FM Broadcasting channel search tool.

1. *Introduction*:

The GE84 channel search tool is designed to assist administrations in the planning of their VHF-FM sound broadcasting stations, in the frequency band **87.5-108 MHz**, in accordance with the GE84 Agreement. The tool provides a quick and easy way to identify, in your planning process, available frequencies for new sound broadcasting services.

The tool evaluates the levels of interference received from stations already recorded in the GE84Plan as well as from proposed modifications (TIP notices) to the Plan on a channel-by channel basis taking into account co- and adjacent channel interference. It can be envisaged as a first step in the frequency planning process, keeping in mind that the interference generated by the proposed modification is not assessed. Before taking any final decision on the frequency channel to be selected, it is advised to perform a full compatibility analysis on this channel (see **GE84 Compatibility Analyses** in **eTools**).

The summary of the GE84 procedure on Article 4 and the relevant flowchart are available at: http://www.itu.int/en/ITU-R/terrestrial/broadcast/Pages/FMTV.aspx

This new functionality, which can be accessed using a TIES user account, is part of ***eBCD2.0*** and can be found under ***eTools*** at: https://www.itu.int/ITU-R/eBCDMVC/ECalculations.

The software calculates the nuisance field strength (NFS) received at the transmitter site of the proposed station from 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 television stations recorded in the ST61 Plan in this band, if appropriate.

The channel search allows the user to run the interference analysis for a range of frequencies. By default the whole FM band is analyzed: 87.6 MHz – 107.9 MHz.

The notice form T01 is to be used for the notification of an assignment to a VHF sound broadcasting station. A guide is available at:

https://www.itu.int/en/ITU-R/terrestrial/tpr/Pages/FMTVNotices.aspx#FMTVNotices

2. *Description of the Channel Search module:*:

2.1.1. Purpose

To assess the impact from other emissions to a proposed FM station on the basis of Annex 2 to the GE84 Agreement, the tool offers the capability to analyze part or all the FM frequency band allocated to FM Broadcasting in Region 1 and part of Region 3 (87.5-108 MHz).

The tool evaluates, considering the coordinates of the a given station/proposed modification, all the interferers identified within a 1'500 km radius producing an NFS ≥ 30 dB(µV/m) for a specific frequency and adjacent frequencies up to ± 400 kHz using 100 KHz steps. If no interferer is identified, the frequency channel is still listed and its list of interferers is left as blank.

2.1.2. Options:



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

The contributors down to a value of NFS equal to 30 dB(μV/m) can be identified. If "Top 20 only" is checked, only the top 20 contributors are displayed, in the NFS limit of 30 dB(μV/m) .

- Consider Tip:

By default, the ongoing modifications to the GE84 Plan (TIP notices) are considered. The assignments recorded in the GE84 Plan are also taken into account.

If this option is not considered, TIP notices are not taken into account in the calculations.

- Consider TV station:

By default, the television stations recorded in the ST61 Plan, are taken into account in the calculations.

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

- 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.

- Consideration of a frequency band, within the boundaries of the FM band (87.6-107.9MHz)

The user can instruct the tool to make calculations for a specific frequency range (Freq from, Freq To).

The calculation will apply those frequencies to the proposed modification, in 100 kHz steps, and show the interference received from the neighboring stations in the GE84 Plan using the same or adjacent frequency channels.

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 eBCD2.0 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 either ***TerRaNotices*** available on the BR IFIC DVD, or the web-based on-line validation tool available at:

http://www.itu.int/ITU-R/terrestrial/OnlineValidation/MemberPages/OnlineValidation.aspx

2.1.4 Output:

Nuisance field strength at your proposed modification(s) from other stations (identified as contributors), identification of the highest NFS received and usable field strength calculated at the transmitter site.

3. *How to use GE84 Channel Search*:

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 1*: 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.*

Note 2: *Run the calculations by submitting an input file composed of one or multiple T01 notices (1 file allowed). Please note that the notices will be analyzed independently against the Plan*

3.2. Start GE84 Channel Search

1. Login to http://www.itu.int/ITU-R/eBCD/MemberPages/eCalculations.aspx (TIES account needed).
2. Select the GE84 Channel Search option.



3. Push the button **New Calculation**
4. Submit the electronic notice file to **eTools** for GE84 Channel Search by uploading the notice file previously prepared.
5. Important: 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.



Provision 6.2 of Chapter 6 of Annex 2 to the GE84 Agreement

NFS calculation at the wanted proposed modification considers not only the recorded assignments but also the ongoing plan modifications already published in Part A

TV stations recorded in the ST61 Plan are considered

A defaults value of 10 dB discrimination is applied for orthogonal polarization if selected.

