relief and the other details to be taken into account while considering specific interference scenario.

1.2) Forming the station parameters list which is may be needed for solving the sharing/compatibility issues.

How to resolve interference between stations

- 2) Discussions between administrations on a method to determine whether the specified on Step 1 criteria is exceeded.
- 3) Definition of possible technical and operational interference mitigation technique for fixed service stations.
- 4) Analysis and identification of actions taking into account the mitigation technique defined according to Step 3.

Why coordination agreement

- The most efficient method for resolving interference of stations in a border region is frequency assignment planning, when neighboring administrations possess entire information regarding parameters of planned and operated stations of the affected administrations.
- In such a case the impact of harmful interference can be calculated during bilateral/multilateral discussions of the planned station.
- And although the situation described above is not typical in cross-border discussions between administrations , such approach shows the idealized course of action process providing maximum efficiency at minimum probability of neglected harmful interference.
- This approach has no difference between determination of technical conditions and the calculation to determine the mutual impact of a new or modified frequency assignment of requesting administration to stations of the affected administrations.

Why coordination agreement

- To calculate the effect of harmful interference during bilateral/multilateral discussions of a planned station, a parameter for permissible harmful interference needs to be determined.
- When defining the parameter for permissible impact of harmful interference on receiving station, it is recommended to use condition of protection of the receiving station from “long-term” harmful interference at a minimum (threshold) signal level.
- “Long-term” interference is defined as harmful interference with permissible level exceeded more than 1% of time. During bilateral/multilateral discussions on harmonization of planned frequency assignments to stations, it is recommended to use the requirement for protection from “long-term” interference not exceeded more than 20% of time.

Why coordination agreement

- In majority of cases the complete information on station parameters of neighbour administrations is not available and calculation of harmful interference during bilateral/multilateral discussions of planned station is challenging.
- In this case for determination of exceedance conditions for stations, some assumptions on possible station parameters at neighbour administrations are required.
- Actually, replacing parameters of unknown stations by system parameters of stations, it is possible to pass on to determination of harmful interference on border and rest territory of the affected neighbour administration using parameters of a conditional area around a station of requesting administration with a new or modified frequency assignment.

To decide with whom to coordinate

- Two-step procedure for defining necessity of bilateral/multilateral discussion is a simple in use and simultaneously providing high practical accuracy method for calculation of conditional area around a station, using combination of the above mentioned methods.
- The procedure consists of the following two steps:

To decide with whom to coordinate

First step of the procedure uses the parameter of conditional distance, presented as a table of maximum conditional distances for specified frequency bands which correspond to notifying frequency assignments, and derived for conservative system parameters of stations and using conservative initial data for the interference propagation path. If the resulting use of the conditional distance criterion shows that station bilateral/multilateral review isn't required, then the two-step procedure is completed. If the resulting use of the parameter shows that bilateral/multilateral review may be required, the procedure goes to its second step. The first step of the procedure will select stations for which bilateral/multilateral review isn't required in 99% of cases.

To decide with whom to coordinate

Second step of the procedure uses the parameter based on the conditional area for stations for which conditional distance parameter confirmed necessity of bilateral/multilateral review. Calculation of conditional area at the second step of the procedure uses known parameters of the planned station, system parameters of unknown station and conservative initial data (simplified calculation of losses), or known parameters of planned station, system parameters of unknown station and known initial data for propagation path (detailed calculation of losses).

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Thank you !

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