



Using DVB-T sticks as Wideband SDR Receivers

Mike G4KXQ

SDR Hardware

FlexRadio £4,000-5,000

FLEX-6700 SDR



FLEX-6700 Signature Series SDR

FLEX-6500 SDR

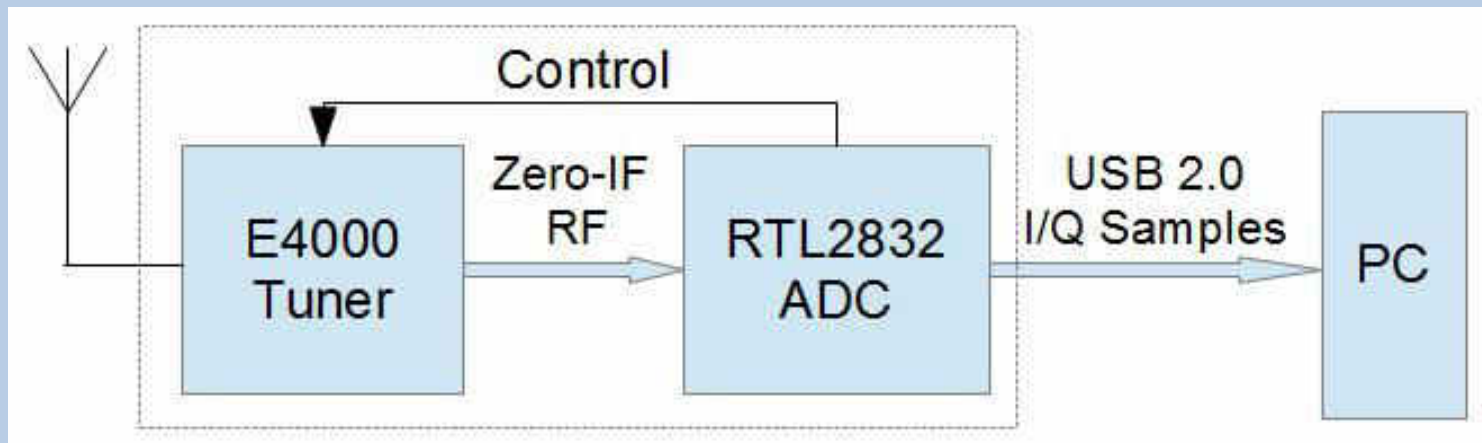
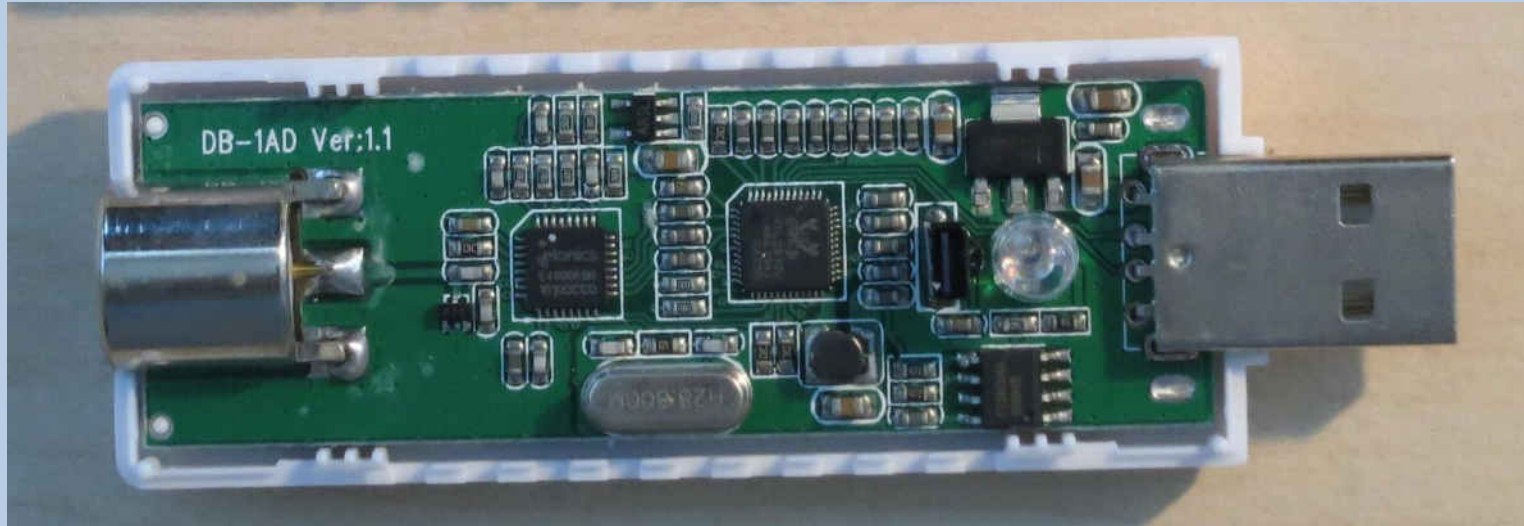


