

# **ITU World Radiocommunication Seminar**

**Equivalent power-flux density limits examination** 

2-6 December 2024, Geneva, Switzerland



# Equivalent power-flux density limits examination

**Part III – Preparing Input Data** 



# Compiling data set

# Masks in XML format are stored in MDB file

All other parameters are contained in SRS Database.

To facilitate calculation, it is advisable to extract a notice to a separate database only including 1 frequency assignment per each frequency band subject to Article **22**, **9.7A**, **9.7B** examination.

All data is compiled using **EPFDPrepare** Tool







- 1. Download exercise file: Data EPFD files (zip)
- 2. Unzip it somewhere on your local drive
- 3. Repeat the steps below

or

Follow demonstration in video **<u>EPFD Demo</u>** 

# Starting GIBC

GENEVA2024

Input databases:		GIBC SNS V10 BETA – 🗆 🗙
-Mask database -SRS-data		Tools / Options       PFD/EIRP GSO       PFD/EIRP NGSO       PFD/EIRP Earth Station         Appendix 7       Appendix 30B       Appendix 30 30A         EPFD       Power Control       FOS       Ap8 & PFD Space       AP30B ESIM         Step 1       Prepare and validate SBS and Masks data       Image: Control Section 2016       Image: Control Section 2016
Options: • Notice ID for examination • Analysis RR.22 Hard Limits or No. 9.7B) • Use Dual Timestep option to improve simulation performance (see Section 4.7, Part D, ITU-R Recommendation S.1503-2). • Full WCG Down Check. The Worst-case geometry on downlink (WCG Down) calculation can take a significant amount of time to complete. To increase calculation performance, by default, the latitude step size of 1 degree will be used, if it less than PFD mask step size.		Step 1.Prepare and validate SRS and Masks data         Masks:       C:\Program Files (x86)\ITU\BR_Space_v10.0\Gibc\EPFD\Test\EPFD.         <       >         SRS:       C:\Program Files (x86)\ITU\BR_Space_v10.0\Gibc\EPFD\Test\EPFD.         <       >         SRS:       C:\Program Files (x86)\ITU\BR_Space_v10.0\Gibc\EPFD\Test\EPFD.          >         EPFDPrepare       >         Step 2. Analysis       RR.22 Hard Limits         Notice Id       Analysis       RR.22 Hard Limits         Full WCG Down Check       Select Limits       Agenium         Use Dual Timestep       Timestep       Ts1         Meseage       Meseage       Meseage
<ul> <li>Select Limits option to preselect Article 22 limits, which are to be examined.</li> <li>Timestep Normal or TS1. Use TS1 to reduce simulation time steps.</li> <li>Select software to run (Agenium or Transfinite)</li> </ul>		Results
Status window	,	Open database Open folder View results
Results review: -Open database with the results -Open folder with the results -View Results using 'EPFD ResultsView'		Software location and EPFD limits path Transfinite:C:\Program Files (x86)\S1503_2Analysis\Program\S1503_2.exe Agenium: C:\Program Files (x86)\Agenium\EPFDValidation\EPFDvalidation.exe Limits DB: C:\Program Files (x86)\ITU\BR_Space_v10.0\Gibc\EPFD\EPFD_limits_RES85.r
Set default locations for the EPFD Validation Software: - No need to change by default		<u>Erro Manual</u> <u>Exit</u> Www.itu.int/wrs-24

### Preparing data







- Prepare the mask database
- Prepare SRS-type database:
  - -Import the notice from an existing database
  - -Link frequency assignments in imported notices to the masks in Mask database
- Validate input in the databases



#### -Input files:

SRS-data source:

1-SpaceCap-NSKY.mdb

XML Mask files:

EIRP\_ES\_Mask\_NSKY\_id 3.xml EIRP\_SS\_Mask\_NSKY\_id 4.xml PFD\_Mask\_NSKY\_id\_1.xml PFD\_Mask\_NSKY\_id\_2.xml

## -Compiled files:

Mask database:

NSKY Masks.MDB

SRS-type database:

NSKY SRS.MDB

Alternative SRS-type database to decrease calculation time:

```
NSKY SRS-repeat track.MDB
```

-Result:

EPFDResults\_123520456.mdb





#### Preparing Mask database



-Start by creating new mask database:

