# FM Broadcasting compatibility analysis tool based on Article 4 of the GE84 Agreement

### 1. Introduction:

**The GE84 compatibility analysis tool** is designed to assist administrations in the planning and coordination of their VHF-FM sound broadcasting services, in the frequency band **87.5-108 MHz**, in accordance with the GE84 Agreement.

The summary of the GE84 procedure on article 4 and the relevant flowchart are available on: <u>https://www.itu.int/en/ITU-R/terrestrial/broadcast/Pages/FMTV.aspx</u>

This new functionality, which can be accessed via a TIES user account, is part of *eBroadcasting* and can be found under *eTools* at: <u>https://www.itu.int/ITU-R/eTerrestrial/ECalculations</u>

The software is running field strength calculations at the transmitter site of the proposed modification with respect to other assignments in the GE84 Plan (recorded assignments and, possibly, proposed modifications), in the frequency band 87.5-108 MHz. The examination is also considering the ST61 Plan entries recorded in the frequency band 87.5-100 MHz.

An additional GE84 functionality will be delivered at a later stage to allow users to perform a detailed analysis on frequency assignments published in Part A of a specific GE84 Special Section to assess their impact on your own frequency assignments.

#### 2. <u>Modules</u>:

#### 2.1. Compatibility analysis

#### 2.1.1. Purpose

Assess the impact to and from other emissions of a new or existing FM service, in accordance with Article 4 procedure of the Agreement. The values are calculated by the method contained in Annex 2, Chapter 4, at the transmitter site of the stations which are likely to be affected.

#### 2.1.2. Options:

#### - Consider only the 20 Top major contributors:

It is set by default, based on provision §6.2 of Chapter 6 of Annex 2 to of the GE84 Agreement for calculation of the usable filed strength (Eu) of your proposed modification. If this option is disregarded, all the contributors are considered.

#### - Consider Tip:

By default, the ongoing modifications to the GE84 Plan (TIP notices) are not considered. Only the assignments recorded in the GE84 Plan are considered, in accordance with Article 4 procedure for determining the reference usable field strength of an assignment to be protected, published on the BRIFIC as part of the Reference Situation.

If this option is considered, TIP notices are considered in the calculations.

#### - Consider TV station:

By default, the television stations recorded in the ST61 Plan, are considered in the calculations.

If this option is not considered, only FM stations are considered.

#### - Consider Polarization discrimination:

By default, a polarization discrimination of 10 dB is considered in the calculations, in accordance with §3.8.3 of Chapter 3 of Annex 2 to the GE84 Agreement. This value can be changed.

If this option is not considered, no polarization discrimination shall be applied.

#### - Use P.1812 propagation model:

By default, for prediction purposes, the propagation methods described in Chapter 2 of Annex 2 to the GE84 Agreement are used.

The users also have the possibility to evaluate the prediction of point-to-point interference using the method described in Recommendation ITU-R P.1812 in conjunction with one of the selected digital terrain maps (DTMs), presently available at the BR level. Currently, 4 options are made available for selection:

- ASTER V3 (30 m resolution with coverage from 80°S to 80°N latitudes limited by P1812 model applicability),
- SRTM1 (30 m resolution with coverage from 56°S to 60°N latitudes),
- SRTM3 (90 m resolution with coverage from 56°S to 60°N latitudes),
- AUTO: the AUTO option is proposed by default, which lets the software automatically select the appropriate DTM between SRTM1 and ASTER V3 (both using 30m resolution). SRTM1 will be considered by the calculations when both stations under consideration (Tx/Rx) are within the SRTM range. Otherwise, ASTER V3 is considered if at least one of the stations under consideration is located outside the SRTM range.

These options become visible at the level of the configuration information, after the user selects the option "Use P.1812 propagation model".

Please note that, for the P1812 model, the calculation time is significantly longer than for GE84 propagation model. For that reason, the tool accepts a file with a maximum of **50 notices**.

#### 2.1.3 Input:

Electronic Notice File (one file per job). The electronic notice file can be created using *TerRaNotices* from the BRIFIC DVD or, if you are an *eBroadcasting* user, you can generate it from **myAdmin** or **eQry** as follows:

**eQry**: define the selection criteria (one administration only), push the button *Apply Filter* to display the summary list and the selected notices appear or,

**myAdmin**: click on the number of notices corresponding to the group of notices of interest. When the summary list appears, it is possible to further refine the selection criteria by ticking the checkbox Use Filter.

Push the button Generate e-notices (Export to SGML).

When the notice file is ready, an email is sent to the TIES user mailbox and the output notice file is available for download from eTools (Notice Generation option).

**Important:** It is highly recommended to previously validate the file using the web-based on-line validation tool available at:

https://www.itu.int/ITU-R/eTerrestrial or https://www.itu.int/ITU-R/eTerrestrial/eValidation

#### 2.1.4 Output:

Interference field strength to and from your proposed modification(s) to other stations (identified as contributors) and resulting usable field strength at transmitter site.

