

# Frequency Co-ordination - The Procedure



**ITU Workshop on Spectrum Management**

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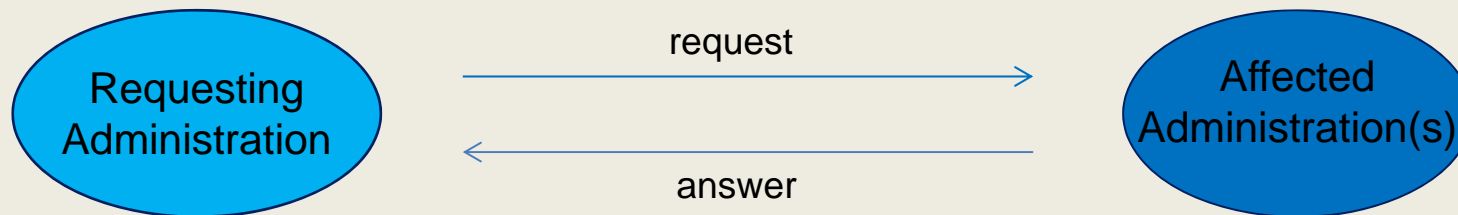
**Mexico City**

# Frequency Co-ordination - The Procedure

## Dependent on:

- Radio service (mobile, fixed, broadcasting, satellite)
- Frequency range (exclusive, shared)
- Frequency category (co-ordination, notification)

## Basic sequence:



# Frequency Co-ordination - The Procedure

## 1. Evaluation of obligation to co-ordinate:

### Application of co-ordination trigger-criterion (threshold):

- a) Fixed Service: Co-ordination Distance to the borderline(s)

Co-ordination necessary if station's distance below Co-ordination Distance !

- b) Mobile Service: Protection Margin PM on borderline

$$PM = E_{perm} - E_{calcul}$$

$E_{perm}$  = permissible field strength on borderline

$E_{calcul}$  = calculated field strength on borderline(s)

Co-ordination necessary if  $PM < 0$  dB !

- c) Co-ordination recommended if protection of receiver is required.

# Frequency Co-ordination - The Procedure

## Trigger for co-ordination in the Fixed Service:

The co-ordination distance depends on the frequency range. The distances in the following table are recommended:

| Frequency range<br>[GHz] | Co-ordination distance<br>[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 co-ordination distance for frequencies below 10 GHz is limited to 100 km for antenna heights below 300 m above sea level.

# Frequency Co-ordination - The Procedure

## Trigger for co-ordination in the Mobile Service:

| Frequency range (MHz)      | Permissible interference field strength (relative to 1 V/m) |
|----------------------------|---|
| 29.7 - 47                  | 0 dB  |
| 68 - 74.8                  | +6 dB   |
| 75.2 - 87.5                | +6 dB   |
| 146 - 149.9                | +12 dB  |
| 150.05 - 174               | +12 dB  |
| 380 - 385                  | +18 dB  |
| 390 - 395 <sup>1</sup>     | +18 dB  |
| 406.1 - 430                | +20 dB  |
| 440 - 470                  | +20 dB  |
| 790 - 862                  | +26 dB <sup>2</sup>   |
| 870 - 960 <sup>3</sup>     | +26 dB  |
| 880 - 960 <sup>4</sup>     | +38 dB  |
| 1710 - 1785 <sup>3</sup>   | +35 dB  |
| 1805 - 1880 <sup>3</sup>   | +35 dB  |
| 1900 - 1920 <sup>4,5</sup> | +30 dB  |
| 1920 - 1980 <sup>4</sup>   | +46 dB <sup>6</sup>   |
| 2010 - 2025 <sup>4,5</sup> | +30 dB <sup>6</sup>   |
| 2110 - 2170 <sup>4</sup>   | +46 dB <sup>6</sup>   |
| 2500 - 2690                | +39 dB <sup>2</sup>   |

[1] for emergency and security systems only

[2] Limit is applicable for the aggregate power of all carriers of the respective base station within a bandwidth of 5 MHz

[3] for GSM systems only

[4] for UMTS/IMT-2000 terrestrial systems only

[5] for TDD only

[6] This value is taken from ERC/REC/(01)01

Values on the borderline at 10 m height

# Frequency Co-ordination - The Procedure

## Trigger Values:

## Derivation:

- System specifications (input sensitivity, thermal noise)
- Measurements (filter curves)
- Simulations (SEAMCAT)
- Interpolation (based on existing values)
- Calculations

## Sources:

- ITU documents, e. g. ITU-R SM.1049
- Regional harmonization bodies, e. g.
- CEPT-ECC: Report 97, TR 25-08, cross-border-co-ordination Recs
- Etc.

