



Budapesti Műszaki és Gazdaságtudományi Egyetem
Villamosmérnöki és Informatikai Kar

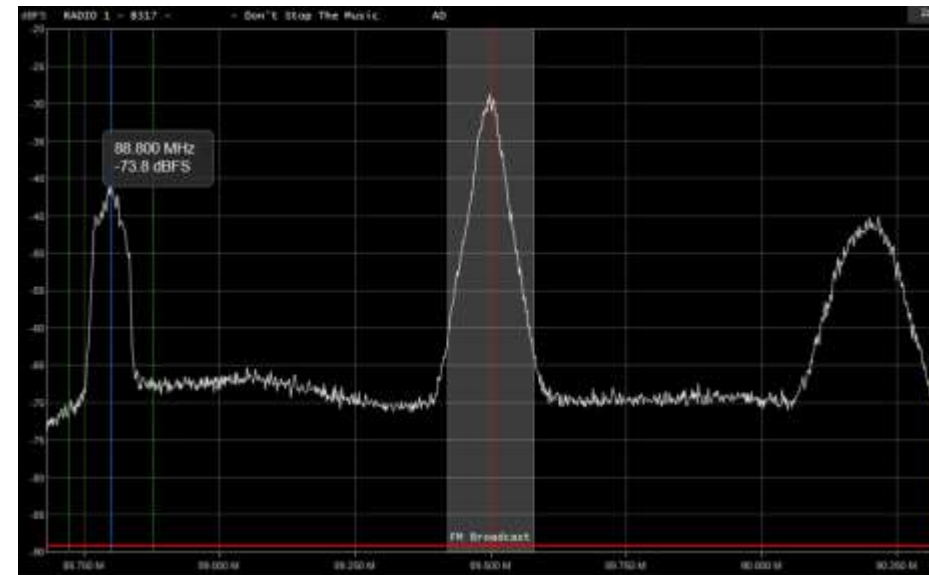
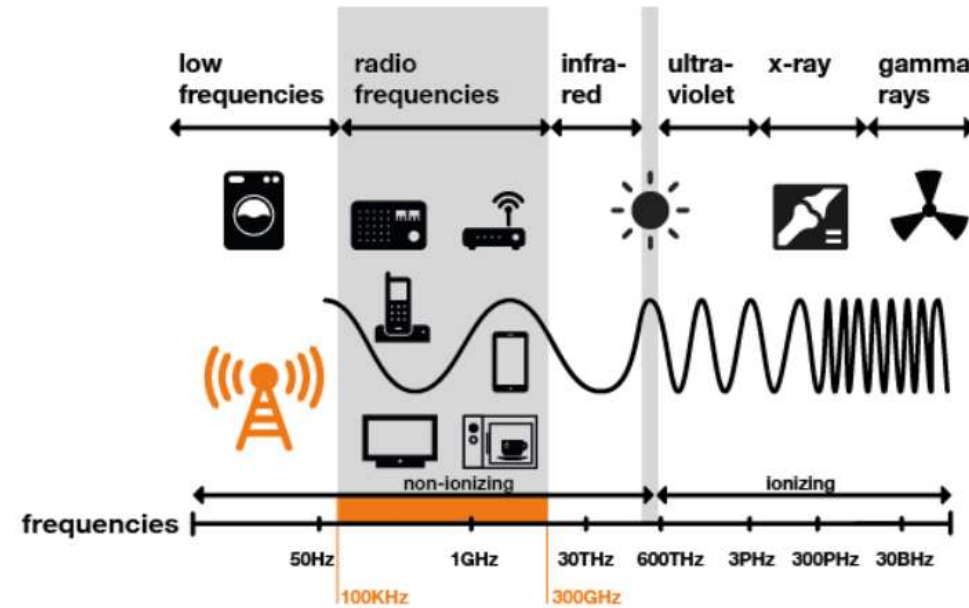