😻 Mask \_  $\times$ -New mask mdb file Help Mask database operations Mask operations Other -Add XML files into mask database First select the database to work with. You can create a Once the database is opened you can manipulate with New Notice ID new database or open an existing one existing masks in database or add new masks. 0 -Store masks(s) to MDB Extract selected mask Renumber NoticeID of New mask mdb file Delete selected mask (s) from MDB -Once done, save new mask database selected mask Combine several EIRP Open existing mask Store mask(s) to MDB Save changes Review selected mask -Save changes ndh fil Mask Select mask files to store in database ×  $\leftarrow \rightarrow$ 1 ~ C Search 1 - Input New folder 🗏 • 💷 🕜 Organize \* Name Date modified Type Size 6 EIRP ES Mask NSKY id 3.xml 3/11/2022 9:12 AM XML Document 3 KB ~ 🗖 EIRP\_SS\_Mask\_NSKY\_id 4.xml 3/11/2022 9:12 AM XML Document 2 KB PFD\_Mask\_NSKY\_id\_1.xml 3/12/2022 2:02 PM 12,088 KB XML Document PFD\_Mask\_NSKY\_id\_2.xml XML Document 3/12/2022 2:02 PM 12,088 KB > > Support > > 2 File name: "PFD\_Mask\_NSKY\_id\_2.xml" "EIRP\_ES\_Mask\_NSKY\_id 3.xml" "EIRP\_SS ~ XML-format files (\*.xml) www.itu.int/wrs-24 10 Open Cancel



•	Read-only data	Vou may ch	hange parameter: File	s below (Noticeld, Maskld, ES_ID, Min EIRP_ES_Mask_NSKY_id 3.xml	Freq, MaxFreq). Press 'Save Data Type	to store the masl	- k		X Help
•	List of errors/warnings in XML	Severity	Type of mask Satellite name Message	Earth station EIRP	Reference bandwidth (kHz) Earth station ID (ES_ID - only for EIRP ES mask)	40 -1 Line number	Position in line		t : : :
						1			
•	Some meta data can be changed here								
•	Save the mask in the database		Notice ID	123520456	Min frequency (MHz)	27500		Save ma MD	ask in B
			Mask ID	3	Max frequency (MHz)	30000		Canc	el



#### List of all masks added

	V Mask									_	C	ן	×
F	Mask database operations First select the database to work with. You can create a new database or open an existing one					Mask operations Once the database is opened you can manipulate with existing masks in database or add new masks.			Other New Notio	ce ID		Help	
	New mask mdb file			Extract se (s) frc	elected mask om MDB		Delete selected mask	Renum	ber No ected	oticel[ mask	) of		
	Open exis mdb	ting mask o file	Sav	ve changes		Store mas	sk(s) to MDB		Review selected mask	Combi	ne sev Masl	veral E k	IRP
	Notice Id 123520456 123520456 123520456 123520456	Mask Id 3 4 1 2	Satellite Name NSKY NSKY NSKY NSKY	Mask Type E S P P	Type azimu azimu	Of Pfd Mask uth_elevation uth_elevation							
												2	upport

# Preparing SRS database



 Create new examination database Or

• Open existing database to validate/modify the data

• Start with creating a new database

<b>?/</b> P	Prepare SRS Data Wizard		×
File	Help		
		Select a working database	
	First step is to create	a new database or open an existing database to work with.	
	If you are running this and to import the filing fi	s Wizard for the first time, it is recommended to start working with a new database rom another database.	
	If you choose to creat produced database or	te a new database you can import at the next step notice of interest from <b>SpaceCap SRS_ALL</b> database.	
	When a new database which would facilitate No	e is created all very large earth stations would be contained already in this database o. 9.7B examination.	
	Alternatively, you can additional filing from <b>S</b>	open an existing examination database to continue validation or to import an <b>RS_ALL</b> database or <b>SpaceCap</b> produced database.	
		Select desired action to proceed	
		• New examination database	
		$\bigcirc$ Open existing database examination database	
			- 1
			- 1
			- 1
	Cancel	Prev Next	Support

# Preparing SRS database – Import filing from existing database



• The purpose is to create examination SRS-type database which would contain minimum required data for EPFD validation

- Basic principles:
  - Will contain only groups subject to Article 22 limits
  - Only 1 group per frequency range subject to Article 22 limit
  - Fill-out any missing data
- For source database the following can be used:
  - BR IFIC SRS.mdb
  - Database prepared in SpaceCap
- We will use '1-SpaceCap-NSKY.mdb' as a source database
- Click 'Import from existing database' to start import wizard