#### 2.2 Analysis of Plan entries based on query filter (without generating electronic notices).

will be proposed at a later stage

#### 3. How to use GE84 compatibility analysis:

#### 3.1. Electronic notice preparation

Prepare and validate your notice file as mentioned in section 2.1.3 above and save the file on your computer.

**Note**: If your file contains a frequency assignment (frequency & coordinates) already RECORDED in the Plan, make sure that you are submitting a "MODIFY" notice targeting the RECORDED entry if you do not want it to be considered twice in the calculations.

#### 3.2. Start the compatibility analysis

- 1. Login to <u>https://www.itu.int/ITU-R/eTerrestrial/ECalculations</u> (TIES account needed).
- 2. Push the button New Calculation.
- 3. Select the **GE84 Compatibility Analyses** option.
- 4. Submit the electronic notice file to **eTools** for GE84 Compatibility Analyses by uploading the notice file prepared for the GE84 Compatibility Analyses.
- 5. Push the button **New Calculation**, check the options in the configuration information.
- 6. Upload the electronic notice file and submit it (**Submit** button).

Note: You will be notified at your TIES email account when the job is complete. You can also monitor the status of your submission by going back to the calculation history.



# 4. Analysis of the Compatibility Results

Description of calculation results made in conformity with 4.3.7.1/4.3.7.2 of the Regional Agreement, Geneva 1984

### 1. General Results:

	Job summary	De	elete s	<u>Share</u>						
	job id			job na	me	job status				
	27216			test		Success				
	Job Input									
	Adm E-notic	e file				Number of	umber of Notices			
	F <u>F Add</u>	amends	MOD.txt			1				
	Configuration Inform	ation								
	Top 20 only	onsider 1	Tip 🔽 TV a	also 🗌 Po	larization Discrimination (dB)	🗹 Trigger N	IFS from proposed me			
	Job Output									
	Input notice file validate	d by the	OnlineValida	tion process o	n 16/06/2016 14:05:48					
				nistrations with which the limits of a		1/4.3.7.2 are	Eu (dB			
	Proposed Modifi	roposed Modification			exceeded		(µV/m))			
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	according to 4.3	7.1/2.1	This is not	t the list of	fadministrations	statio	ns listed in			

# 2. Interference to other emissions: "affected"

102.2MHz_SOROCA CRT_028°16'32"E-48°09'13"N-Id:1 MDA ROU UKR   Select the proposed modification Interference of the proposed modification   102.2MHz_SOROCA CRT_028°16'32"E-48°09'13"N-Id:1 V   GE84 Compatibility Analyses Description Gestion		75.62			
Select the proposed modification    102.2MHz_SOROCA CRT_028°16'32"E-48°09'13"N-Id:1 V   GE84 Compatibility Analyses Description					
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102.2MHz_SOROCA CRT_028°16'32"E-48°09'13"N-Id:1					
GE84 Compatibility Analyses Description					
Result Affected Interferers					
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Assign ID Adm + Intent + Stn Cls + Assigned (MHz) Polar + Site Name + Total Distance Path (Km) Path (Km) + Cls + Cold Sea Path (Km) Path (Km) + Cls + Assigned + Protection N (ABW) + Assigned + Cold Sea (Assigned + Cold Sea (Assi	IFS BU Ref ▲ (dB(μV/m)) (dB(μV/m))	<sup>ed</sup> ↓ Current E↓ (dB(μV/m)) (dB)			
091 3682 MDA RECORDED BC 102.1 V BALTI 0 51 0 0 0 26.5 214 33 6	2.43 90.82 83.05	83.05 0			
140 <mark>12081 UKR RECORDED BC 102.3 V NOVODNISTROV\$K</mark> 77 0 0 0 26.5 308 25 5	8.79 84.81 92.03	92.03 0			
01016476 ROU RECORDED BC 102.2 V SUCEAVA 160 0 0 0 26.5 251 37 5	7.19 89.93 80.63	80.63 0			
340 <mark>8</mark> 8472 UKR RECORDED BC 102.2 V NOVOUKRAINKA 240 0 0 0 26.5 85 37 5	2.19 76.76 75.25	75.25 0			
130 2724 UKR RECORDED BC 102.2 V ZHYTOMYR 237 0 0 0 24 7 37 4	9.35 77.14 78.21	78.21 0			
171 5387 UKR RECORDED BC 102.1 V FRUNZIVKA 143 0 0 0 26.5 129 25 4	9.27 81.32 80.45	80.45 0			
340 7366 ROU RECORDED BC 102.2 H PASCANI 154 0 0 0 26.5 229 37 4	8.23 90.31 90.32	90.32 0			
020 <mark>1</mark> 3733 UKR RECORDED BC 102.2 V ODESA 266 0 0 0 26.5 135 37 4	8.17 89.97 83.03	83.03 0			
201271 UKR RECORDED BC 102.1 V UMAN 0 158 0 0 0 26.5 65 25 4	8.02 69.57 83.68	83.68 0			
The documentation is available and	Protection and free				
easy to access from the portal. Distance site to site & information	of GE84 Agreement	) depending on:			
concerning the various paths	. Frequency spacing	, acpending en			
Total distance (land and sea)	. Transmission Syste	em			
Cold sea path	. Steady/tropospher	. Steady/tropospheric interference			
Warm sea path					
ERP at pertinent azimuth					
• Super-refractivity path For co-cites, a minimum distance of 1 km is					
For considered. See not displayed for					
D 1912 colculations					