Information
processing based on
complex envelopes
on an SDR platform



Outline

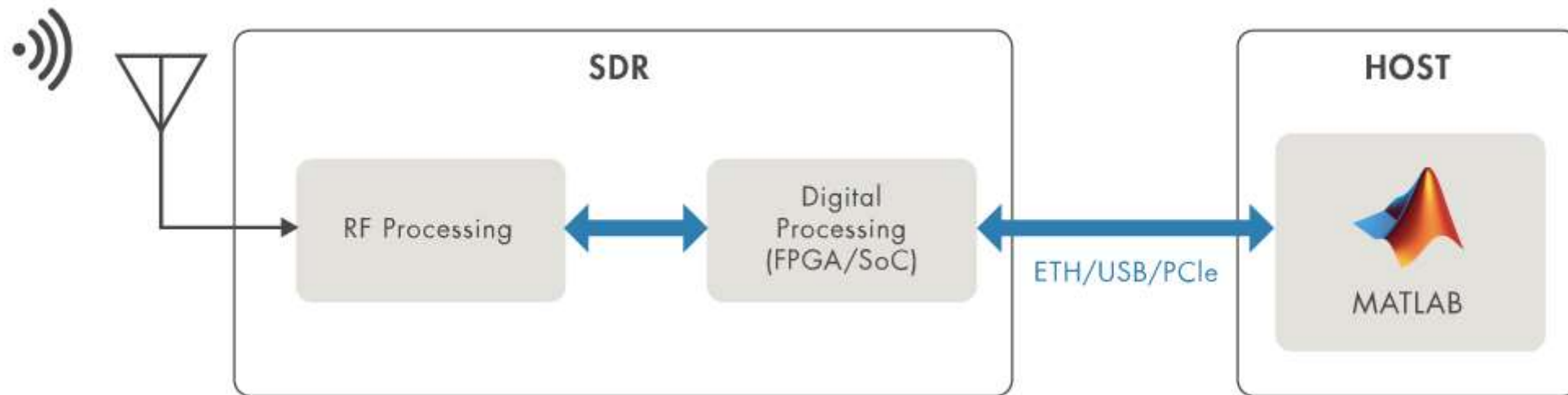
- Wireless comm
- SDR basics
