GE84
Optimization Tool available in eTools

https://www.itu.int/ITU-R/eTerrestrial/eBroadcasting

AFRICAN TELECOMMUNICATIONS UNION
UNION AFRICAINE DES TÉLÉCOMMUNICATIONS

1st frequency coordination meeting
on the GE84 Plan Optimization for Africa
Première réunion de coordination des fréquences
sur l'optimisation du Plan GE84 pour l'Afrique
15 – 19 February 2021

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Optimization Tool

- This tool has been primarily developed to achieve an efficient use of the 87.5-108 MHz (FM) band for analogue sound broadcasting and to allocate new frequencies to FM broadcasting to meet the increasing need for additional frequencies in African countries.

- This tool can also be used by all the administrations party to the GE84 Agreement.

GE84
Plan
optimization

Optimization Tool

Goal

- to allocate new frequencies to FM broadcasting to meet the growing need for additional frequencies

Results

- Nuisance Field strength (NFS) generated and received by a proposed requirement in view to identify additional frequencies

Analysis of the results

- Search for an assignable frequency based on predefined criteria

Notice types accepted

- **T01** & **TB5**

- **No DB update – Used for simulations**

NFS – definition

- **Nuisance field strength(NFS)**
  - The field strength of the interfering transmitter (at its pertinent e.r.p.) modified by the relevant protection ratio.
  - Considering 1 <u>single</u> source of interference

Basis for the calculations
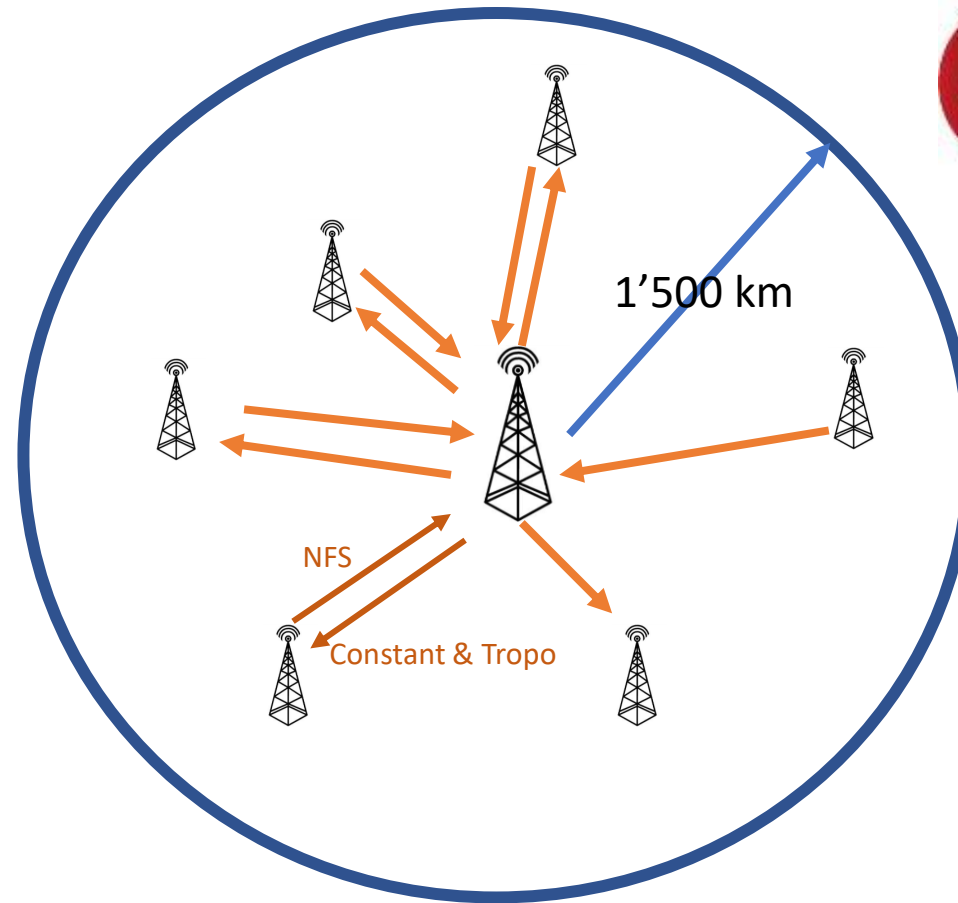
Based on the coordinates of a station, the tool assesses all identified interference sources within a radius of **1'500 km** for a **given frequency and adjacent frequencies** up to ± 400 kHz.

Outil d'Optimisation

Résults

- Nuisance FS (NFS) generated and received by a proposed requirement in view to identify additional
- For each site-to-site calculation, 2 values of NFS are evaluated:
    - Evaluation of NFS for steady interference, modified by the pertinent PR
    - Evaluation of NFS for tropospheric interference, modified by the pertinent PR
- See tables 2.1 et 2.2 of Annex 2 of the Agreement.

