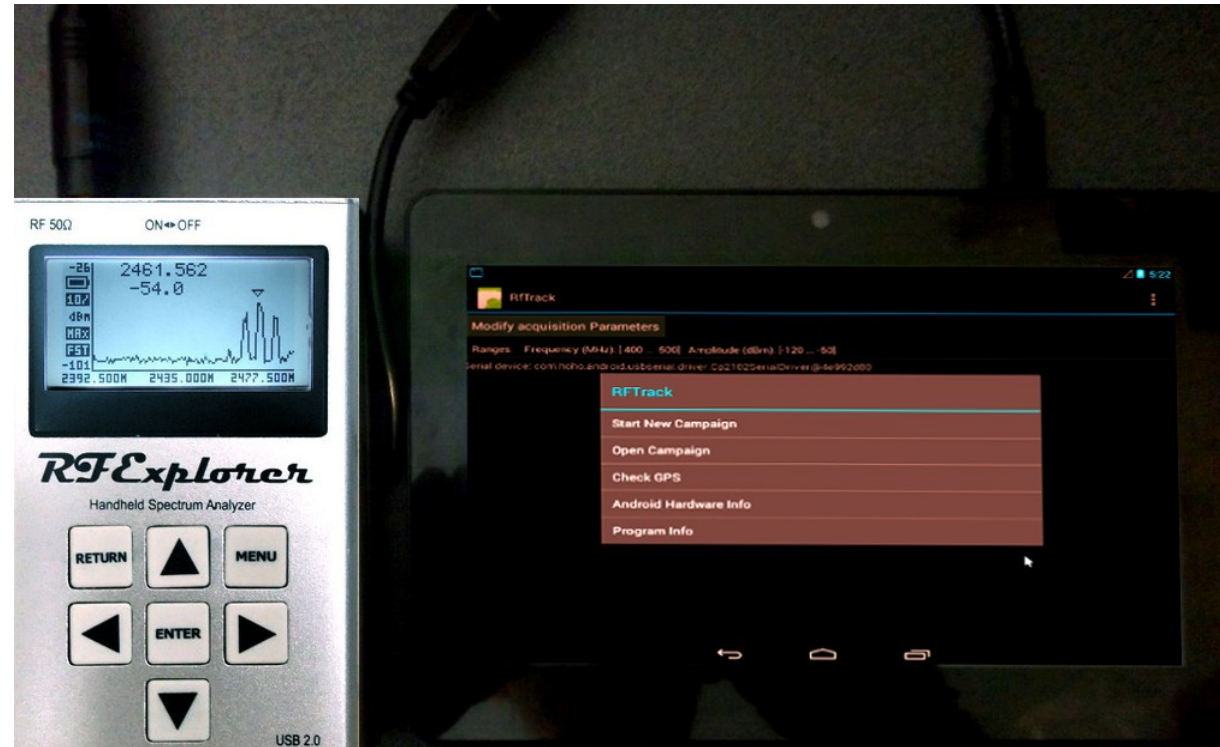


App RfTrack Ver. 0.57

Low-cost monitoring
System for White
Spaces frequencies



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first of all: FEEDBACK

Next days you will receive an RFExplorer and an Android phone.

Please, give us feedback to to improve the system

For example, this feedback is not useful



the programmer needs to change jobs !!!

Instead are useful feedback like:

...the programmer needs to change jobs **BECAUSE:**

- when I press option ... there is this problem... (**AND YOU DESCRIBE THE TYPE OF PROBLEM**)
- **IMPORTANT: tell us if the problem is *SYSTEMATIC*:** for example, pressing KEY1 and later KEY2 in MENUx the program Exit ...

AND SO ON...

Or after using it, you can pick you some ideas for options that you will implementated.

