

# GE84 optimization in eTools

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



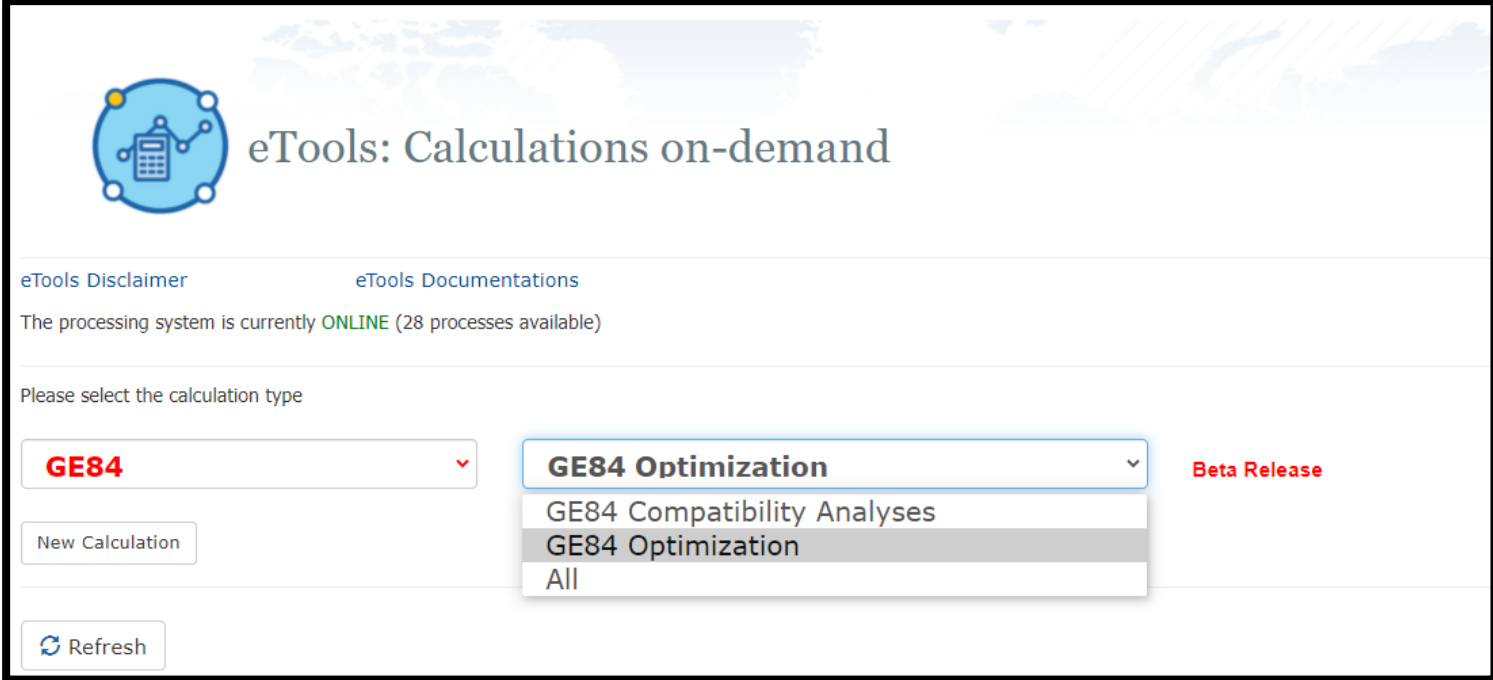
AFRICAN TELECOMMUNICATIONS UNION  
UNION AFRICAINE DES TÉLÉCOMMUNICATIONS



2nd frequency coordination meeting  
on the GE84 Plan Optimization for Africa  
Deuxième réunion de coordination des fréquences  
sur l'optimisation du Plan GE84 pour l'Afrique  
28 June - 2 July 2021