Steady–tropospheric field
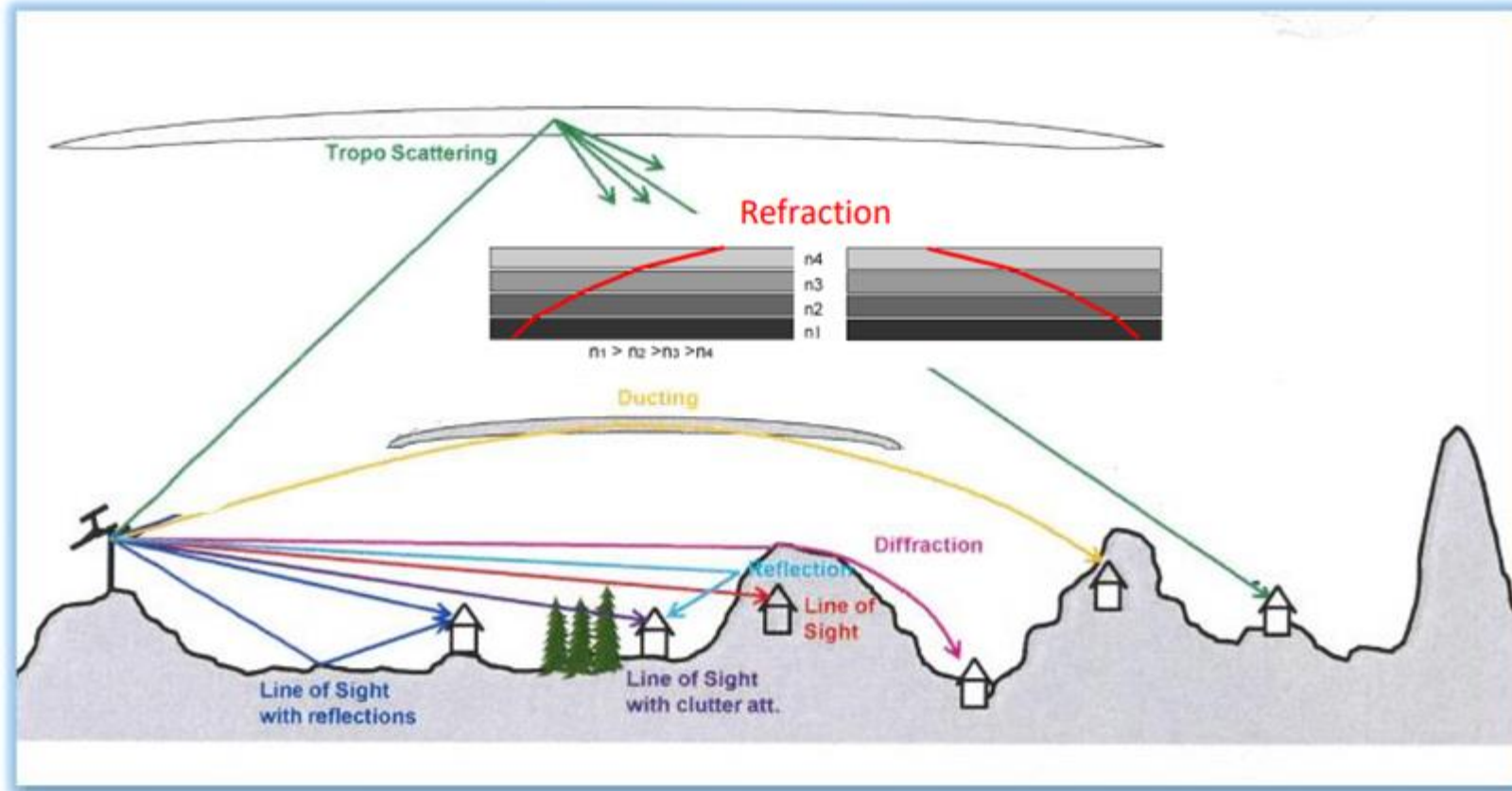
Adapted from LS Telecom Propagation training material

Optimization Tool

Transmission system	Description
1	Monophonic (maximum frequency deviation ± 75 kHz) (GE84)
2	Monophonic (maximum frequency deviation ± 50 kHz) (GE84)
3	Stereophonic, polar modulation system (maximum frequency deviation ± 50 kHz) (GE84)
4	Stereophonic, pilot-tone system (maximum frequency deviation ± 75 kHz) (GE84)
5	Stereophonic, pilot-tone system (maximum frequency deviation ± 50 kHz) (GE84)

Optimization Tool PR for transmission systems 1 et 4

Ecart entre les fréquences (kHz)	Rapport de protection en radiofréquence (dB) pour une déviation maximale de fréquence de ± 75 kHz			
	Monophonie		Stéréophonie	
	Brouillage constant	Brouillage troposphérique	Brouillage constant	Brouillage troposphérique
0	36	28	45	37
25	31	27	51	43
50	24	22	51	43
75	16	16	45	37
100	12	12	33	25
150	8	8	18	14
200	6	6	7	7
250	2	2	2	2
300	−7	−7	−7	−7
350	−15	−15	−15	−15
400	−20	−20	−20	−20

Optimization Tool

- **Compatibility between the requirements submitted** to the calculations considered

- Introduction of the notion of **requirements with a flexible frequency.**

- For flexible frequency requirements, **the entire FM band (87.6 to 107.9 MHz) is analysed in steps of 100 kHz.**

- The objective is, **as a first step**, to submit **flexible frequency requirements** in order to identify the most suitable frequencies. **In the following steps**, the user can begin to fix/set frequencies until all requirements are assigned an **appropriate fixed frequency**.