- Cognitive radio features
 - Automatic free-band recognition





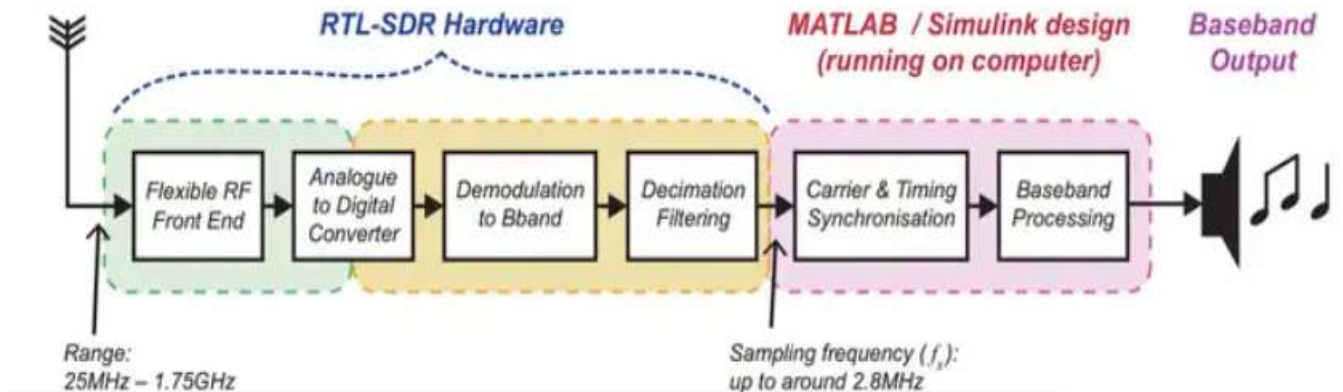
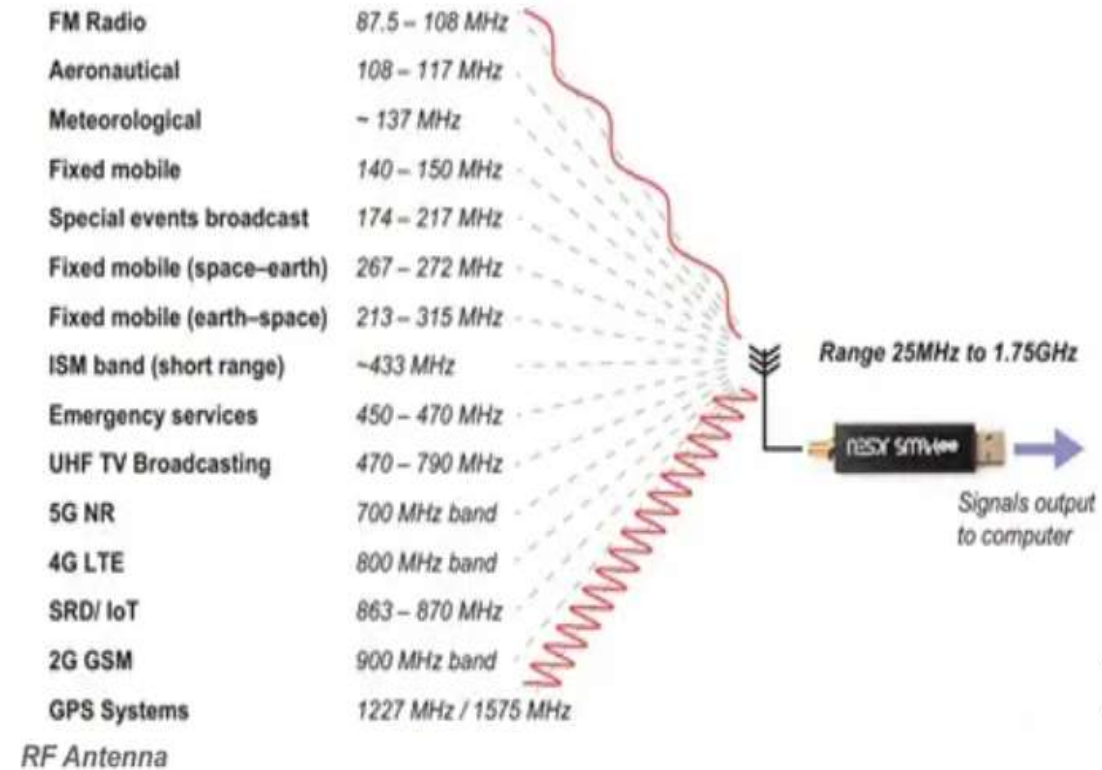
Software Defined Radio