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# GE84 tools



The screenshot shows the 'eTools: Calculations on-demand' web interface. At the top left is a blue circular icon with a calculator and network nodes. The title 'eTools: Calculations on-demand' is displayed in a large, dark blue font. Below the title are two links: 'eTools Disclaimer' and 'eTools Documentations'. A status message indicates 'The processing system is currently ONLINE (28 processes available)'. A section titled 'Please select the calculation type' contains two dropdown menus. The first dropdown is set to 'GE84' and has a 'New Calculation' button below it. The second dropdown is set to 'GE84 Optimization' and has a 'Beta Release' label to its right. Its menu is open, showing three options: 'GE84 Compatibility Analyses', 'GE84 Optimization' (which is highlighted), and 'All'. A 'Refresh' button is located at the bottom left of the interface.

eTools: Calculations on-demand

[eTools Disclaimer](#)    [eTools Documentations](#)

The processing system is currently **ONLINE** (28 processes available)

Please select the calculation type

**GE84**    **GE84 Optimization**    **Beta Release**

GE84 Compatibility Analyses  
GE84 Optimization  
All

New Calculation

Refresh

# Notice types – CAUTION: fragment=GE84!

- Notices accepted: T01 and TB5

The notices submitted to the iterations are simulations

Date of notification: 12 / 10 / 2010

ID1/ Unique identification code given by the Administration to the assignment:

**T01**

Fragment:  Article 11  GE84  ST61

Notification intended for:  Addition  Modification

12A/ Operating agency:

12B/ Address code:

2C/ Date of bringing into use:

10B/ Regular hours of operation (UTC): From:  To:

Assignment characteristics:  Antenna characteristics:

Station information

4A/ Antenna site name: AAZANEN

4B/ Geographic area: MRC

4C/ Longitude: 3° 7' 3" W

Latitude: 35° 15' 7" N

9EA/ Altitude of site above sea level: 184 m

3A1/ Call sign:

3A2/ Station identification:

Emission characteristics

1A/ Assigned frequency: 87.7 MHz

7AB/ Bandwidth: 300.000 kHz

7D/ Transmission system: 4

9D/ Polarization: V

8BH/ Horizontal e.r.p.:  dBW

8BV/ Vertical e.r.p.: 35.000 dBW

Antenna characteristics

9/ Antenna directivity: D

9EB/ Maximum Effective Antenna Height: 209 m

9E/ Height of Antenna Above Ground Level: 25 m

Coordination successfully completed with the following administrations:

Available administrations	Selected administrations
AFG	ALG
AFS	E
AGL	
ALB	
AND	

13C/ Notified remarks:

# *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.

# *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

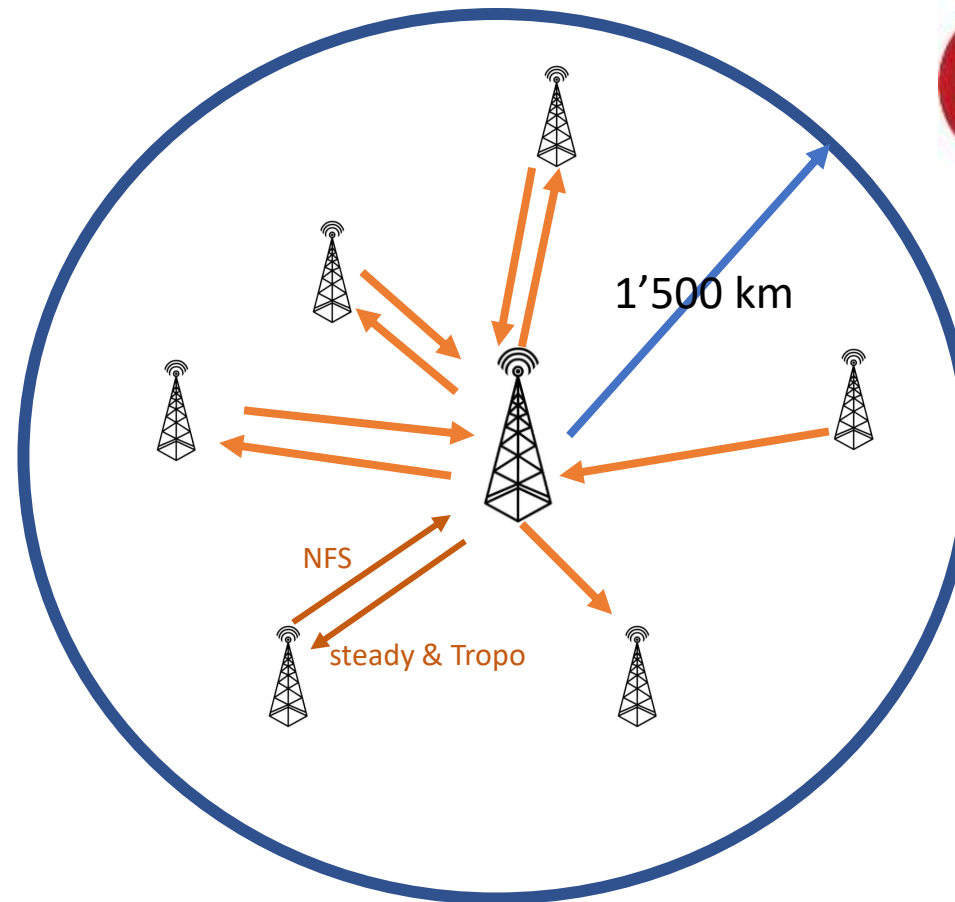
## ***Analysis of the results***

- Search for an assignable frequency based on predefined criteria

# Optimization Tool



GE84  
Plan  
optimization



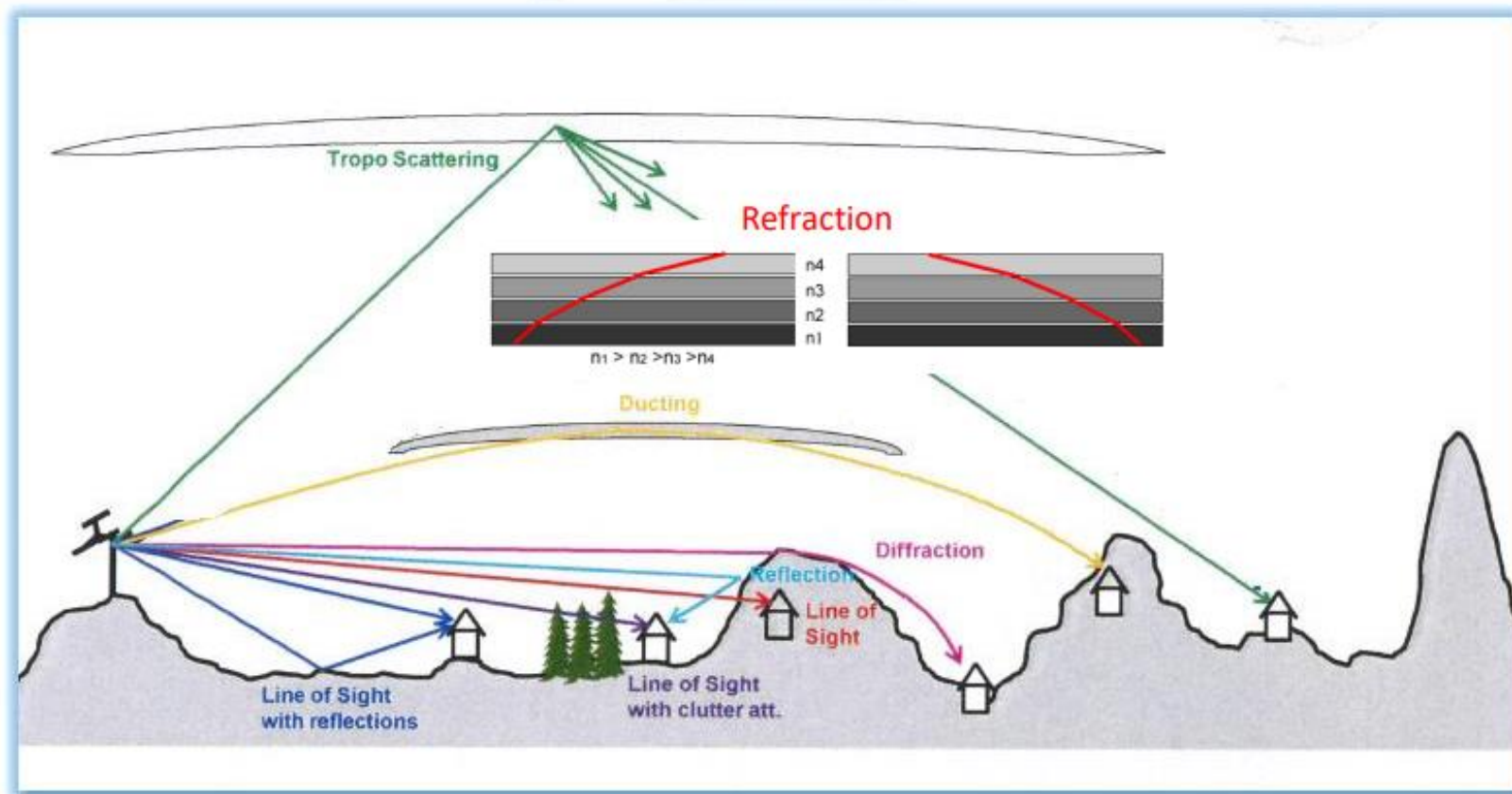
Based on the coordinates of a station, the tool assesses all identified interference sources within a radius of **1'500 km** for a **given frequency and adjacent frequencies** up to  $\pm 400$  kHz.