<u>Note</u>:

The line is red:

When the resulting "Proposed Eu", taking into consideration the proposed modification, is greater than 54 dB(μV/m), for protection of FM stations and 52 dB(μV/m), for protection of TV stations,

and,

• the same proposed Eu is increased by more than 0.5 dB compared with the reference usable field strength (Eu Ref), as described in §4.3.7.1 and 4.3.7.2 of the Agreement.

These limits are also applied to identify the potentially affected administrations.

**Eu Ref** calculations are being done outside this tool and published on the BR IFIC. Please note that those calculations are always made based on GE84 propagation model described in Chapter 2 of Annex 2 to the Agreement using the following options:

- Considering only the recorded assignments.
- Not considering polarization discrimination.
- Considering ST61 TV stations, if present.

Current and Proposed Eu calculations:

• Their calculation depends on the filters chosen. If polarization discrimination or notices in process are considered, the values of Eu may be lower than the Eu Ref. The results will not be in line with the Article 4 calculations published on the BRIFIC. However, they are very useful during the planning and coordination process.

If the proposed modification is a MODIFY notice, its target is considered in the evaluation of the current Eu. It is replaced by the MODIFY notice for the evaluation of the proposed Eu.

#### 3. Interference from other emissions: list of interferers (only 20 if top 20 contributors selected in the configuration)

#### 102.2MHz\_SOROCA CRT\_028°16'32"E-48°09'13"N-Id:1

 $\mathbf{v}$ 

#### E84 Compatibility Analyses Description

Result	Affect	ted In	terferers											
Export to	ixport to Excel													
sign ID	Adm 🗘	Intent 🗘	Stn Cls 븆	Assigned Frequency (MHz)	Polar 🗘	Site Name 🔶	Total Distance 🖨	Cold Sea Path (Km)	Warm Sea Path <sub>∳</sub> (Km)	Super refractivity Path (Km)	ERP (dBW)	Azimuth (deg)	Protection Rat (dB)	NFS (dB(μV/m))
4038621	MDA	RECORDED	BC	102.3	н	KISHINEV	136	0	0	0	43	341	25	61.35
\$4036227	ROU	RECORDED	BC	102.2	н	PLOIESTI	370	0	0	0	50	34	37	60.74
4038472	UKR	RECORDED	BC	102.2	V	NOVOUKRAINKA	240	0	0	0	34.5	267	37	59.04
\$4038560	UKR	RECORDED	BC	102.1	V	KHMELNYTSKYI	172	0	0	0	38	146	25	58.82
2003733	UKR	RECORDED	BC	102.2	V	ODESA	266	0	0	0	34	316	37	56.6
)3002724	UKR	RECORDED	BC	102.2	V	ZHYTOMYR	237	0	0	0	32.5	187	37	56.48
4012081	UKR	RECORDED	BC	102.3	V	NOVODNISTROVSK	77	0	0	0	17	128	33	54.38
9103682	MDA	RECORDED	BC	102.1	V	BALTI 0	51	0	0	0	12.7	34	33	53.9
4037366	ROU	RECORDED	BC	102.2	н	PASCANI	154	0	0	0	27	48	37	53.06
2185730	UKR	RECORDED	BC	102.2	V	ANTOPIL	303	0	0	0	32.5	153	37	52.93
\$4036070	ROU	RECORDED	BC	102.1	н	DARABANI	123	0	0	0	33	92	25	49.42
34038458	UKR	RECORDED	BC	102.1	V	MYKOLAIV	307	0	0	0	41	297	25	47.99
4038490	UKR	RECORDED	BC	102.3	V	POLONNE	224	0	0	0	34	166	25	47.82
										-				1

Distance site to site & information concerning the various paths

ERP at pertinent azimuth

Pertinent protection ratio (see Tables 2.1 to 2.3 of Annex 2 of GE84 Agreement) depending on: . Frequency spacing . Transmission System . Steady/tropospheric interference

Field Strength of the interfering transmitter (at pertinent erp) modified by pertinent protection ratio