- hardware units + application software
- Multi-mode, Multi-function, Multi-frequency
- Band, protocol and function update



SDR platform

- Dongle - RTLSDR
- Range 25MHz to 1.75GHz



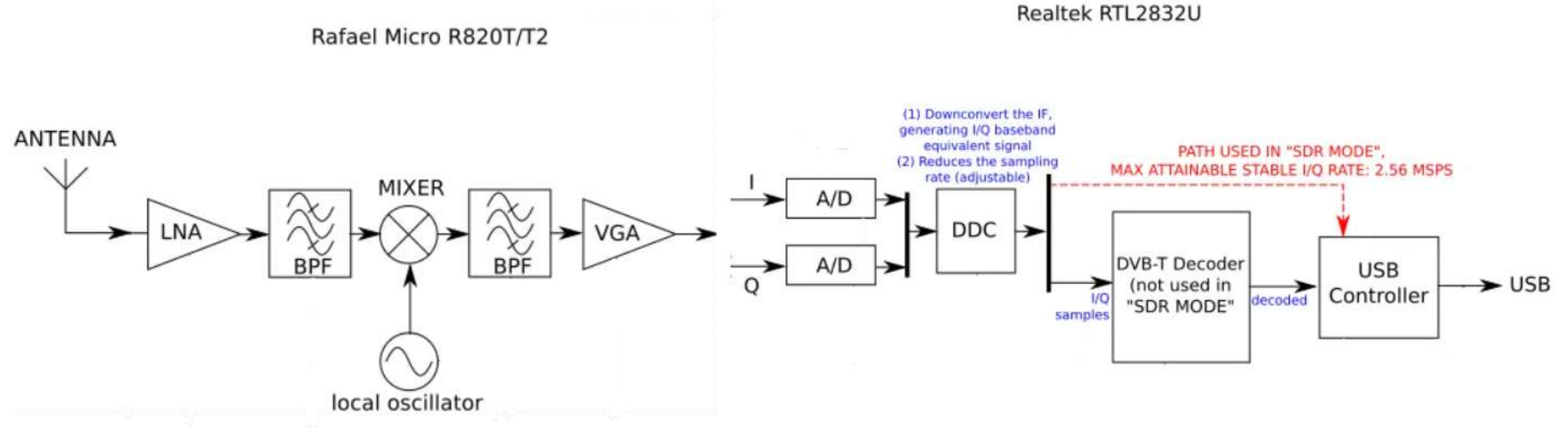


SDR Dongle

- R820T2 & RTL 2832U



Realtek RTL2832U



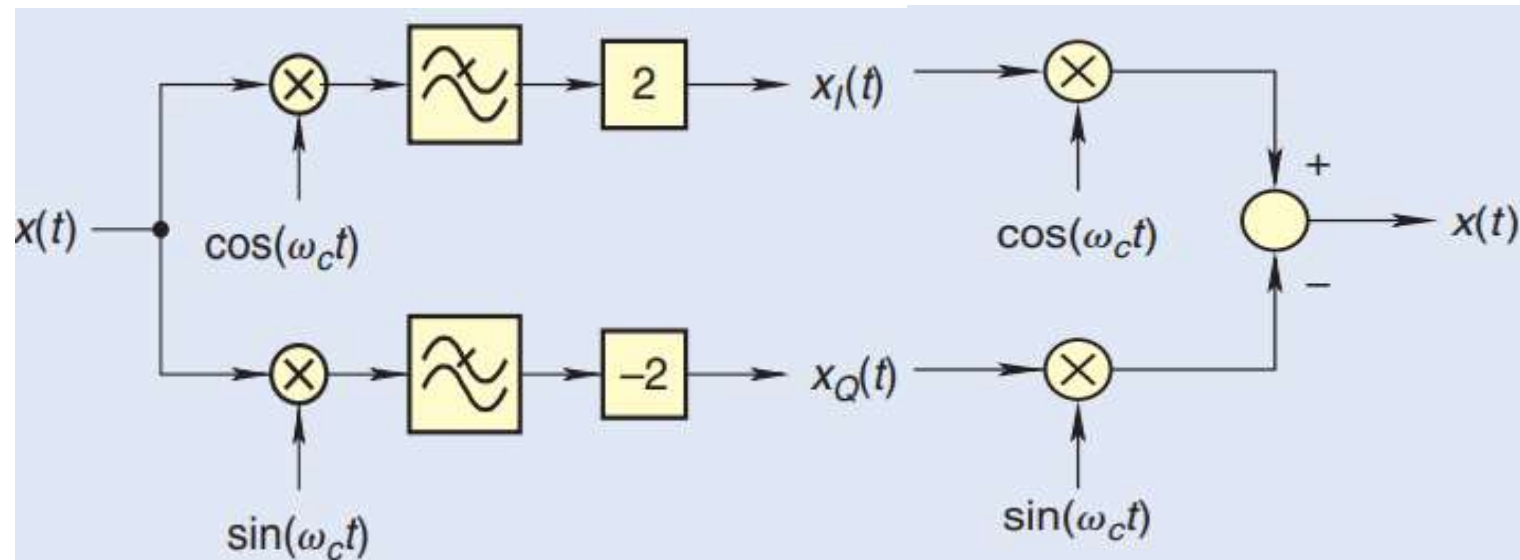


Complex Envelope Representations of Signals

- Complex Envelope
- Generation of Complex Envelope
- Reconstruction of RF Bandpass Signal

