Frequency Co-ordination - The Procedure

ITU Workshop on Arab Cross-Border Frequency Coordination
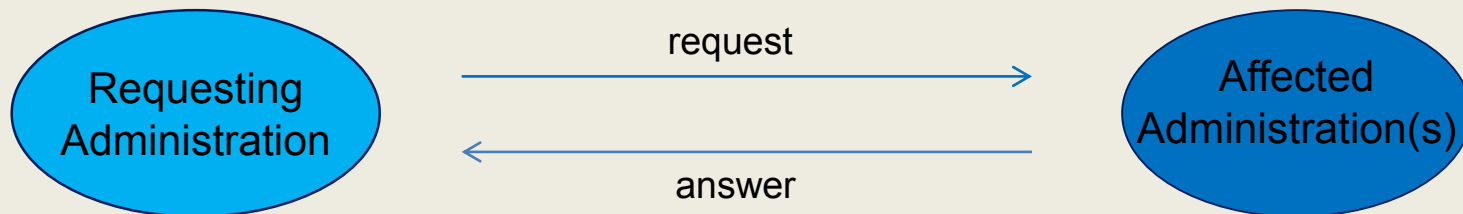26 January 2017
Dubai

Frequency Co-ordination - The Procedure

Dependent on:

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

Basic sequence:

	request	
Requesting Administration	→	Affected Administration(s)
	←	
	answer	

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 [1]	+18 dB
406.1 - 430	+20 dB
440 - 470	+20 dB
790 - 862	+26 dB [2]
870 - 960 [3]	+26 dB
880 - 960 [4]	+38 dB
1710 - 1785 [3]	+35 dB
1805 - 1880 [3]	+35 dB
1900 - 1920 [4, 5]	+30 dB
1920 - 1980 [4]	+46 dB [6]
2010 - 2025 [4, 5]	+30 dB [6]
2110 - 2170 [4]	+46 dB [6]
2500 - 2690	+39 dB [2]

[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.

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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)
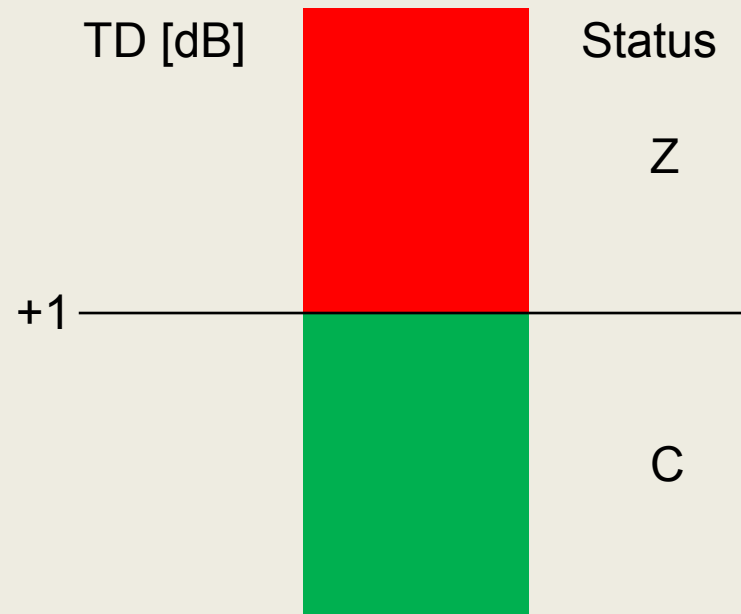- at Co-ordinated Stations (P-P)

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.

TD [dB]   Status

                                              Z

+1 ————————————

                                              C

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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.

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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.

PM [dB]   Status

C

e.g.+5

0   E, G, H

e.g.-5

Z
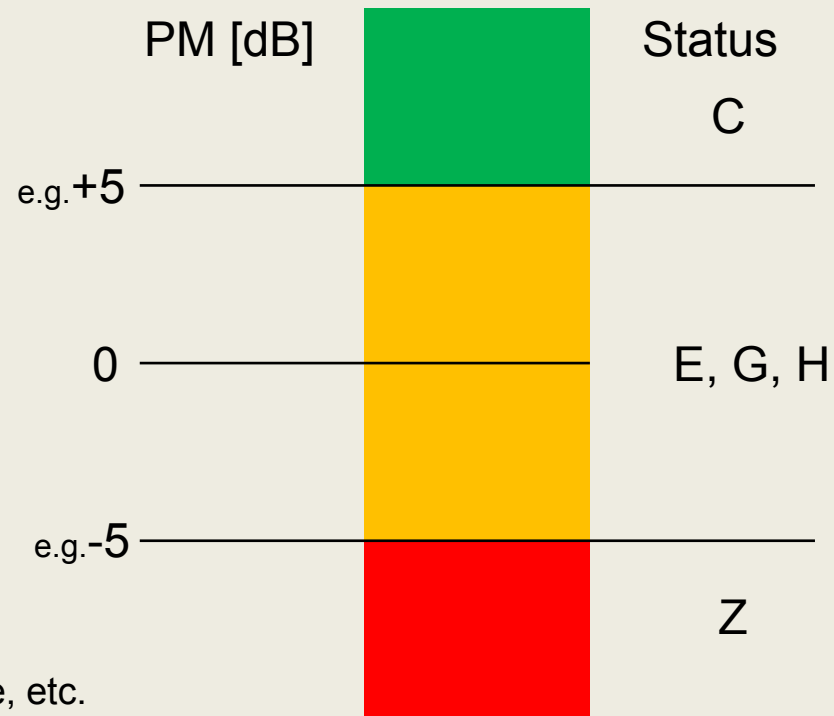
Frequency Co-ordination - The Procedure

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

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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.

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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	

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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)

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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	

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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):

Thank you !

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