V Pre	pare SRS Data V	Vizard						×
File H	Help							
		Import a	a filin	g from anot	her database	•		
		Press t	he buttor	h below to launch the	Import Wizard.			
	You can imp	port a non-GSC	filing fro	m an existing <b>Space</b> database.	Cap database or exist	ing SRS	ALL	
			lf no in	nport is needed, pres	s Next.			
			:					
			≧→	Import from existing da	tabase			
		1						
	Cancel			Prev	Next			Support

#### Preparing SRS database – Import filing from existing database

- Select source database to import from
- Enter notice ID in source database
- Open the source notice
- Select the way how examination groups will be created

**First option** is a default method of selecting frequency assignments groups which can be imported from source databased. Under this option, program looks for frequency assignments groups which are subject to Article 22 or No. 9.7B coordination provision and lets user to select which are the groups need to be imported from.

**!!!** With new SNS v10 – under this option you can select Scenario already captured in the database in v10 SNS.

**Second option** is using information provided in the masks regarding minimum and maximum frequency of the frequency range to which particular PFD/EIRP mask is applicable. Provided that only single PFD or EIRP mask is applicable to specific frequency range only one new group will be generated.

**Third option** uses information on Article 22 EPFD limit applicable frequency band and frequency assignments used in the notice. But unlike first option, this option generates completely new groups, while avoiding having multiple groups operating in overlapping frequency band.

 Since we have already our mask database prepared and it is covering all the frequency bands subject to Article 22 limits, we will use second option

M ImportWizard	– D X Help
Select source database and Press to select input database	d notice Data base location
Select source database	C:\OneDrive\_Mission\ISR2022\1 - Input\1-SpaceCap-NSKY.mdb
Enter notice ID 123520456	Press to open the notice
<ul> <li>Frequency Assignments</li> <li>Choose what to import from Notice</li> <li>Generate From Masks</li> <li>Generate From Notice</li> </ul>	Selected function let you choose which groups will be imported from an existing notice.
Satellite Na	me NSKY
Cancel	Prev Next Finish Support
	www.itu.int/wrs-24



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- New from 2025
- Reads scenarios defined in the source database
- Creates examination database which can be read by EPFD validation software using the parameters from the scenario
- Not yet available in BR Software released for Workshop

V ImportWizard							-	X Help
Select Scenaric	o for import to	examinati	on fi	le				 nep
Examination database wi	ill be created with new	groups correspor	nding to	a selected scen	ario.			
Select Scenario from the	list below Parameter	s defined in scena	rio					
1 Ka-band	Scena	гіо						
	Scena	rio ID: 1						
	Scenar	rio Name: Ka-ba	nd					
	Param	ieters						
	Exclus	ion zone angle:	5					
	Minim	um elevation ang	le: 25					
	Averag	ge Distance: 999						
	Densit	y: 1E-06						
	Numb	er of simultaneou	sly track	ed satellites: 1				
	Applie	able Frequencies	s (Uplin	k)				
	Freque	ency Range: 27500	- 30000	)				
	Applie	able Frequencies	s (Down	link)				
	Freque	ency Range: 17800	- 17800	)				
	Freque	ency Range: 19700	- 19700	)				
	Down	link Nco latitude	ranges					
	From	atitude: -90	To La	titude: 90	Nc	o: 1		
	Assign	ned masks						
	Mask	ID: 1						
	Assign	ned Orbits: All						
	Mask	D: 2						
	Assign	ned Orbits: All						
	Mask	ID: 4						
	Assign							
	Assig	ned Orbits: All						
	755191							
							1	
Cancel		Prev		Next		Finish		Summer



At the next step we need to select orbital planes to import

- If there are several orbital configurations having different • sets of orbital planes, we need to select only orbital planes of 1 configuration only which we are going to examine
- For each orbital configuration a separate SRS-type ٠ database needs to be created

ImportW	/izard								—	$\times$
										Help
hoose	orbit	al plane	es to ir	nport						
Included	OrbitID	SatNumber	Apogee	Perigee	Inclination	Lan	PerigeeArgument	MinOperatingHeight		
~	1	0	1000	1000	99.5	0	0	1000		
<ul> <li>✓</li> </ul>	2	0	1000	1000	99.5	31.6	0	1000		
✓	3	0	1000	1000	99.5	63.2	0	1000		
✓	4	0	1000	1000	99.5	94.8	0	1000		-
✓	5	0	1000	1000	99.5	126.4	0	1000		
✓	6	0	1000	1000	99.5	158	0	1000		