Indication on the part of the Band that the user wishes to scan. The software will apply the frequencies within that range to the wanted proposed modification in steps of 100 kHz. The default values shown above are applied if they are not changed by the user.

4. Results of the Channel Search analysis

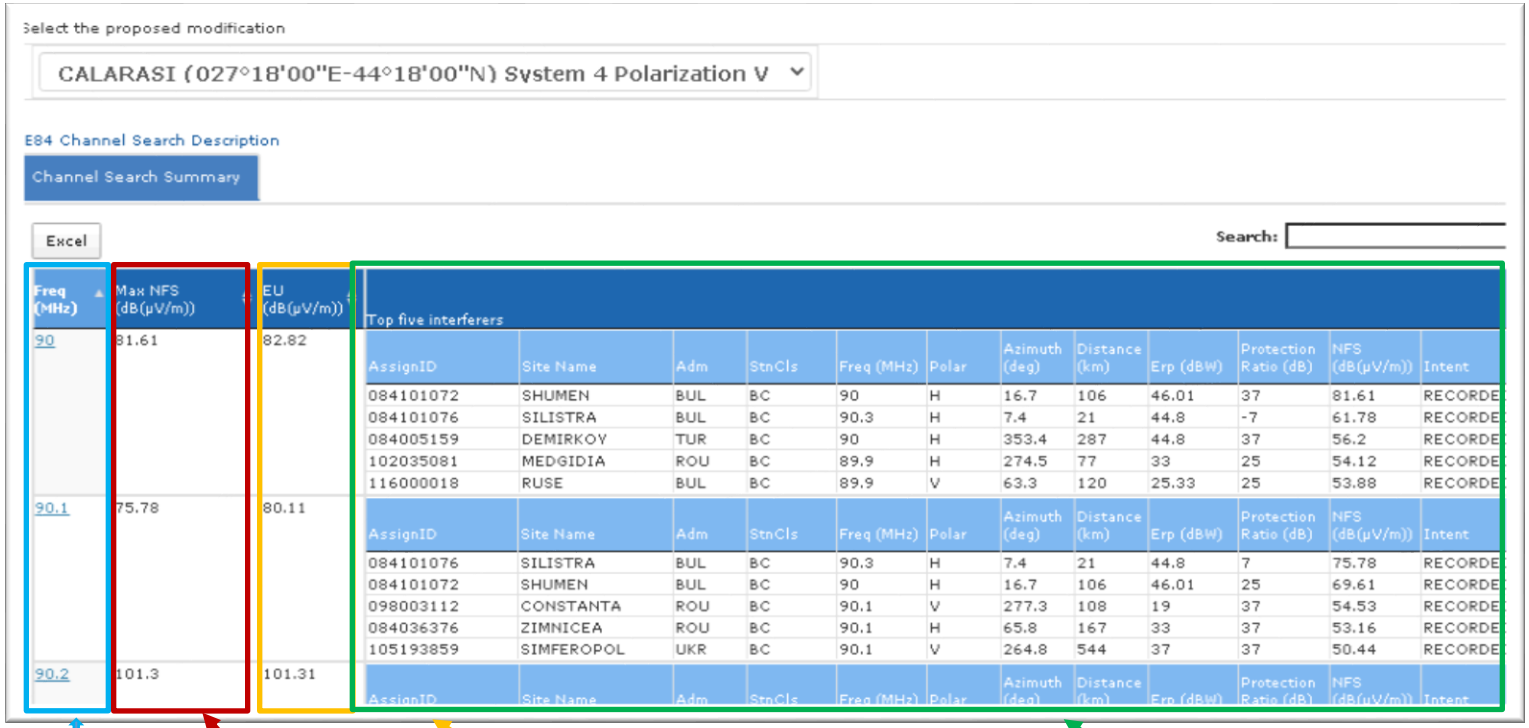
The channel search identifies potential interfering sources and displays the nuisance fields strengths received down to a limit value of 30 dB(μV/m). The list of potential interferers is sorted by NFS value (NFS = Fs received + PR).

a- Channel Search Summary

Regarding the details of the calculations performed for a specific proposed modification, the first display aims at providing a quick overview of the situation for each frequency analyzed in the interval specified by the user.