You can send us an email and tell, for example:

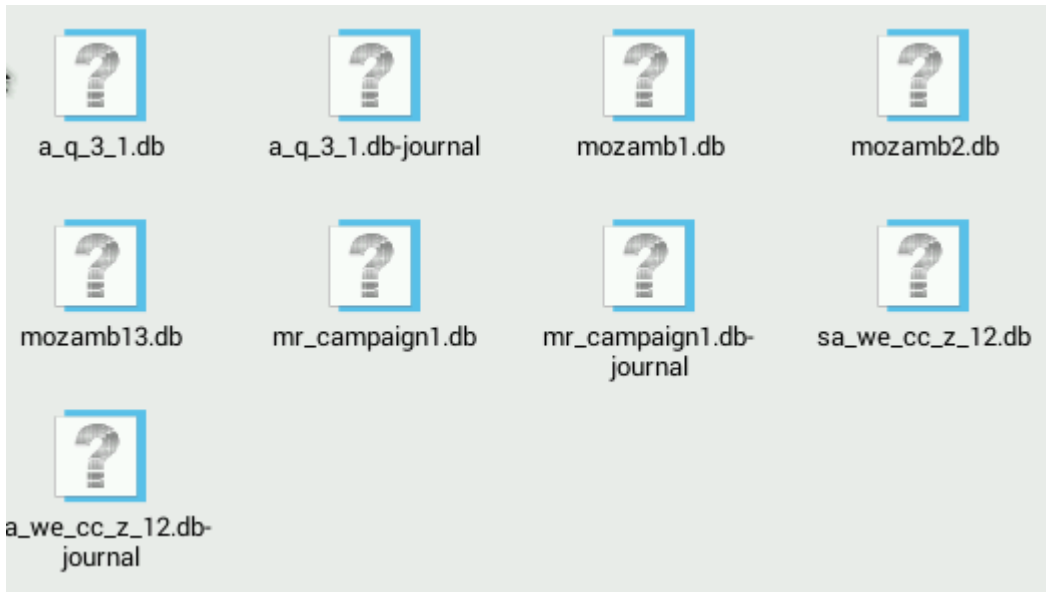
Good Program ... but I'd like an option....

and you describe that option

For a problem, more information I have, sooner I understand the type of problem to fix it

Main Characteristics of Android App RfTrack 0.57

The data are saved in SQLite databases, stored in a local memory of the Android device:



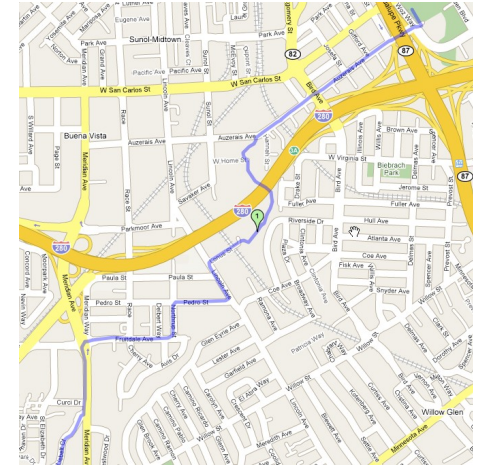
- the Secure Digital memory inserted
- the User Memory of the Android

RfTrack: Android APP developed to monitor TVWS frequencies

The application gives the .db extension to all SQLite File databases generated.

Perform measurements requires a minimum of initial organization, for example have from the beginning the idea:

- Definition of measurement routes



- the kind of antenna used with Spectrum Analyzer
- The setup parameters to do the measurements

Measurement campaign

- With the 0.57 version of RfTrack has introduced the concept of "measurement campaign".
- All the data collected in a campaign are saved in a specific SQLite database
- the name of the SQLite database that is created is the name of the campaign provided by the user