At the next step, since we selected an option to	
generate groups from mask database, we need to	
open the mask database we are going to use	

• The program will identify required groups of frequency assignments to be generated next

ImportWizard							- 0	×
								Help
Оре	n Mask databa	ase file con	taining the ma	asks which will	be used as a source to	generat	e new groups	
Ope	n mask file	C:\OneDri	ve\_Mission\ISR	2022\2 - Compile	d data\NSKY Masks.MDB			
ollowing groups enerated	will be	Based on r	mask(s)					
27500 - 30000	Earth-space	MaskID	LowFrequency	HighFrequency	Reference <u>B</u> andwidth kHz	Туре	DataType	Orbital
17800 - 18600	space-Earth	4	17800	18400		EIRP SS	off-axis	
19700 - 20200	space-Earth	1	17800	18600	40	PFD	azimuth_elevation	
C	>	<						>



- At the next step, the summary is given for required import action
- Press 'Finish' to proceed with the import

V ImportWizard				-	× Help
Summary of elements to in	nport				
Number of orbits to import	5				
Number of groups to import	3				
Number of assoc. earth stations to import	3				
Press 'Finish' to proceed wi	th the import				
Cancel	Prev	Next	Finish		Support

# Preparing SRS database

Once import is done we can advance to the next step (press 'Next')

On the next step, select the notice from drop-• down list and press 'Next'

Prepare SRS Data Wizard	×	
Import a filing from another data	ihase G	ENEVA2024
Press the button below to launch the Import Wizar You can import a non-GSO filing from an existing <b>SpaceCap</b> database database. If no import is needed, press Next.	d. or existing SRS_ALL	
	Prepare SRS Data Wizard File Help	- U X
Import from existing database	Select a notice ID	)
Cancel Prev Next	Select a notice ID from drop down b	ox below. ation and mask link creation.
	123520456 NSKY	~
	Cancel Prev	Next







 $\times$ 

П

Copy mask per satellite(s)

assignment to other orbits

Save

Close

Help Select Orbital Planes using this mask by checking/unchecking 'Include' in the table below. If you want to assign this mask to specific satellite(s) please click 'Assign selected mask to specific satellites' Flag 'AllSatellites' in the table below which indicates whether all satellites in orbital plane are using the same mask will be changed accordingly. Included AllSatellites OrbitID SatNumber Apogee Perigee Inclination Lan PerigeeArgument MinOperatingHeight ✓ All 12 1000 1000 99.5 0 1000  $\checkmark$ All 12 1000 1000 99.5 31.6 0 1000 ✓ All 12 1000 99.5 63.2 0 1000 1000 12 1000 1000 99.5 94.8 0 1000 1 12 99.5 126.4 0 1000 1000 1000 12 1000 1000 99.5 158 0 1000 V Assign mask to specific satellites  $\times$ Check satellites using this mask Select Orbit ID to edit 3 Assigned MaskID OrbitID SatID ✓ ٦ I€  $\rightarrow$ ← ~ Total number of orbital planes: 6 < < ✓ < ✓ < 9 < 3 10 Assign selected mask to Save </ 11 specific satellites < 12 😓 Uncheck All 🖆 Check All

🦅 MaskOrbit

- Example of selective assignment of the mask to specific orbits
- Please note that each orbit needs to have a mask assigned
- Need to repeat the process for each mask
- You may also assign the mask to specific satellite in the orbit



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- Next step is the validation of the prepared data for its completeness and correctness
- Again, it is a step-by-step wizard



X

# • First step is the verification of linking information

- Some warning messages are shown here as an example:
  - These warning messages indicate that some orbits do not have any mask assigned

Please see the warning messages below.

