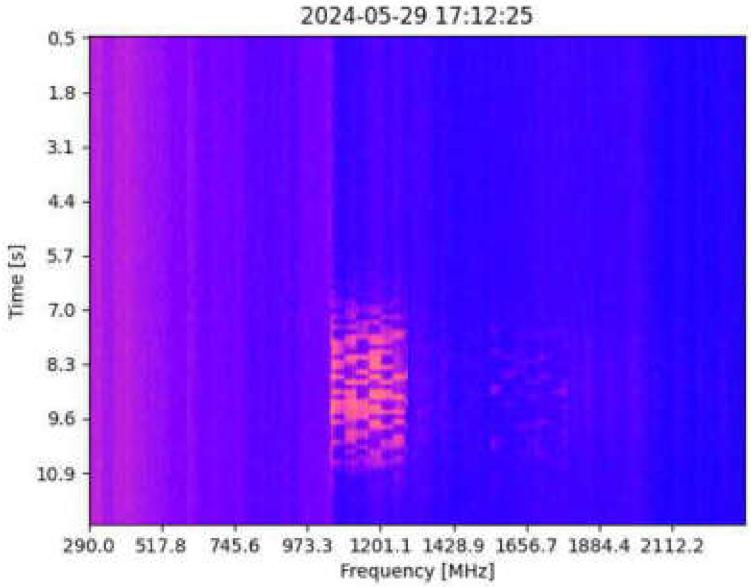
Vienna, 01.07.2024

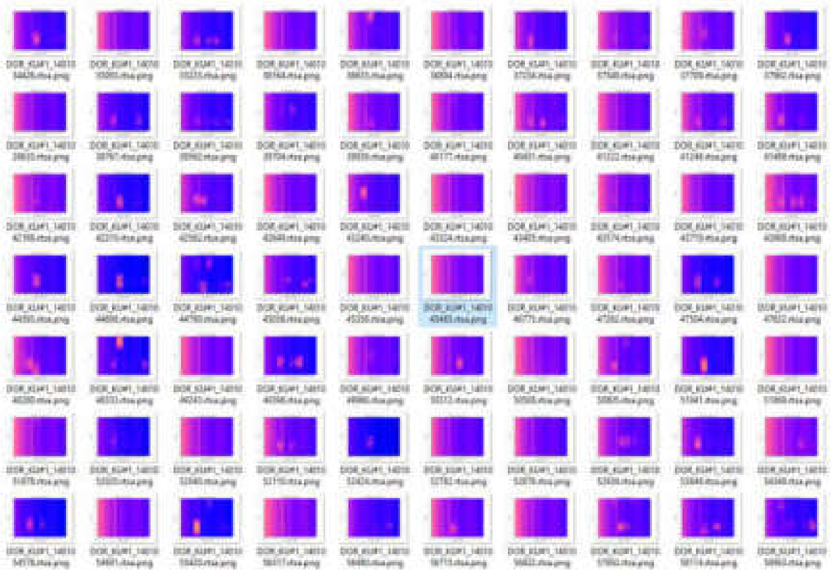
Coding exercise for SW developer position

Context:
RF data is recorded from a digital signal processing unit in a proprietary format in form of frequency sweeps. The global goal is to read out 'meta-data' of the carriers in frequency and time of appearing carriers to be stored in the data base to the respective measurment.

Input Data:
Data content
The incoming data contains spectrum power measurements as sweeps as matrix representing the time and frequency continuum on the power measurements. The following graph shows a sample plot of a recording.



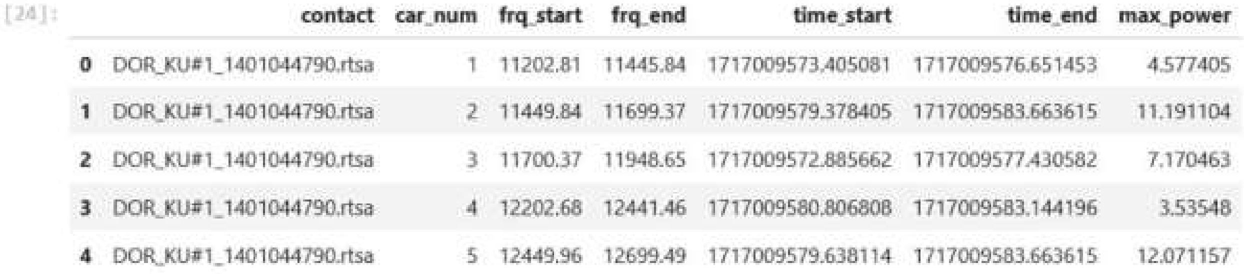
The carrier are different in frequencies and start/end time as shown in a sample plot below.



The frequency recording is done with a down converter (LNB) and has an offset of 10410 MHz

Expected results / outcome:

For each input data a list of carriers found stored as JSON (variable names in snake_case) similar to the results sample in the following picture of a pandas table.



[24]:

	contact	car_num	frq_start	frq_end	time_start	time_end	max_power
0	DOR_KU#1_1401044790.rtsa	1	11202.81	11445.84	1717009573.405081	1717009576.651453	4.577405
1	DOR_KU#1_1401044790.rtsa	2	11449.84	11699.37	1717009579.378405	1717009583.663615	11.191104
2	DOR_KU#1_1401044790.rtsa	3	11700.37	11948.65	1717009572.885662	1717009577.430582	7.170463
3	DOR_KU#1_1401044790.rtsa	4	12202.68	12441.46	1717009580.806808	1717009583.144196	3.53548
4	DOR_KU#1_1401044790.rtsa	5	12449.96	12699.49	1717009579.638114	1717009583.663615	12.071157

rtsa File Decoder:
We enclose the rtsa decoder as py code to access the raw data.

Expected implementation
We would like to get the code as a self standing Jupyter notebook.
Visualisation of the data transformation in the Jupyter is up to the applicant.

Expected documentation
You are free to comment the code in the text of logical approach tracing and we appreciate a short code description in a readme in an separate pdf.

Deliverable:
We expect a link to a git repository for downloading the code / the Jupyter notebook.

Notes:
You are free to ask any question.
If you use any AI generating tool in your work please let us know which part was done by the AI, which AI, and which prompt(s) you used.

Annex:
SW decoder to read .rtsa files
15 rtsa files