Main groups of data saved in the database

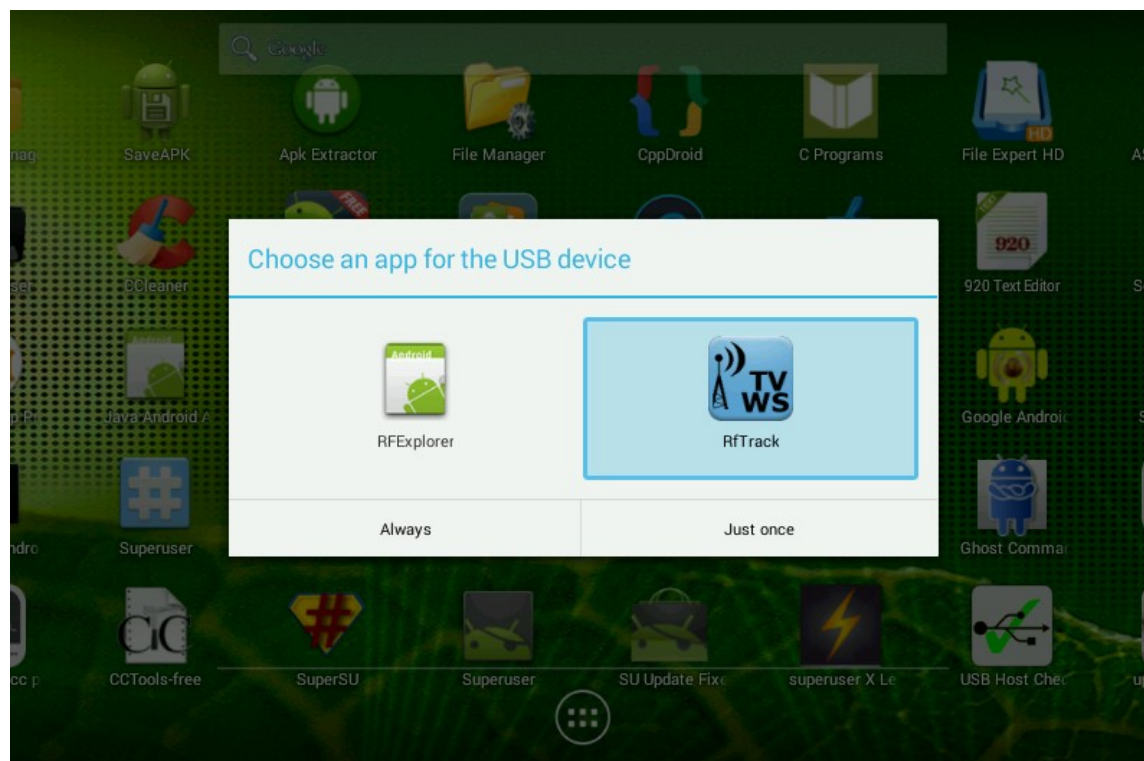
1. Name and info of the campaign
2. the type of antenna used, omni (standard) or directional.
3. GPS position, read at regular intervals:
 - Latitude, Longitude, Altitude (meters above the sea level)
 - speed (in meters / second),
 - Accuracy
 - time provided by the GPS.

4. If the GPS is not available on the Android system (and it is not possible to detect the position either through the network), the user can manually enter Longitude, latitude and height above ground level in meters. ***In this way the program is also suitable for measurements not in motion.***

5. The Setup parameters of RFExplorer:
 - Start and End frequency range of the measures
 - Upper and Lower limits of dBm
6. The data acquisition read from the RFExplorer (112 dBm values)

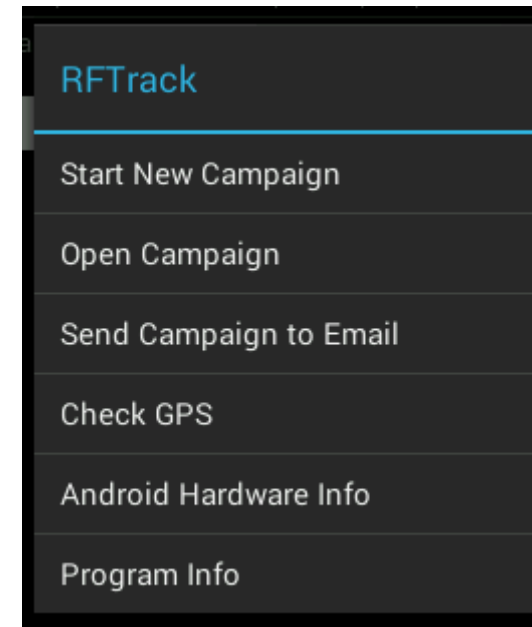
Launch the RfTrack program

Connected the RFExplorer Spectrum Analyzer to the Android unit with the OTG cable, automatically are shown the programs able to communicate with the instrument.

