

# Frequency Co-ordination - The Procedure



**ITU Workshop on Arab Cross-Border Frequency Coordination**

26 January 2017

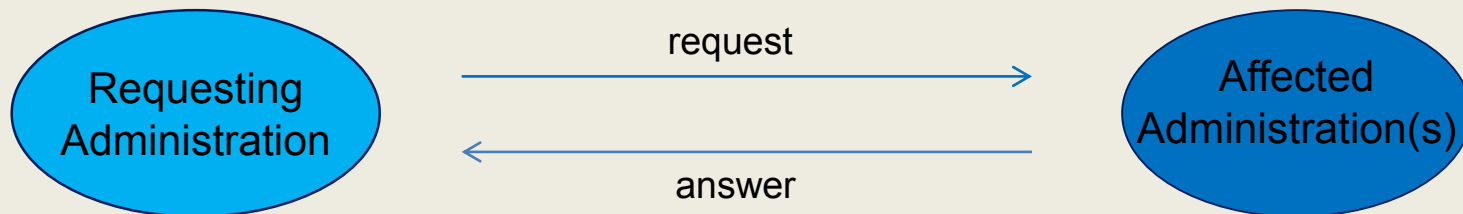
**Dubai**

# 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 [GHz]	Co-ordination 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 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)

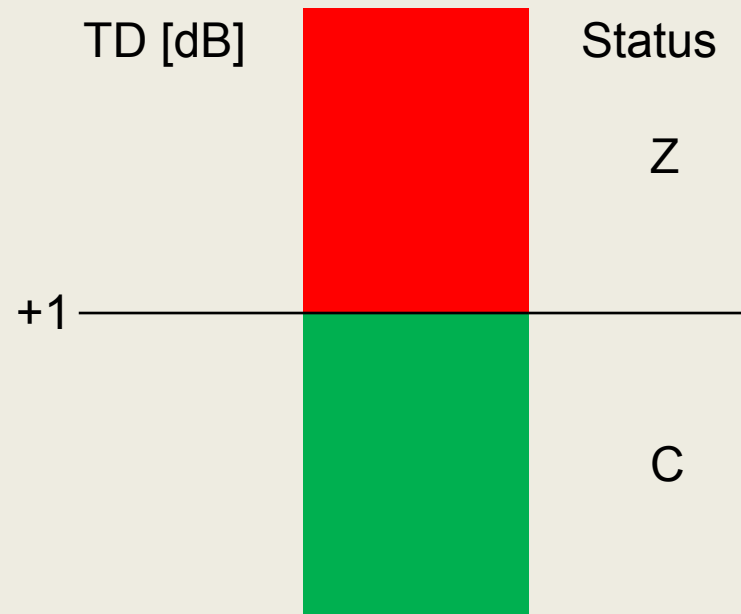
# Frequency Co-ordination - The Procedure

## 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

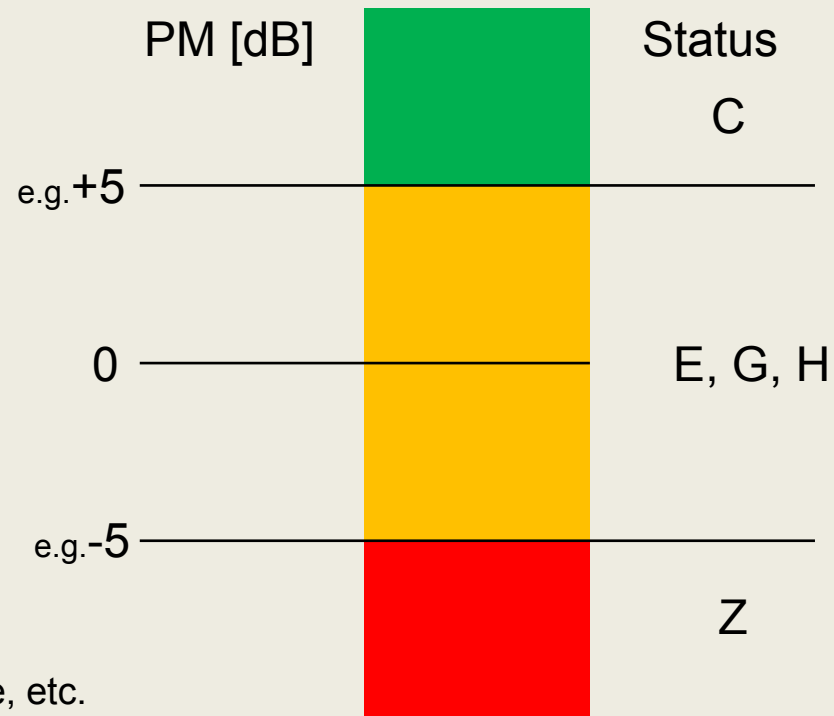
## 3.2 Evaluation of co-ordination request MS:

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	63V243900121
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	P D	07NKS0400122
LOERRACH	86.315 MHz	86.315 MHz	007E4051 47N3730	C D	67V231540111
INTR	456.57 MHz	456.57 MHz		P 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	P D	08X540700111

Cancel Help Print all records Write an Excel readable file OK

Running

DE 15:29 10.06.2015

The background features a large, light blue watermark of the ITU logo, which consists of a globe with a satellite dish and the letters 'ITU' in a stylized font.

**Thank you !**

**István Bozsóki**  
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