#### Validation Errors —

Cancel

V Prepare SRS Data Wizard

File Help

Severity Message

 Warning
 Direction: down, Limit: Article 22, TABLE 22-1B, Low freq: 17800, High Freq: 18600 is not covered by mask\_Ink

 Warning
 Direction: down, Limit: Appendix 5, TABLE 5-1, RR9.7A, Low freq: 17800, High Freq: 18600 is not covered by m

 Warning
 Direction: down, Limit: Appendix 5, TABLE 5-1, RR9.7B, Low freq: 17800, High Freq: 18600 is not covered by m

 Warning
 Direction: down, Limit: Appendix 5, TABLE 5-1, RR9.7B, Low freq: 17800, High Freq: 18600 is not covered by m

 Warning
 Direction: down, Limit: Article 22, TABLE 22-1B, Low freq: 17800, High Freq: 18600 is not covered by mask\_Ink

Prev

Next

Support

## Preparing SRS database - validation



- □ >

File Help

#### Frequency groups validation

Error Found. Minimum elevation angle is missing for one or several records.

Change or correct the data

Cancel

Please enter minimum elevation angle (A.14.b.4) of the earth station expressed in degrees with two decimal positions for each group and press Update

Update

Prev

GroupID	BeamName	EmiRcp	FreqMin	FreqMax	MinElevation	
5002	EPFDDC	E	17880	18600	→	
5003	EPFDDOWN	E	19700	20200		
5001	EPFDUP	R	27500	30000		

- Next step is the verification of group (grp) table \_ containing information on the minimum elevation angle
- Here we have the minimum elevation angle missing
- Enter 25 degrees for each group and press 'Update'

www.itu.int/wrs-24 25

Suppor

Next

# Preparing SRS database – validation

- Next step is the verification of exclusion zone method
- Here we have exclusion zone method and associated angle missing
- Enter 'Exclusion zone method'=Y and 'Exclusion zone angle'=5 degrees and press 'Update'

Prepare SRS Data Wizard File Help  Exclusion zone method (A.4.b)  Error Found. No exclusion angle is provided. Ple Change or correct the data Exclusion zone method Exclusion zone angle Update	o.7.d.1 and A.4.b.7.d.2) ease provide exclusion angle below.	GENEVA 2024
	Prepare SRS Data Wizard	- 0 X
	File Help	
	Exclusion zone method (A.4.b.7 Exclusion zone method is Ok. Pr	'.d.1 and A.4.b.7.d.2)
	Exclusion zone method Y - alpha angle v	
Cancel Prev	Exclusion zone angle 5 Update	

# Preparing SRS database – validation

- Next step is the verification of distribution of earth stations on the uplink
- Required information is missing. Enter 'Average distance'=999, 'Density'=0.000001 and 'Number of satellites receiving simultaneously'=1 and press 'Update'

		_		<b>– ITU</b>	WRS			
V Prepare SRS Data Wizard		- 0	×	GENEVA2	024			
File Help								
Population of earth stations A.4.b.7	(A.4.b.7.a, A.4.k ′.c)	o.7.b and						
These are required for uplink EPFD analysis:								
<ul> <li>density - Average number of associated earth stations t in a cell</li> <li>avg_dist - Average distance between co-frequency cells</li> </ul>	ransmitting with overlappir s in kilometres	ng frequencies per	km2					
<b>NUM_ES</b> = ES_DISTANCE * ES_DISTANCE * ES_DENSITY Special case:								
• Locate single non-GSO earth station at the horesight of	GSO.							
density=1 and avg_dist = 0 km	Prepare SRS Data Wizard				- 0	×		
	File Help							
Change or correct the data	Population of earth stations (A.4.b.7.a, A.4.b.7.b and A.4.b.7.c)							
Density (1/km <sup>2</sup> ) (A.4.b.7.c)	These are required for up	link EPFD analysis:						
Update	• density - Average numl in a cell • avg_dist – Average dist	per of associated e ance between co-f	arth stations transmit	tting with overlapping metres	frequencies per	km2 ،		
						1		
Cancel Prev	Special case:	E * ES_DISTAINCE *	ES_DEINSITY			Ē		
	<ul> <li>Locate single non-GSO density=1 and avg_dis</li> </ul>	earth station at the <b>t = 0 km</b>	e boresight of GSO:			I		
		Populatior	n data is Ok. Press	'Continue'				
	Change or correct the data Average distance (km) (A.4 Density (1/km²) (A.4	.b.7.b) 999 1b.7.c) 1E-06 date	Number of sate	ellites receiving simultane	ously (A.4.b.7.a)	1		
	Cancel		Prev	Next		Support		
			** ** ***	COLLEGATION AND COLLEGATION AN				