# Frequency Co-ordination - The Procedure

## 2. Sending of co-ordination request:

### Content

- Reference Number (unique identifier)
- Request Status (B)
- Frequency Category (2)
- Characteristics of Station

### File-format

Word file, Text file (fixed/variable record length with/without separators, CR/LF), HTML

### Transmission-media

Email, FTP, https, Fax, Disc

To be agreed among administrations. It is recommended to chose formats which can be imported/exported by interfaces of modern systems.

# Frequency Co-ordination - The Procedure

Co-ordination request, example (MS):

|         | 1                       | 3 | 2                       |
|---------|-------------------------|---|-------------------------|
| 1A   1Z | 153,18750 M   2         | M | 148,58750 M   2         |
| 6A      | FB                      |   | MO                      |
| 6 B Z   | CV   Z                  |   | CV   Z                  |
| 10Z     | 0                       |   | 0                       |
| 4A      | Gondorf                 |   | Gondorf                 |
| 4 B C   | D   006E3651   049N5727 |   | D   006E3651   049N5727 |
| 4 D Z   | 0   242                 |   | 10                      |
| 7A      | 7K60F7W                 |   | 7K60F7W                 |
| 8 B1 2  | 4,0   E                 |   | 4,0   E                 |
| 9 A B   |                         |   |                         |
| 9D      | V                       |   | V                       |
| 9G      | 0,0                     |   | 0,0                     |
| 9Y      | 9                       |   | 2                       |
| 9XH V   | 000ND00   000ND00       |   | 000ND00   000ND00       |
| 1Y      | 148,58750 M             | M | 153,18750 M             |
| 13Y 13Z | B                       |   | B                       |
| 2W      | 05.03.2015              |   | 05.03.2015              |
| 13X     | D 15 X20004 0121        |   | D 15 X20004 0122        |



# Frequency Co-ordination - The Procedure

## 3. Evaluation of co-ordination request:

- a) Fixed Service: Calculation of the Threshold Degradation (TD):
  - which the requested station causes at Co-ordinated Stations
  
- a) Mobile Service: Determination of the Protection Margin (PM):
  - on the Cross Border Range (CBR) line
  - on the Protection for Receivers (PFR) line
  - on the Border Distance (x-km) line (preferential only)
  - at Co-ordinated Stations (P-P)

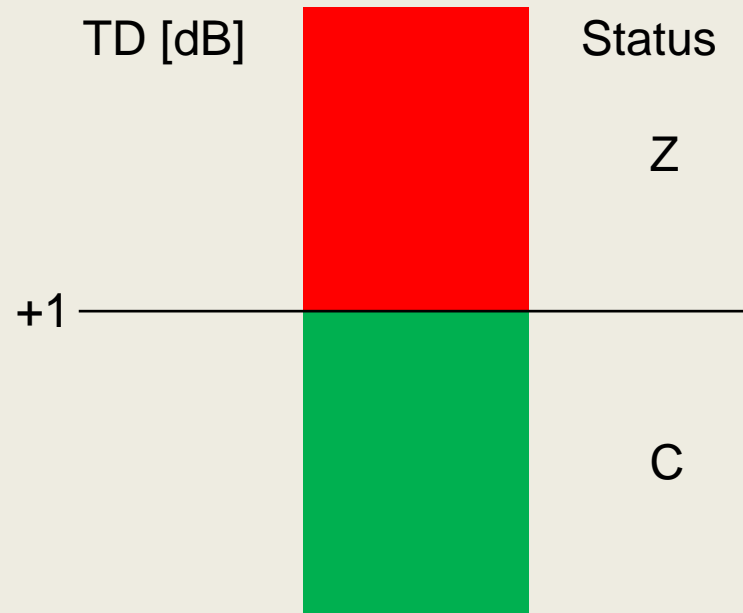
# Frequency Co-ordination - The Procedure

## 3.1 Evaluation of co-ordination request FS:

Result dependent on TD:

TD > 1: refusal permitted

TD < 1: refusal not perm.



# Frequency Co-ordination - The Procedure

## Threshold Degradation:

The Threshold of a radio receiver is defined as the level of the wanted signal received for a given Bit Error Rate (BER).

In presence of an interfering signal (I), the level of the received wanted signal must be increased to preserve the same BER.

For a given BER, the difference between the increased threshold level value due to interference, and the threshold value without interference, is the Threshold Degradation (TD).

TD is assumed to be equivalent to the noise level increase, due to the interfering signal at the input of the receiver.