Generation of complex envelope

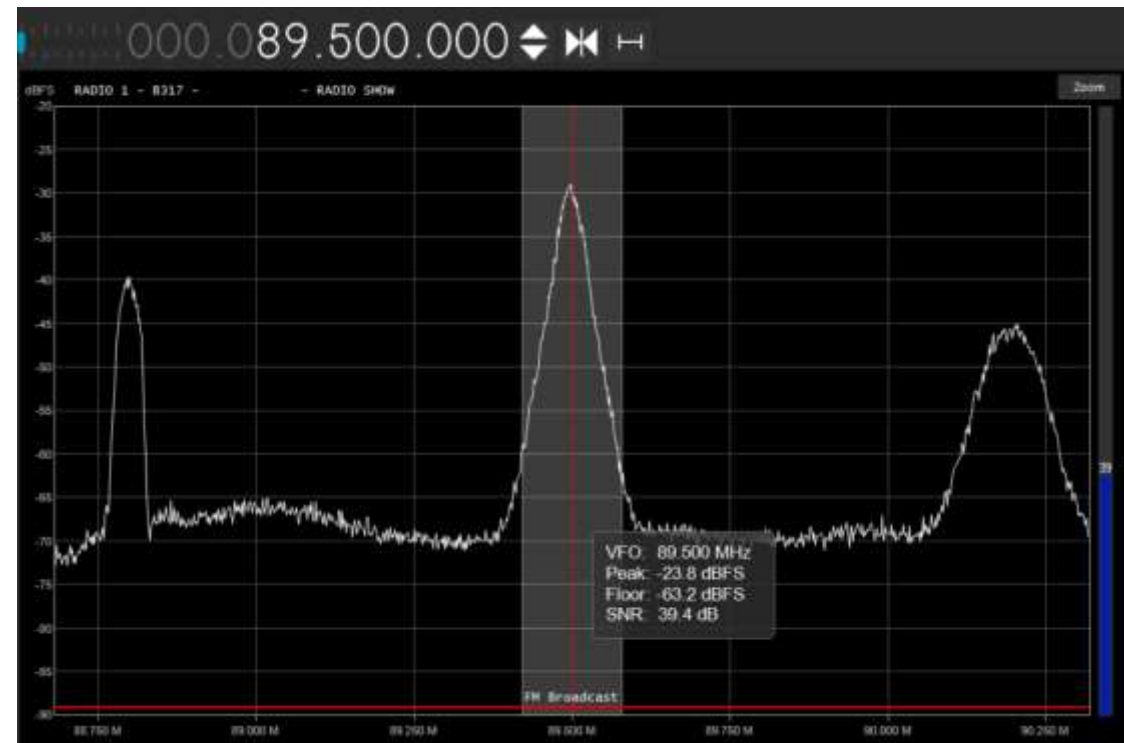
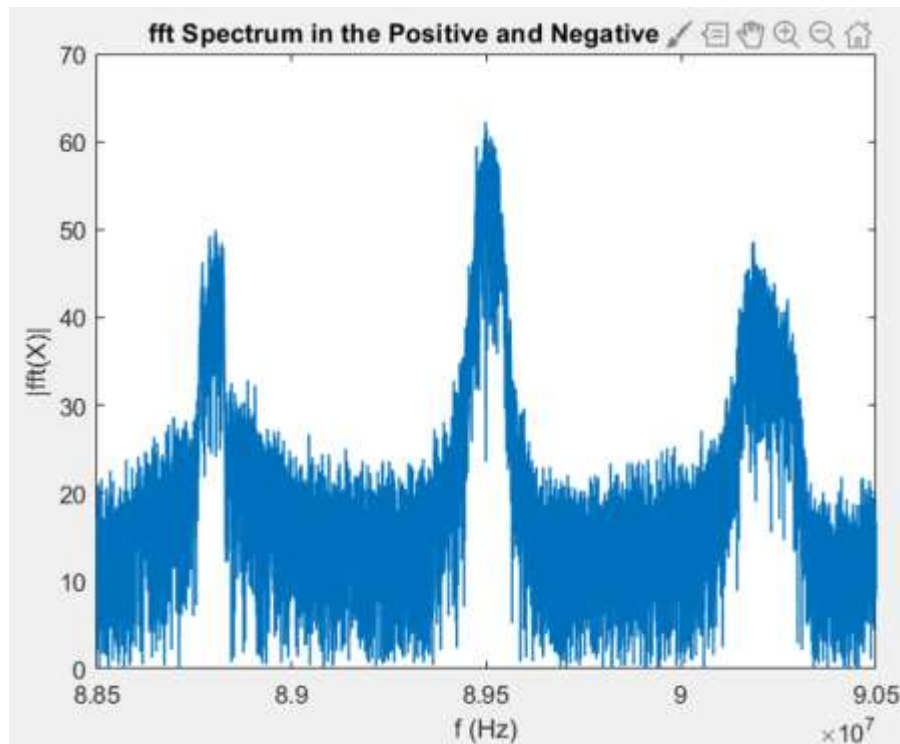
Reconstruction of RF bandpass signal