## Preparing SRS database - validation

- Next step is the verification of *Nco* (number of satellites transmitting simultaneously to the same geographical area at any point within the given latitude range)
- Required information is missing. Enter the values: 90 to 90 with 1 satellite and press 'Update'
- In some cases several ranges might be required.
   E.g. system is only serving specific latitude range.
   For example, -45 to 45. In this case the table should contain 3 rows:
  - -90 to -45 with Nco=0
  - -45 to 45 with **Nco=1**
  - 45 to 90 with Nco=0

Prepare SRS Data Wizard le Help			>			٨/R	ς	
Operatio	onal latitude ra	anges (A.4.b.	6)		GENEVA202	24		
<b>lat_fr, lat_to</b> – lower upper limit of <b>nbr_op_sat</b> - maximum number of to a given location within the latitu Entries should cover the whole ran	f the latitude range f non-geostationary sate ide range ge from -90 to 90 latituc	llites transmitting with a	overlapping frequencie	1 25 y				
Fatal Error. No record is prese	ent in sat_oper table f the data belo	for the selected Noti w.	ce ID. Please, enter					
Change or correct the data								
Indicates number of sate latitude range. Operationa certain range no	ellite transmitting simultaned al latitude ranges should cove transmission is carried out, e	ously to any same given poi er whole Earth (-90 to 90 la enter 0 for number of satell	int within a titude). If for ites					
Lat_fr Lat_to Nbr_op_sat								
		Prepare SRS Data Wi	zard			-		×
		File Help						
Carcel	Update	<ul> <li>lat_fr, lat_to – low</li> <li>nbr_op_sat - maxii</li> <li>to a given location</li> <li>Entries should cove</li> </ul>	Operational er upper limit of the la num number of non- <u>c</u> within the latitude ran er the whole range from	latitude range geostationary satellites ge m -90 to 90 latitude.	ges (A.4.b.6)	erlapping fi	reque	ncies
	nev	-	Operational I	latitudes are Ok. Pre	ss 'Continue'			
		Change or correct the Indica latitude	data tes number of satellite tra range. Operational latitud certain range no transmi _op_sat	nsmitting simultaneously t le ranges should cover wh ssion is carried out, enter (	o any same given point v ole Earth (-90 to 90 latitu 0 for number of satellites	within a de). If for		
		Cancel	<u></u>	Prev	Next			

# Now we can select our prepared databases and 'Return to GIBC'

	- 11	UWR
Epfd Data Preparation —		× 24
In this dialog you can either select the databases containing the data fo examination or prepare the Appendix 4 data elements required for E examination of the filing or create and/or validate new databases	r EPFD PFD	
Please select the databases required for examination		
Select the database with the masks		
C:\OneDrive\_Mission\ISR2022\2 - Compiled data\NSKY Masks.MDB		
Select SRS database with non-GSO system for examination		
C:\OneDrive\_Mission\ISR2022\2 - Compiled data\NSKY SRS-repeat track.MDB		
Return to GIBC		
Prepare Appendix 4 data required for EPFD examination		
1. Create Masks Database		
PFD/EIRP Mask Operations		
2. Create SRS database		
Prepare SRS Data		
Create summary for notice in Word		
		Support

Preparing databases	GIBC SNS V9 - Graphical Interface for Batch Calculations       —       ×         PFD (terrestrial serv.)       PFD (space serv.)       Appendix 7       Appendix 30B       Appendix 30 30A         EPFD       Appendix 8       Power Control       FOS       Tools / Options       PFD NGSO         Step 1.Prepare and validate SRS and Masks data
<ul> <li>Once everything is ready:</li> <li>Enter notice ID</li> <li>Select recommended options</li> </ul>	SRS: C:\OneDrive\_Mission\ISR2022\2 - Compiled data\NSKY SRS-repeat t EPFDPrepare Step 2. Analysis Notice 1 123520456 Analysis RR.22 Hard Limits Full WCG Down Check Select Limits Agenium Use Dual Timestep TS1 Transfinite
<ul> <li>Start running EPFD validation by choosing 'Transfinite'</li> </ul>	Message   Calling EPFD Calculation 13:34:47     Results   C:\Users\timka\ITU\BR_SPACE_v9.0\TEX_RESULTS\EPFD\123520456\220     S1503_2: A22, ntc_id = 123520456 (NSKY)
	Completed 0 of 17 runs Run 1 - 0.1 % Run 3 - 10.5 % Run 6 - 10.9 % Run 9 - 13.2 % Run 10 - 10.3 % Run 13 - 12.9 % Run 14 - 10.3 % Cancel EPFD Manual EXIT Help 10