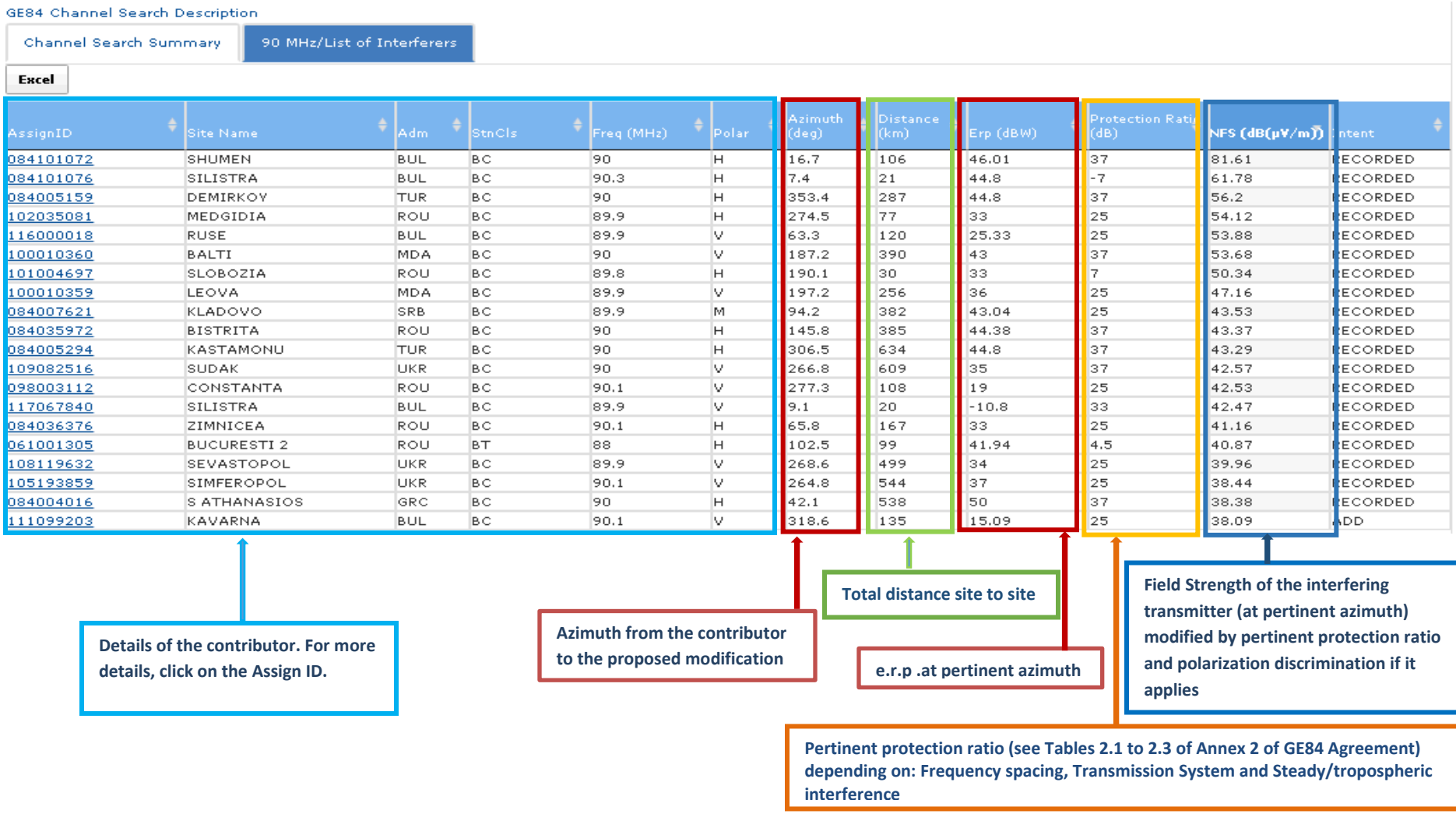
For each frequency, the following information

- the maximum NFS received at the wanted transmitter site
- the usable field strength at the wanted transmitter site (Eu), calculated by considering either the 20 main contributors, or all the contributors, generating an interference level ≥ 30 dB(μV/m), depending on the user selection.
- the 5 highest contributors., in order to have a quick overview of the situation for each frequency analyzed in 100 kHz steps.