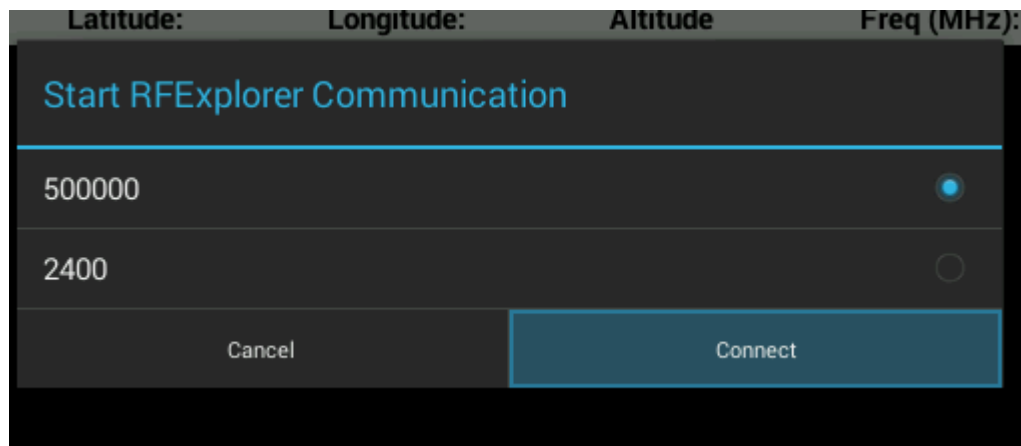
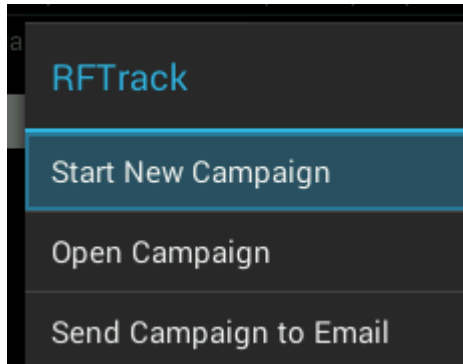


In this example, we see the last version of program (RfTrack) and a previous version, with different name.

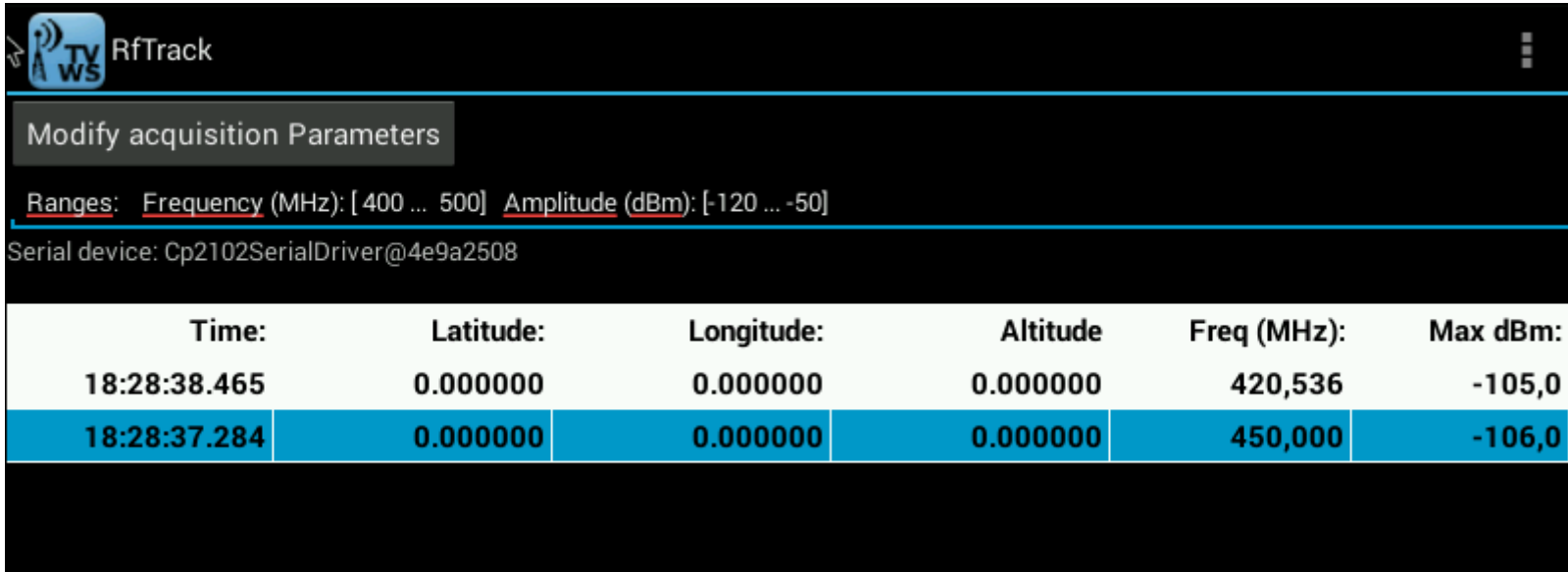
This is the main menu that appears when the program is launched