# Frequency Co-ordination - The Procedure

## 3.2 Evaluation of co-ordination request MS:

Result dependent on PM:

PM > 0: refusal not perm.

PM < 0: refusal permitted

Status assignment not automated,  
therefore human intervention possible,  
dependent on experience, type of service, etc.



# Frequency Co-ordination - The Procedure

## 3.3 Evaluation of co-ordination request:

### Co-ordination statuses:

- A** For information, the assignment described is not submitted to a co-ordination
- B** Request for agreement.
- C** Agreed without reservation
- D** Temporary, coordination subject to operational tests or measurements
- E** Agreement on a non-interference basis (NIB)
- F** Agreed, subject to a requirement identical or to the requirement of RR 4.4
- G** Agreed, without any reservation as to interference (NOGAR)
- H** E+G (NIB/NOGAR)
- M** Request for agreement following a modified co-ordination after E, G, H or Z
- P** Assignment according to preferential frequency agreements and others
- R** Deletion of co-ordinated assignment
- W** Withdrawal of the co-ordination request
- Z** Request for agreement refused

# Frequency Co-ordination - The Procedure

## 4. Sending of co-ordination answer:

### Content:

- Reference Number (as in Request)
- Answer Status (C, E, G, H, Z, etc.)
- Remark (name and frequency of affected station(s), other (line-) conditions)

Answer file-format and transmission-media as agreed.

# Frequency Co-ordination - The Procedure

Co-ordination answer, example (MS) :

| Reference      | Name    | Frequency   | Status | Remark                 |
|----------------|---------|-------------|--------|------------------------|
| D 15X200040121 | Gondorf | 153.18750 M | Z      | 153.1900 M Any station |
| D 15X200040122 | Gondorf | 148.58750   | C      |                        |
|                |         |             |        |                        |

# Frequency Co-ordination - The Procedure

## 5. Co-ordination Deadlines:

Necessary to control proper application of the co-ordination procedure:

- Ask for lacking or supplemental information after initial request: 30 days
- **Send co-ordination answer after receipt of full information: 45 days**
- Reminder sent after 45 days shall be responded by co-ordination answer: 20 days
- Reminder not responded by co-ordination answer after 20 days : considered status C
- **Notification that co-ordinated station is put into operation: 180 days**
- Reminder sent after 180 days shall be responded by notification: 30 days
- Reminder not responded by notification after 30 days : Co-ordination null & void

bold: majority of cases

(proposed periods, bi- or multilaterally negotiable)



# Frequency Co-ordination - The Procedure

## 6. Notification on usage of Preferential Frequencies:

### Content

- Reference Number (unique identifier)
- Notification Status (P)
- Frequency Category (1)
- Characteristics of Station

Condition: Frequencies have been defined by prior bi- or multilateral agreements as preferential frequencies for given Administrations  
Requesting Administration verifies fs-value on x-km-line

Advantage: No evaluation, answer or deadlines necessary if conditions are met

# Frequency Co-ordination - The Procedure

## 6. Preferential Notification, example (MS):

|           | 1                       | 3 | 2                       |
|-----------|-------------------------|---|-------------------------|
| 1A   1Z   | 153,18750 M   1         | M | 148,58750 M   1         |
| 6A        | FB                      |   | MO                      |
| 6 B Z     | CV   Z                  |   | CV   Z                  |
| 10Z       | 0                       |   | 0                       |
| 4A        | Gondorf                 |   | Gondorf                 |
| 4 B C     | D   006E3651   049N5727 |   | D   006E3651   049N5727 |
| 4 D Z     | 0   242                 |   | 10                      |
| 7A        | 7K60F7W                 |   | 7K60F7W                 |
| 8 B1 2    | 4,0   E                 |   | 4,0   E                 |
| 9 A B     |                         |   |                         |
| 9D        | V                       |   | V                       |
| 9G        | 0,0                     |   | 0,0                     |
| 9Y        | 9                       |   | 2                       |
| 9XH V     | 000ND00   000ND00       |   | 000ND00   000ND00       |
| 1Y        | 148,58750 M             | M | 153,18750 M             |
| 13Y   13Z | P                       |   | P                       |
| 2C        | 05.03.2015              |   | 05.03.2015              |
| 13X       | D 15 X20004 0121        |   | D 15 X20004 0122        |

# Frequency Co-ordination - The Procedure

## 7. Exchange of lists of co-ordinated Assignments:

In IT-supported spectrum management the database entries of assigned and co-ordinated stations represent an Administrations Frequency Register.