Select the proposed modification
CALARASI (027°18'00"E-44°18'00"N) System 4 Polarization V
E84 Channel Search Description
Channel Search Summary
Excel
Search:
Freq (MHz)
Max NFS (dB(µV/m))
EU (dB(µV/m))
Top five interferers
90
81.61
82.82
AssignID Site Name Adm StnCls Freq (MHz) Polar Azimuth (deg) Distance (km) Erp (dBW) Protection Ratio (dB) NFS (dB(µV/m)) Intent
084101072 SHUMEN BUL BC 90 H 16.7 106 46.01 37 81.61 RECORDE
084101076 SILISTRA BUL BC 90.3 H 7.4 21 44.8 -7 61.78 RECORDE
084005159 DEMIRKOY TUR BC 90 H 353.4 287 44.8 37 56.2 RECORDE
102035081 MEDGIDIA ROU BC 89.9 H 274.5 77 33 25 54.12 RECORDE
116000018 RUSE BUL BC 89.9 V 63.3 120 25.33 25 53.88 RECORDE
90.1
75.78
80.11
AssignID Site Name Adm StnCls Freq (MHz) Polar Azimuth (deg) Distance (km) Erp (dBW) Protection Ratio (dB) NFS (dB(µV/m)) Intent
084101076 SILISTRA BUL BC 90.3 H 7.4 21 44.8 7 75.78 RECORDE
084101072 SHUMEN BUL BC 90 H 16.7 106 46.01 25 69.61 RECORDE
098003112 CONSTANTA ROU BC 90.1 V 277.3 108 19 37 54.53 RECORDE
084036376 ZIMNICEA ROU BC 90.1 H 65.8 167 33 37 53.16 RECORDE
105193859 SIMFEROPOL UKR BC 90.1 V 264.8 544 37 37 50.44 RECORDE
90.2
101.3
101.31
AssignID Site Name Adm StnCls Freq (MHz) Polar Azimuth (deg) Distance (km) Erp (dBW) Protection Ratio (dB) NFS (dB(µV/m)) Intent
frequency assigned to the proposed modification for the simulation
Identification of the highest level of interference received by the wanted station (proposed modification)
Minimum value of the field strength, calculated by the simplified multiplication method.
Top 5 contributors from the exhaustive list of interferers.

b- **Exhaustive list of interferers for a specific frequency**.

When the user clicks on a specific frequency, a new tabulation appears to present the full list of contributors causing an interference level ≥ 30 dB(μV/m). If "consider TIP" is not selected, only the RECORDED assignments are considered (see Intent column). If the user clicks on the *AssignID*, the details of the assignment are shown. Here the last entry is a TIP entry, in process and not yet recorded)



AssignID	Site Name	Adm	StnCls	Freq (MHz)	Polar	Azimuth (deg)	Distance (km)	Erp (dBW)	Protection Ratio (dB)	NFS (dB(μV/m))	Intent
084101072	SHUMEN	BUL	BC	90	H	16.7	106	46.01	37	81.61	RECORDED
084101076	SILISTRA	BUL	BC	90.3	H	7.4	21	44.8	-7	61.78	RECORDED
084005159	DEMIRKOY	TUR	BC	90	H	353.4	287	44.8	37	56.2	RECORDED
102035081	MEDGIDIA	ROU	BC	89.9	H	274.5	77	33	25	54.12	RECORDED
116000018	RUSE	BUL	BC	89.9	V	63.3	120	25.33	25	53.88	RECORDED
100010360	BALTI	MDA	BC	90	V	187.2	390	43	37	53.68	RECORDED
101004697	SLOBOZIA	ROU	BC	89.8	H	190.1	30	33	7	50.34	RECORDED
100010359	LEOVA	MDA	BC	89.9	V	197.2	256	36	25	47.16	RECORDED
084007621	KLADOVO	SRB	BC	89.9	M	94.2	382	43.04	25	43.53	RECORDED
084035972	BISTRITA	ROU	BC	90	H	145.8	385	44.38	37	43.37	RECORDED
084005294	KASTAMONU	TUR	BC	90	H	306.5	634	44.8	37	43.29	RECORDED
109082516	SUDAK	UKR	BC	90	V	266.8	609	35	37	42.57	RECORDED
098003112	CONSTANTA	ROU	BC	90.1	V	277.3	108	19	25	42.53	RECORDED
117067840	SILISTRA	BUL	BC	89.9	V	9.1	20	-10.8	33	42.47	RECORDED
084036376	ZIMNICEA	ROU	BC	90.1	H	65.8	167	33	25	41.16	RECORDED
061001305	BUCURESTI 2	ROU	BT	88	H	102.5	99	41.94	4.5	40.87	RECORDED
108119632	SEVASTOPOL	UKR	BC	89.9	V	268.6	499	34	25	39.96	RECORDED
105193859	SIMFEROPOL	UKR	BC	90.1	V	264.8	544	37	25	38.44	RECORDED
084004016	S ATHANASIOS	GRC	BC	90	H	42.1	538	50	37	38.38	RECORDED
111099203	KAVARNA	BUL	BC	90.1	V	318.6	135	15.09	25	38.09	ADD