Start a new campaign



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The screenshot displays the RfTrack application interface. At the top left is the app icon and name. Below it is a button labeled "Modify acquisition Parameters". Underneath, the acquisition ranges are shown: "Ranges: Frequency (MHz): [400 ... 500] Amplitude (dBm): [-120 ... -50]". Below this, the serial device is identified as "Cp2102SerialDriver@4e9a2508". The main part of the screen is a table with six columns: Time, Latitude, Longitude, Altitude, Freq (MHz), and Max dBm. The table contains two rows of data, with the second row highlighted in blue.

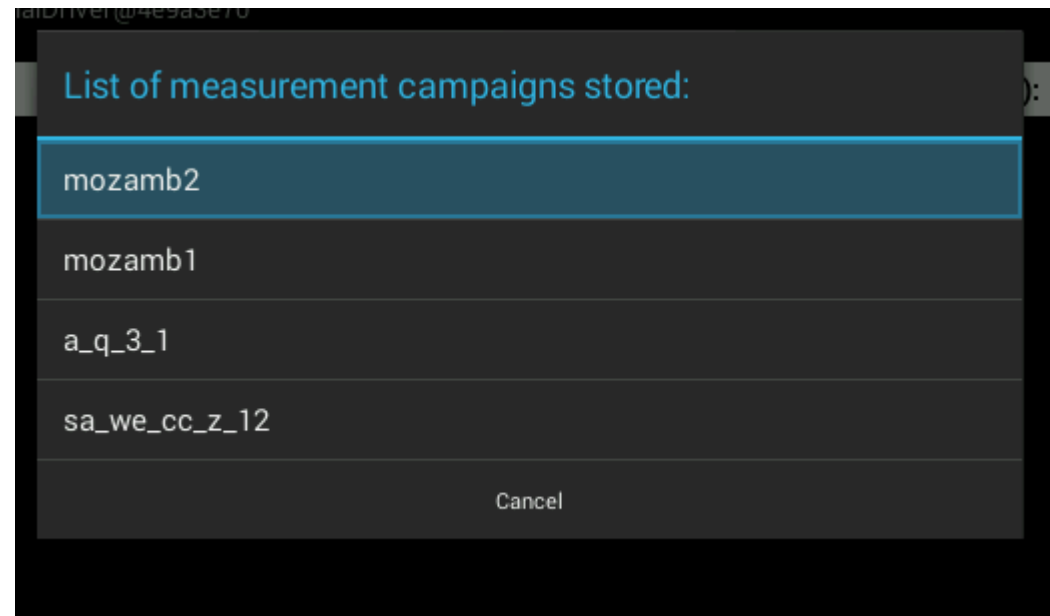
Time:	Latitude:	Longitude:	Altitude	Freq (MHz):	Max dBm:
18:28:38.465	0.000000	0.000000	0.000000	420,536	-105,0
18:28:37.284	0.000000	0.000000	0.000000	450,000	-106,0