GENEVA2024	/RS
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	✓ EPFD Results View — □	×
	Select input results View results	
	Select results database C:\OneDrive\_Mission\ISR2022\3 - Results\EPFDResults_12352045 e_ Clear All Added	
	Select Result to Display (use 'Ctrl/'Shift' to make multiple selection)	
<ul> <li>Once calculation is finished click 'View Results'</li> </ul>		
<ul> <li>EPFD Results View is started</li> </ul>		
<ul> <li>Note: You can also run EPFD Results View as standalone application by starting:</li> </ul>		
c:\Program Files (x86)\ITU\BR_Space_v10\Gibc\EPFD\EPFDResultsView.exe		
<ul> <li>In the main window highlight the limit and click — 'Add Selected results' —</li> </ul>		
Then switch to 'View results' tab		
	Tree View     Add Selected results	



- Checkbox under 'pass' in each limit indicates the pass/fail status
- Highlight the result/limit you wish to plot and press 'Plot Selected results'

✓ EPFD Results View	_		×
Select input results View results			
100 perc EPFD Limit Margin			
► 60 -234.128 -164.46 -69.668			
10 50 -230.813 -164.45 -66.363			
40 -226.361 -164.44 -61.921	_		
1 30 -222.045 -164.43 -57.615	_		
0.1	-		
	_		
■ 0.01 5 -202.983 -164.404 -38.579	-		
	-		
	-		
	-		
	-		
E 1E-05	-		
LE-06 Run Type: Art22, SW: Transfinite, epfdL, FSS, F=17.8 GHz, Ant S.1428, d=2 m, per 1000 kHz, ResultID: 7, RunID: 3, 0.3199 932161 69238 24	-		
- LIMIT, Art22, SW: Transfinite, ResultID: 7, EPFD Type: epfd↓, FSS, F=17.8 GHz, Ant S.1428, d=2 m, per 1000 kHz	-		
1E-07	-		
6 8 9 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7			
EPFD, dBW/m^2/1000 kHz 0.04 -195.973 -153.317 -42.656			
0.03 -194.267 -152.139 -42.128			
✓ Plot also limit (extracted from results)	Conv	Plot to Clinb	oard

Select Results to Display (press 'Ctrl' to make multiple selection of results produced by two software)

EPFD Type	sw_name	run_id	IncomingNtc	ExistingNtc	result_id	run_type	worst_es_lat	worst_es_long	worst_gso_long	pass	percentage_complete	С
epfd↑, FSS, F=27.5 GHz, Ant S.672, Ls -10, 1.55°, per 40 kHz	Transfinite	3	123520456		1	Art22	50.93			$\sim$	100	С
epfd↑, FSS, F=29.5 GHz, Ant S.672, Ls -10, 1.55°, per 40 kHz	Transfinite	3	123520456		2	Art22	50.93			$\checkmark$	100	С
epfd↓, FSS, F=17.8 GHz, Ant S.1428, d=1 m, per 1000 kHz	Transfinite	3	123520456		6	Art22	-10.65	-53.06	-58.21	$\checkmark$	100	С
epfd↓, FSS, F=17.8 GHz, Ant S.1428, d=1 m, per 40 kHz	Transfinite	3	123520456		3	Art22	-10.65	-53.06	-58.21		100	С
epfd↓, FSS, F=17.8 GHz, Ant S.1428, d=2 m, per 1000 kHz	Transfinite	3	123520456		7	Art22	-10.65	-53.06	-58.21		100	С
epfd↓, FSS, F=17.8 GHz, Ant S.1428, d=2 m, per 40 kHz	Transfinite	3	123520456		4	Art22	-10.65	-53.06	-58.21	$\sim$	100	С
epfd↓, FSS, F=17.8 GHz, Ant S.1428, d=5 m, per 1000 kHz	Transfinite	3	123520456		8	Art22	-10.65	-53.06	-58.21		100	С
epfd1. FSS. F=17.8 GHz. Ant S.1428. d=5 m. per 40 kHz	Transfinite	3	123520456		5	Art22	-10.65	-53.06	-58.21	$\checkmark$	100	С