A List corresponding to each affected Administration contained in the Frequency Register shall be exchanged bilaterally at least once every six months to:

- Support network planning
- Perform co-ordination pre-check
- Evaluate justification of co-ordination answer
- Derivate „put into operation“ notifications

Availability of Frequency Register does not exempt from co-ordination obligation !

# Frequency Co-ordination - The Procedure

## Frequency Register, example (MS):

Annex2\_MS - [ANNEX2\_MS Program]

End program Screen Help

Loading data ...

Data records

| Name of station 4A | TX Frequ. 1A | RX Frequ. 1Y | Coordinates 4C   | 13Y | Coo.referenz 13X |
|--------------------|--------------|--------------|------------------|-----|------------------|
| BEFFENDORF         | 76.995 MHz   | 86.795 MHz   | 008E3445 48N1924 | C D | 810240880133     |
| INTR               | 77.85 MHz    | 77.85 MHz    |                  | C D | 690241050222     |
| GMUND AM TEGERNSEE | 468.95 MHz   | 468.95 MHz   | 011E4330 47N4500 | C D | 860242590111     |
| BOGEN              | 158.77 MHz   | 158.77 MHz   | 013E0530 48N4503 | C D | 890213510121     |
| REGEN              | 68.17 MHz    | 77.97 MHz    | 013E0842 48N5630 | C D | 680261403222     |
| INTR               | 409.8875 MHz | 409.8875 MHz |                  | C D | 870244960911     |
| TEISNACH           | 158.93 MHz   | 158.93 MHz   | 012E5812 49N0209 | C D | 890217060122     |
| RICKENBACH         | 76.575 MHz   | 86.375 MHz   | 007E5918 47N3725 | C D | 02A202040121     |
| SONTHOFEN          | 150.69 MHz   | 150.69 MHz   | 010E1651 47N3030 | C D | 810244460121     |
| HAUPTMANNSGREUT    | 173.96 MHz   | 169.36 MHz   | 010E2630 47N4330 | H D | 770242850211     |
| DEGGENDORF         | 85.275 MHz   | 75.475 MHz   | 012E5830 48N4930 | C D | 680254230621     |
| ALTOETTING         | 76.715 MHz   | 86.515 MHz   | 012E4112 48N1230 | E D | 770241060133     |
| BAD SAECKINGEN     | 457.3 MHz    | 457.3 MHz    | 007E5539 47N3330 | C D | 78V272490131     |
| REGEN              | 76.755 MHz   | 86.555 MHz   | 013E0618 48N5810 | C D | 02A201120121     |
| INTR               | 153.85 MHz   | 153.85 MHz   |                  | C D | 63V249900121     |
| BERCHTESGADEN      | 75.775 MHz   | 85.575 MHz   | 012E5730 47N3730 | C D | 680254000132     |
| FRIEDRICHSHAFEN    | 173.32 MHz   | 168.72 MHz   | 009E2748 47N3930 | E D | 700240230222     |
| TUTZING            | 150.33 MHz   | 150.33 MHz   | 011E1453 47N5454 | G D | 96X570010221     |
| MUENCHEN           | 85.975 MHz   | 85.975 MHz   | 011E3257 48N0830 | C D | 55V230910111     |
| WALDKRAIBURG       | 456.53 MHz   | 466.53 MHz   | 012E2439 48N1230 | F D | 07NKS0400122     |
| LOERRACH           | 86.315 MHz   | 86.315 MHz   | 007E4051 47N3730 | C D | 67V231540111     |
| INTR               | 456.57 MHz   | 456.57 MHz   |                  | F D | 07NKS3560211     |
| TUTTLINGEN         | 76.595 MHz   | 86.395 MHz   | 008E4921 47N5739 | C D | 740242660132     |
| ST. GEORGEN        | 76.575 MHz   | 76.575 MHz   | 008E1933 48N0724 | C D | 65V219120121     |
| MINDELHEIM         | 158.53 MHz   | 158.53 MHz   | 010E2952 48N0215 | C D | 920219010122     |
| AULENDORF          | 163.93 MHz   | 163.93 MHz   | 009E3736 47N5521 | E D | 830243790311     |
| TANNHEIM           | 76.775 MHz   | 86.575 MHz   | 010E0419 47N5944 | C D | 04Y007840122     |
| GERETSRIED         | 456.49 MHz   | 466.49 MHz   | 011E2733 47N5118 | C D | 890216030211     |
| ROEHRNBACH         | 448.0 MHz    | 448.0 MHz    | 013E3022 48N4736 | F D | 08X540700111     |

Cancel Help Print all records Write an Excel readable file OK

Running

DE 15:29 10.06.2015

**Thank you !**