Perform spectrum measurement

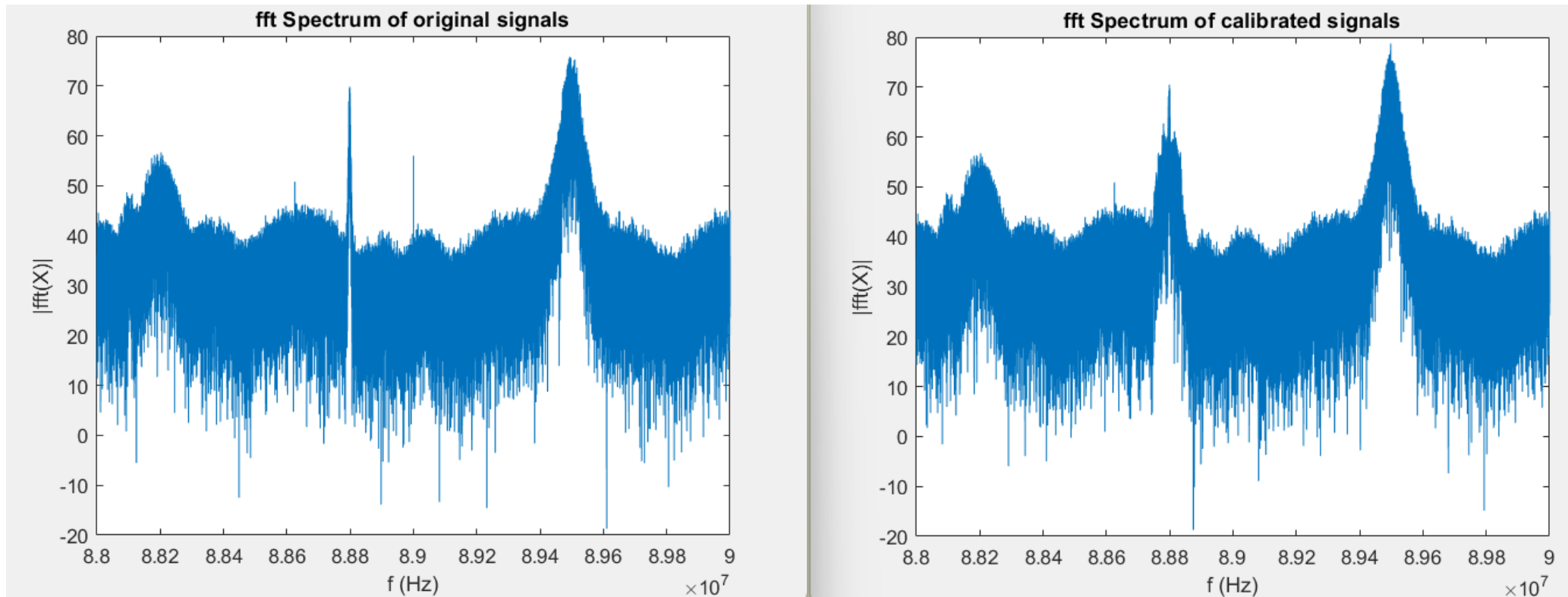
- SDRsharp is used as a reference (see right picture)