Plot Selected Results

# Running EPFD Prepare as stand-alone app





Running EPFD Prepare as stand-alone app (launching EPFD validation)

#### More options are available

- Can control number of CPU hardware threads to use: Note: higher number does not mean faster – may need to decrease this number significantly. It is recommended to keep it below the number of available CPU cores
- Timestep 'TS2' option is available for Transfinite
  - Decreases calculation time for large constellations
  - Is not officially described in Rec. ITU-R S. 1503
  - Therefore, can be used only for experimenting/tunning
- Access to log-file of EPFD validation software to troubleshoot

<b>V</b> Epfd Data Preparati	on		- 0
Enter notice ID and se	lect examination type		
Enter notice ID	123520456	Examinatio	on Type Article 22
Select the database wit	h masks for examinat	ion	
E:\SkyDrive\_Mission\l	SR2022\2 - Compiled	data\NSKY Masks.MDB	
Select SRS database wi	th non-GSO system fo	or examination	
E:\SkyDrive\_Mission\I	SR2022\2 - Compiled	data\NSKY SRS-repeat track.MDB	
Select Limits DB			
C:\Program Files (x86)	ITU\BR_Space_v9.0\G	ibc\EPFD\EPFD_limits_RES85.mdb	
Results database			
Select Results DB			
C:\1\EPFDResults_3195	20412_2022_01_27_0	7_31_03.mdb	
Generate new resul	ts database		View res
Options			
<ul> <li>Select limits</li> </ul>		Number of CPU core	es to use 32
✔ Use Dual TimeStep			Maximum cores availa
Full WCG Down Ch	eck	Timester	Option TS2
Start			
Select EPFD software	Transfinite ~	Start	with selected softwa
Path to EPFD software	C:\Program Files (x8	36)\S1503 <u>2</u> Analysis\Program\S1503	3_2.exe EPFD Lo
		Back to prepare	



- Use 'Dual Time Step' or 'TS1' option
- If experimenting with a single mask, run with an option 'Select limits' to avoid running all the masks and limits
- If experimenting with a mask, try unofficial 'TS2' option only available in *Transfinite*
- If experimenting with a mask you may increase performance by limiting number of timesteps required for calculation
- $\Rightarrow$ Set orbital planes to have repeating ground-track (see file **NSKY SRS-repeat track.MDB**)
- ⇒Open SRS-exam database
- ⇒Open orbit table
- $\Rightarrow$ Modify values as shown:
- ⇒f\_stn\_keep=Y
- ⇒rpt\_prd\_dd=number of days (3-10)

 $\Rightarrow$ Don't forget to change back these values before executing the final validation

ntc_id 👻	orb_id 🤜	nbr_sat_	pl⊽	right_asc 👻	<mark>f_s</mark> tn_keep ⊸	🛛 rpt_prd_dd 🔽	rpt_prd_hh 🔽	rpt_prd_mm 🗸	rpt_prd_ss 🔻	f_precess 🗢	precession 👻
123520456		1	12	0	Y	10	) (	<mark>) (</mark>	) 0	N	
123520456		2	12	31.6	Y	10	) <mark>(</mark>	<mark>) (</mark>	0	N	
123520456		3	12	63.2	Y	10	) (	<mark>) (</mark>	0	N	
123520456		4	12	94.8	Y	10	) C	<mark>) (</mark>	0	N	
123520456		5	12	126.4	Y	10	) C	<mark>)</mark> (	0	N	
123520456		6	12	158	Y	10	<mark>) (</mark>	o (	0	N	
					<b>.</b>		-	•			



- Before submitting the data, please make sure that you are certain in the results:
- You may submit the masks as separate files or inside MDB
- You may submit examination SRS-database which you used to validate EPFD on your side:
  - Please make sure that characteristics (especially orbital characteristics) are the same as in initial submission
  - Please make sure that it covers all the frequency ranges in initial submission which are subject to Article 22 EPFD limits
- If you choose not to submit examination SRS-database, please indicate in accompanying note all the information related:
  - Minimum elevation angles
  - Exclusion zone
  - Earth station distribution
  - *Nco* data
- In case of a doubt or technical issue, you may seek assistance of the Bureau
- Please note, once you submit the data and it is complete, the findings established by the Bureau using your data will be definitive



# **EPFD** web-page

https://www.itu.int/epfdsupport

epfd-support@itu.int