Send Campaign to email



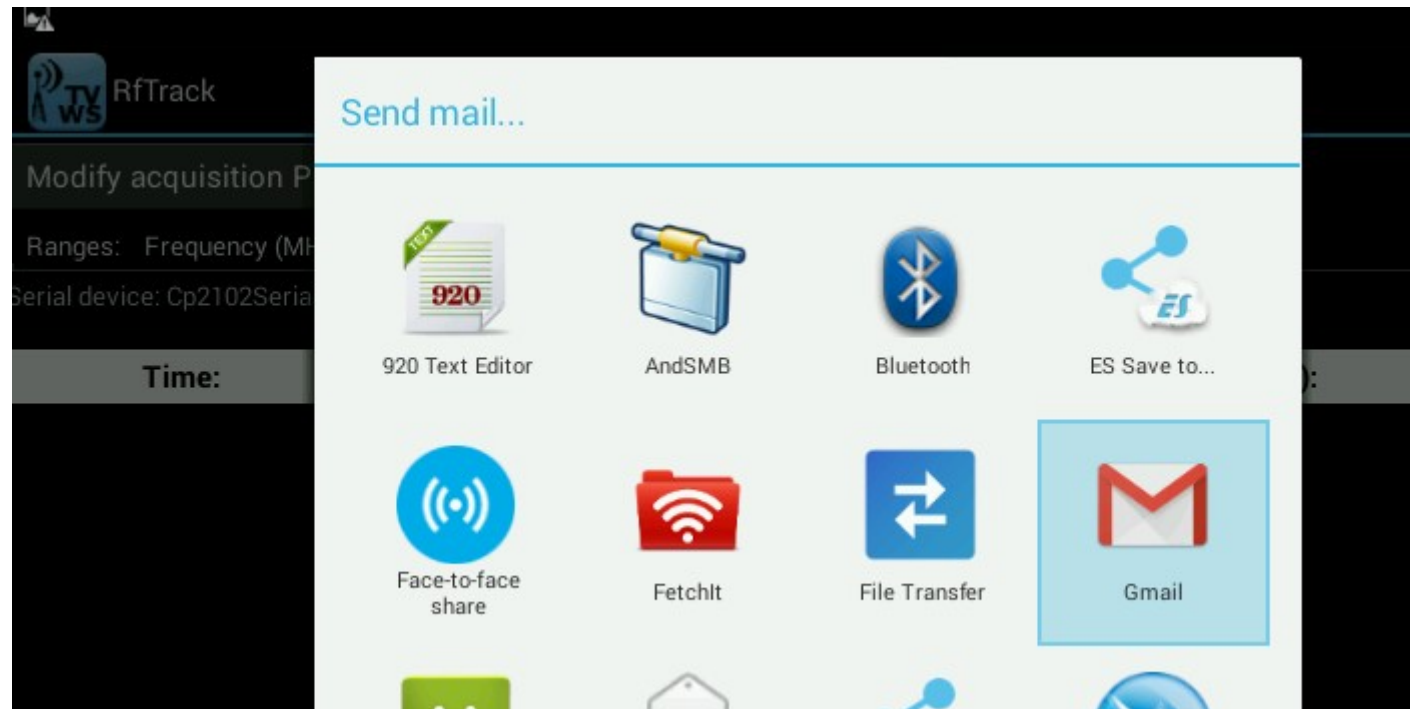
Appears the list of campaign actually stored.