## Rec. ITU-R P. 1812

Propagation mechanisms in the VHF/UHF band



Adapted from LS Telecom Propagation training material



# 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/was, **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 for the submissions to the iterations**

**FLEX channels** are no longer accepted **since Iteration 9, Thursday, 13 May 2021.**

**No drastic changes** to requirements **since Iteration 12, Thursday, 24 June 2021.**





# Optimization tool

**Flexible  
Frequency  
Requirement**

**T01**

Date of notification: [dropdown] ID1/ Unique identification code given by the Administration to the assignment: [text box]

Fragment:  Article 11  GE84  ST61  
Notification intended for:  Addition  Modification [...]

12A/ Operating agency: [dropdown] 2C/ Date of bringing into use: [dropdown]

12B/ Address code: [dropdown] 10B/ Regular hours of operation (UTC): From [dropdown] To [dropdown]

Assignment characteristics | **Antenna characteristics**

Station information  
4A/ Antenna site name: KIBWEZI  
4B/ Geographic area: KEN  
4C/ Longitude: 37° 55' 0" E  
Latitude: 2° 22' 0" S  
9EA/ Altitude of site above sea level: 1087 m  
3A1/ Call sign: [text box]  
**3A2/ Station identification: FLEX**

Emission characteristics  
**1A/ Assigned frequency: 87.7 MHz**  
7AB/ Bandwidth: 300.000 kHz  
7D/ Transmission system: 4  
9D/ Polarization: H  
8BH/ Horizontal e.r.p.: 47.800 dBW  
8BV/ Vertical e.r.p.: [text box] dBW

Antenna characteristics  
9/ Antenna directivity: D  
9EB/ Maximum Effective Antenna Height: 342 m  
9E/ Height of Antenna Above Ground Level: 100 m

Coordination successfully completed with the following administrations  
Available administrations: AFG, AFS, AGL, ALB, ALG  
Selected administrations: [empty box]  
Buttons: Add >, < Remove, << Clear

13C/ Notified remarks: [text area]