Measurement calibration

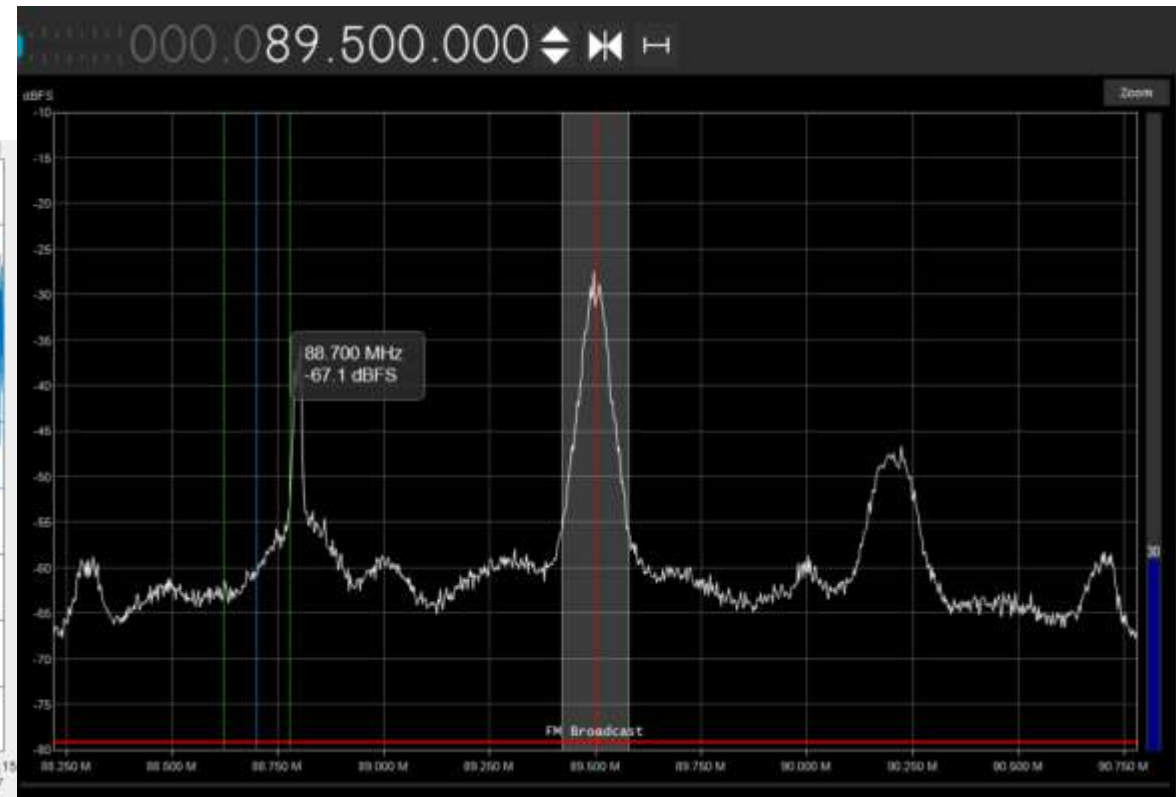
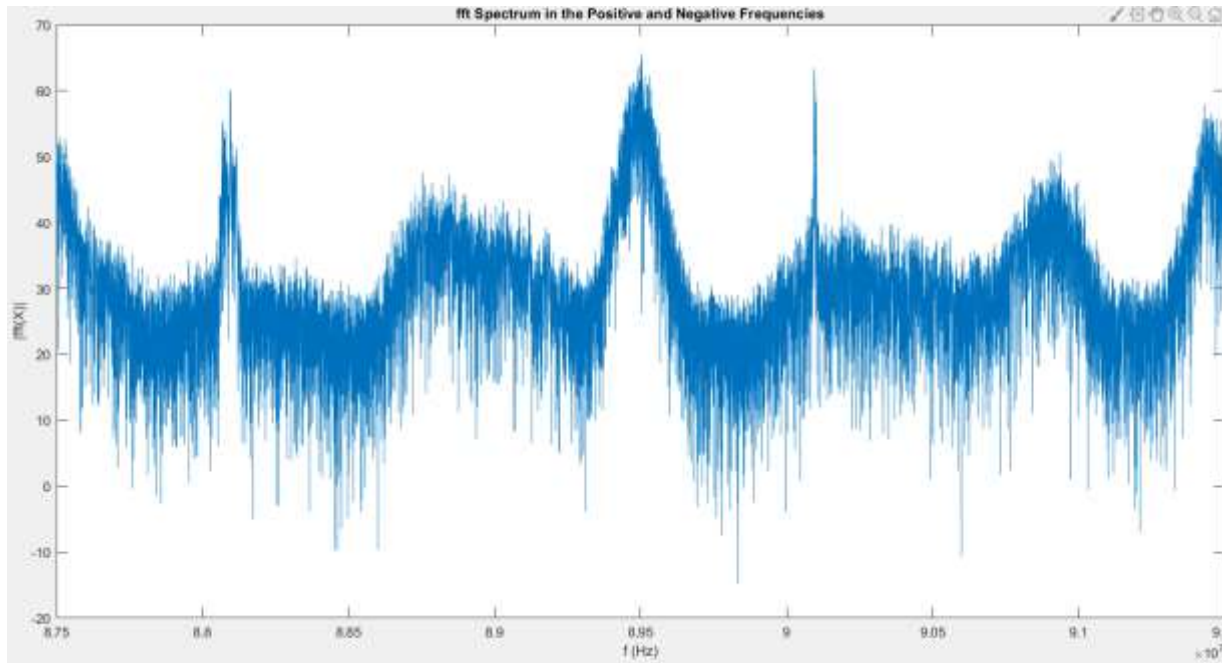
- Eliminate DC offset