Select and click the campaign from the list



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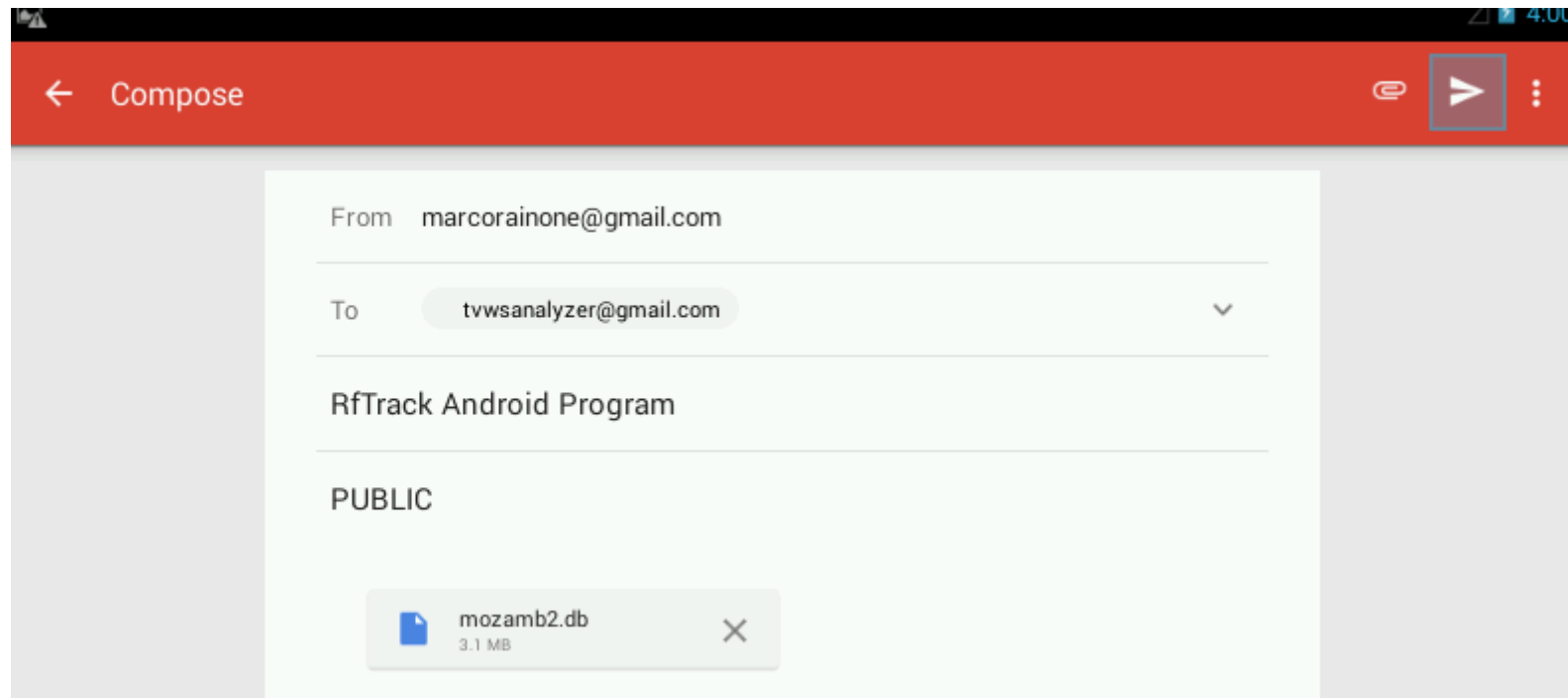
appears the list of possible mail clients that can be used to send the email