- IMPORTANT: **Flexible frequency requirements should be removed before the end of the exercise**.

Optimization tool

Flexible Frequency Requirement

Optimization tool

Calculation criteria →

☑ Consider Tip ☑ TV also ☑ Polarization Discrimination (dB) [10]

Criteria for the definition of assignable frequencies →

☐ Ignore self interference ☐ Ignore interference received   Acceptable NFS (dB (µV/m)) [54]

Evaluate Statistics

Adm	Submitted	Assignable	Non Assignable
AFS	179	88	91
AGL	61	61	0
ALG	285	182	103
BDI	6	3	3
BEN	91	55	36
BFA	39	29	10
BOT	49	48	1
CAF	42	40	2

Outil d'optimisation

Critères calculs →

☑ Consider Tip ☑ TV also ☑ Polarization Discrimination (dB) `10`

Critères pour la definition des fréquences assignables →

☐ Ignore self interference ☐ Ignore interference received Acceptable NFS (dB (µV/m)) `54`

| Evaluate Statistics |

Adm	Submitted	Assignable	Non Assignable
AFS	179	88	91
AGL	61	61	0
ALG	285	182	103
BDI	6	3	3
BEN	91	55	36
BFA	39	29	10
BOT	49	48	1
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Live demo

https://www.itu.int/ITU-R/eTerrestrial/eBroadcasting

New : "Show assignable on top"

Frequency (MHz)	Max NFS Received (dB(µV/m))	Max NFS Generated (dB(µV/m))
107.6	36.12	39.17
107.5	50.12	50.12
101.2	52.64	52.75
104.8	52.64	52.75
107.7	45.44	57.17
107.9	45.44	57.17
91.2	52.64	57.45
97.7	52.64	57.45

◉ Show top 5 interferers in the summary ○ Show top 5 affected in the summary   ☑ Show assignable frequencies on top

FLEX-BIRNI NKONI (005°35'00"E-14°00'00"N) System 4 Polarization H - Id: 3529

The entries are sorted as follows:

1- **Group 1**: assignable frequencies followed **by Group 2**: non assignable frequencies
2 - For each group, independently, sort by Max NFS received / Max NFS generated

Interest: The entries are listed in order to identify the frequencies from the lowest incompatibility to the highest incompatibility.

Consideration of FLEX requirements

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Optimization Tool

Introduction of Coordination

ONLY applied to Reqts with a FIXED frequency!!!!

The coordination info of the Plan Entries is not taken into account

Optimization Tool

Introduction of Coordination

AFS Augrabies – Agreement from NMB

☐ Ignore self interference   ☐ Ignore interference received   Acceptable NFS (dB (µV/m)) 54

Adm	Submitted	Assignable	Non Assignable
AFS	2	1	1
NMB	1	1	0

Showing results for submitted requirements from AFS

Select requirement:
104 MHz-AUGRABIES (020°24'00"E-28°34'00"S) System 4 Polarization V

GE84 Optimization Description

Summary [104 MHz-AUGRABIES (020°24'00"E-28°34'00"S) System 4 Polarization V]

❯ Details of the requirement under consideration

○ Show top 5 interferers in the summary   ⦿ Show top 5 affected in the summary

[Excel]

| Frequency (MHz) | Max NFS Generated (dB(µV/m)) | Max NFS Received (dB(µV/m)) | Top five affected | | | | | | | | | | | | | | |
			Assign ID	Adm.	Intent	Class	Freq.	Pol.	Site Name	Dist.	Cold Sea	Warm Sea	Sup. Refr.	ERP	Azim.	Prot. Ratio	NFS	Coord.
104	58.15	50.21	3	NMB	ADD	BC	104.2	V	ARIAMSVLEI	73	0	0	0	37	310.9	7	58.15	Yes
			2	AFS	ADD	BC	104	H	DE AAR	406	0	0	0	37	122.2	37	37.45	---
			084002558	NMB	RECORDED	BC	103.7	H	ARIAMSVLEI	73	0	0	0	37	310.9	-7	34.15	Yes

Optimization Tool

Introduction of Coordination

AFS AUGRABIES (Assign ID 1) – Agreement from NMB – Impact on interference received for NMB ARIAMSVLEI

Thank you for your attention

Questions ?