SDR bandwidth limitation – an “extension”

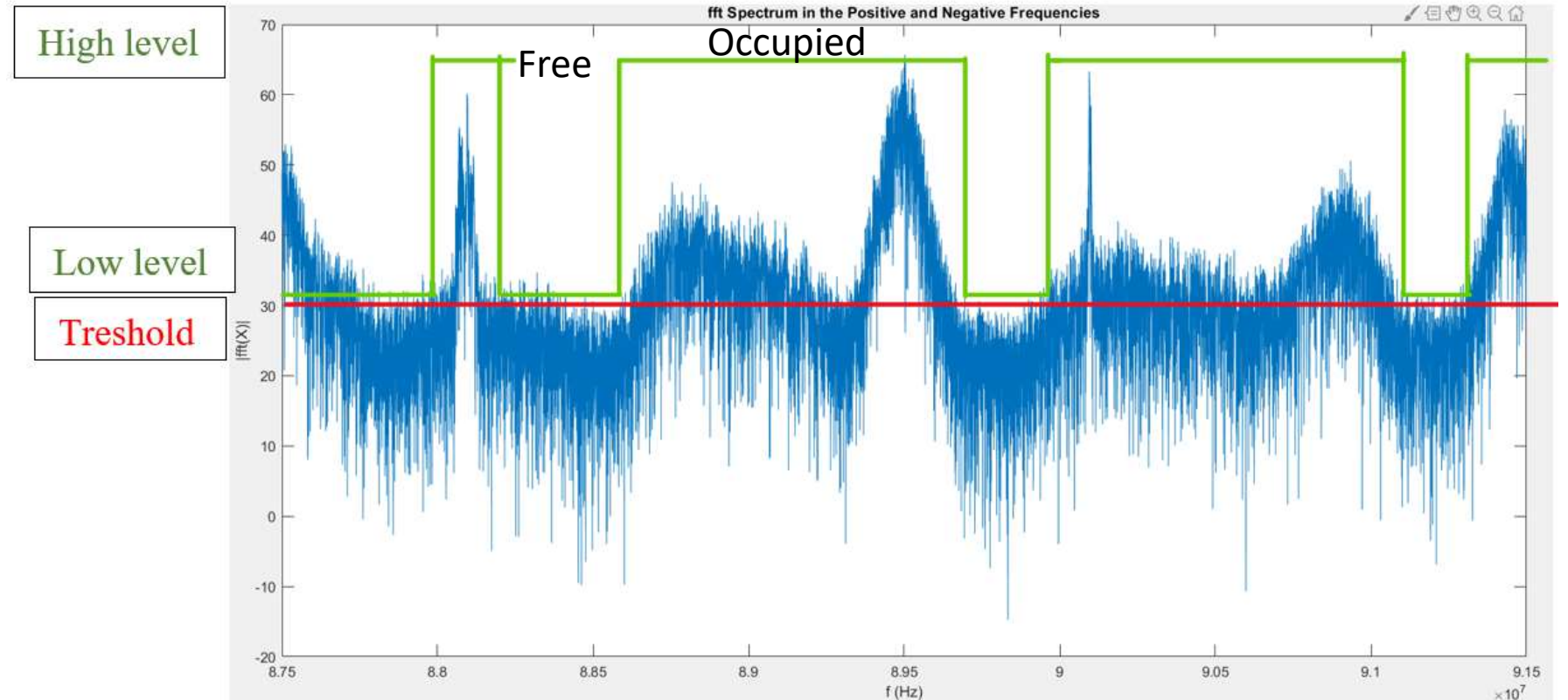
- Bandwidth limitation of SDR: 2MHz
- Measurement of multiple spectrum





Spectral mask of free bands

- Determination of
 - Threshold
 - Occupied CH
 - Free CH
- Input param.:
 - Required BW
- Output:
 - List of free channels with center freq. and BW





Log and evaluation

- Generation of a txt file or Excel to store information of the spectrum

Channel #	BW requirement	BW actual	Center Frequency (MHz)
1	1MHz	1MHz	98
2		1.5MHz	85
3		1MHz	96
...		...	...

Thank you!