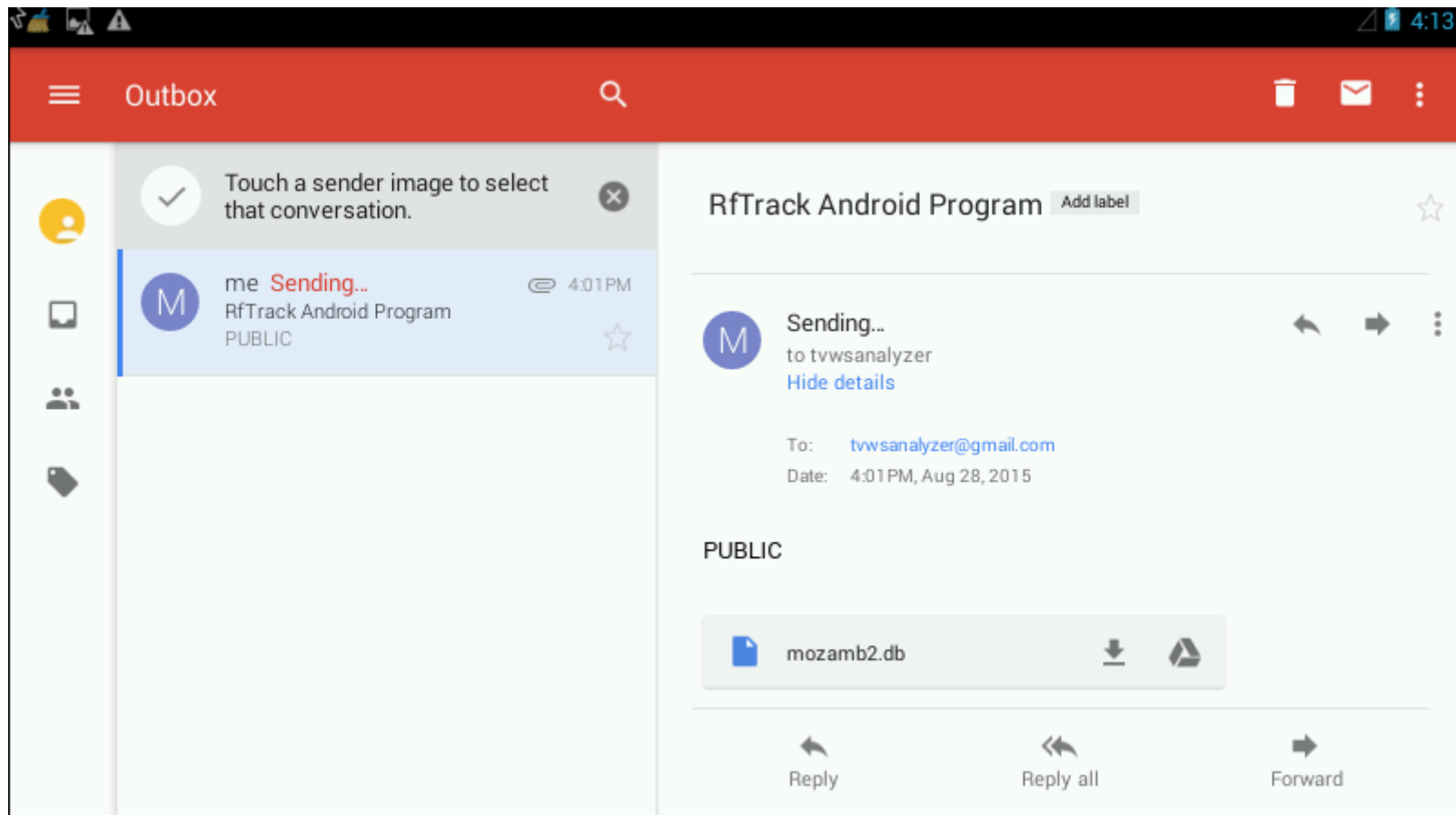
for example, choose Gmail

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in gmail the email looks completely filled



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A script in the remote server processes the database and write a report.

You can find the report in a directory with the same name of the database:

For example, you can find at address:

<http://wireless.ictp.it/tvws/campaigns/mozamb9/>

the report for the database mozamb9.db sent from an Android Unit.

RfTrack: Android APP developed to monitor TVWS frequencies

White Space analyzer

Measurements carried out with **RfTrack** over the specified frequency range and antenna. Remember that most TV signals are vertically polarized.
The received signal level measured in dBm is dependent on the antenna gain and orientation.

Spectrum Maps

The first image shows power levels over time (number of measurements), the following images show different thresholds of spectrum occupancy.