# Optimization tool

Calculation  
criteria

Consider Tip  TV also  Polarization Discrimination (dB)

Criteria for  
the definition  
of assignable  
frequencies

Ignore self interference  Ignore interference received Acceptable NFS (dB ( $\mu\text{V}/\text{m}$ ))

Select the  
Adm to be  
analyzed

**Configuration Information** (only results with Nuisance Field Strength (NFS)  $\geq 30$  dB ( $\mu\text{V}/\text{m}$ ) will be displayed):

Consider Tip  TV also  Polarization Discrimination (dB)

**Job Output**

**Input notice file validated by the OnlineValidation process on 4/19/2021 7:50:13 AM**

Ignore self interference  Ignore interference received Acceptable NFS (dB ( $\mu\text{V}/\text{m}$ ))

Select Administration

SOM

Evaluate Statistics

# Optimization Tool

## Introduction of Coordination

ONLY applied to Reqt's with a FIXED frequency!!!!



**GE84**  
Plan  
optimization

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

**T01**

Date of notification: [dropdown] ID1/Unique identification code given by the Administration to the assignment: [text: Example]

Fragment:  Article 11  GE84  ST61  
Notification intended for:  Addition  Modification [...]

12A/ Operating agency: [dropdown] 2C/ Date of bringing into use: [dropdown]

12B/ Address code: [dropdown] 10B/ Regular hours of operation (UTC): From [dropdown] To [dropdown]

Assignment characteristics | Antenna characteristics

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Station information

4A/ Antenna site name: [text: AUGRABIES] 4B/ Geographic area: [dropdown: AFS] 4C/ Longitude: [20° 24' 0" E] Latitude: [28° 34' 0" S] 9EA/ Altitude of site above sea level: [text: 755] m 3A1/ Call sign: [text] 3A2/ Station identification: [text: FLEX]

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Emission characteristics

1A/ Assigned frequency: [text: 104] MHz 7AB/ Bandwidth: [text: 300.000] kHz 7D/ Transmission system: [dropdown: 4] 9D/ Polarization: [dropdown: V] 8BH/ Horizontal e.r.p.: [text] dBW 8BV/ Vertical e.r.p.: [text: 37] dBW

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Antenna characteristics

9/ Antenna directivity: [dropdown: ND] 9EB/ Maximum Effective Antenna Height: [text: 388] m 9E/ Height of Antenna Above Ground Level: [text: 220] m

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Coordination successfully completed with the following administrations

Available administrations		Selected administrations
AFG	Add > Remove < Clear <<	NMB
AGL		
ALB		
ALG		
AND		

13C/ Notified remarks: [text area]

# Optimization Tool

## Introduction of Coordination

### AFS Augrabies – Agreement from NMB



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

Showing results for submitted requirements from AFS

Select requirement:

104 MHz-AUGRABIES (020°24'00"E-28°34'00"S) System 4 Polarization V - Id: 1

GE84 Optimization Description

Summary [ 104 MHz-AUGRABIES (020°24'00"E-28°34'00"S) System 4 Polarization V - Id: 1 ]

Details of the requirement under consideration

Show top 5 interferers in the summary
  Show top 5 affected in the summary
  Show assignable frequencies on top

Excel

Frequency (MHz)	Max NFS Received (dB(μV/m))	Max NFS Generated (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	49.11	58.15	2	NMB	ADD	BC	104.2	V	ARIAMSVLEI	73	0	0	0	37	310.9	7	58.15	Yes	
			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 by NMB ARIAMSVLEI

Showing results for submitted requirements from NMB

Select requirement:  
104.2 MHz-ARIAMSVLEI (019°50'00"E-28°08'00"S) System 4 Polarization V - Id: 2

GE84 Optimization Description

Summary [ 104.2 MHz-ARIAMSVLEI (019°50'00"E-28°08'00"S) System 4 Polarization V - Id: 2 ]

Details of the requirement under consideration

Show top 5 interferers in the summary Show top 5 affected in the summary Show assignable frequencies on top

Frequency (MHz)	Max NFS Received (dB(μV/m))	Max NFS Generated (dB(μV/m))	Top five interferers														Coord.	
			Assign ID	Adm.	Intent	Class	Freq.	Pol.	Site Name	Dist.	Cold Sea	Warm Sea	Sup. Refr.	ERP	Azim.	Prot. Ratio		NFS
104.2	58.15	49.11	1	AFS	ADD	BC	104	V	AUGRABIES	73	0	0	0	37	310.9	7	58.15	Yes
			084002199	NMB	RECORDED	BC	104.3	H	KEETMANSHOOP	241	0	0	0	47	136.1	25	52.23	---
			084000416	AFS	RECORDED	BC	104.5	H	AUGRABIES	73	0	0	0	47	310.9	-7	44.69	---
			084000284	AFS	RECORDED	BC	104.3	H	GARIES	296	0	0	0	37	35.4	25	38.92	---

# Online demo

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



# Optimization Tool


Introduction of  
maps  
....and much  
more!!!

Job Output  
Input notice file validated by the OnlineValidation process on 6/14/2021 10:31:11 AM  
 Ignore self interference  Ignore interference received Acceptable NPS (dB (µV/m)) 54

Select Administration  
 NMB

Adm	Submitted	Assignable	Non Assignable
NMB	1	2	0

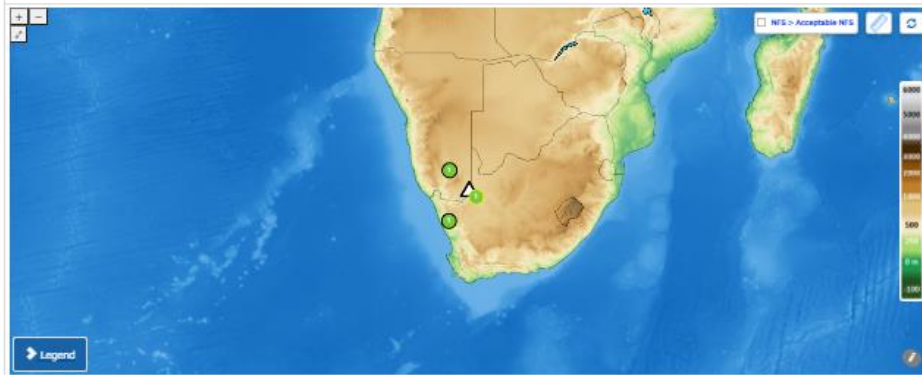
Show Terrain Data  
 Administration:  
 Coordinates:



Showing results for submitted requirements from NMB  
 Select requirement:  
 104.2 MHz-ARIAMSVLE1 (019°50'00"E-28°08'00"S) System 4 Polarization V - Id: 2

GE84 Optimization Description  
 Summary [ 104.2 MHz-ARIAMSVLE1 (019°50'00"E-28°08'00"S) System 4 Polarization V - Id: 2 ] | 104.2MHz | List of Interferes | 104.2MHz | List of Affected

Show Terrain Data  
 Administration:  
 Coordinates:



Excel

Assign ID	Adm	Inband	Site Cls	Assigned Frequency (MHz)	Polar	Site Name	Total Distance	Cold Sea Path (Km)	Warm Sea Path (Km)	Super refractivity Path (Km)	ERP (dBW)	Azimuth (deg)	Protection Ratio (dB)	NPS (dB(µV/m))	Coord.
1	AFS	ALO	BC	104	V	ALGARBIAS	73	0	0	0	37	131.3	7	45.11	Yes
054002109	NMB	RECORDED	BC	104.3	H	KEETMANSHOOP	241	0	0	0	37	315.4	25	37.42	---
054002084	AFS	RECORDED	BC	104.3	H	GARUSS	296	0	0	0	37	214.5	25	32.36	---

Thank you for your attention  
Questions ?