FLEX-6500 Signature Series SDR

RTL 2832U / R820T dongle
SMA adapter £7.95



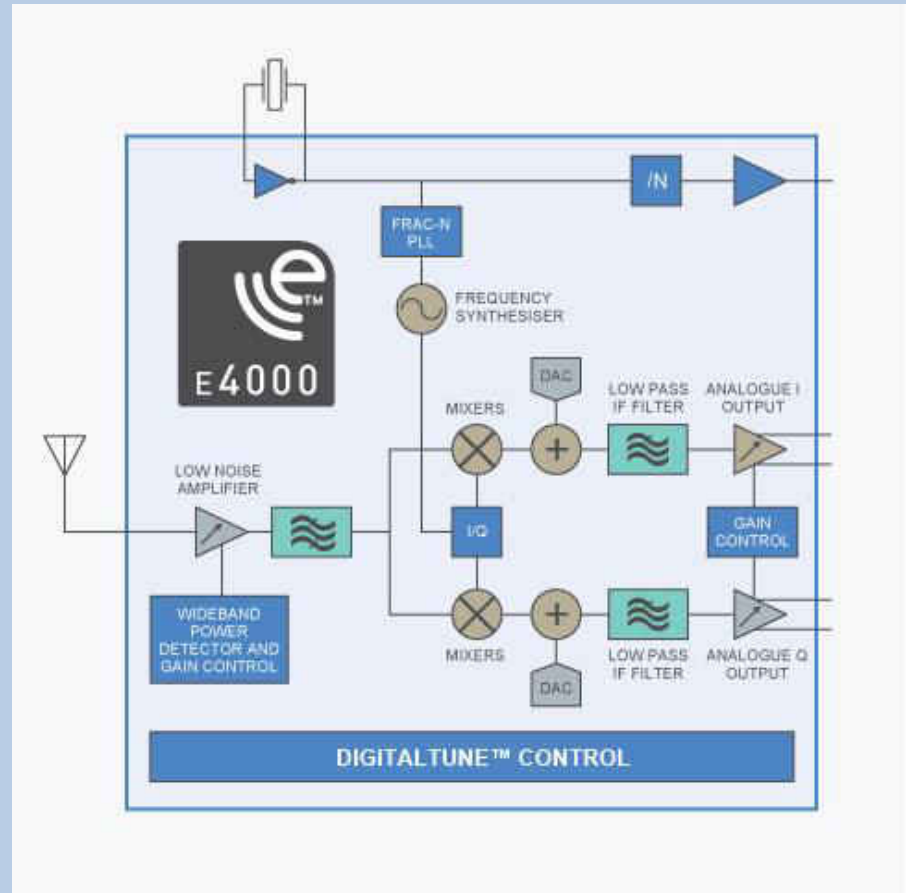
Architecture



I smell very cheap poor man's software radio here :) – Antti Palosaari

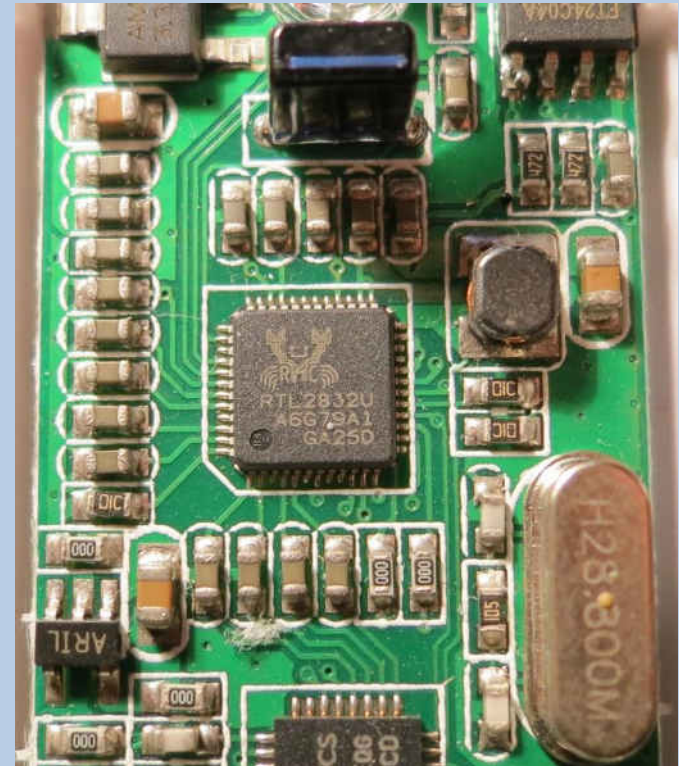
E4000 Tuner

- 50-2200MHz
Gap at 1100-1250MHz
- Tunable CMOS
Bandpass filter
- Zero-IF I/Q output



RTL2832 ADC

- DVB-T Demodulator
- Also contains 8-bit ADC at up to 3.2Msps
 - Designed for WFM, DAB.
- Est. 48dB Dynamic Range



WIDEBAND VHF/UHF RECEIVER

- FRG9600

VHF-UHF receiver covers from 60 to 905 MHz in the following modes: AM, AM-W, FM-W, FM-N, USB and LSB



- RTL-SDR

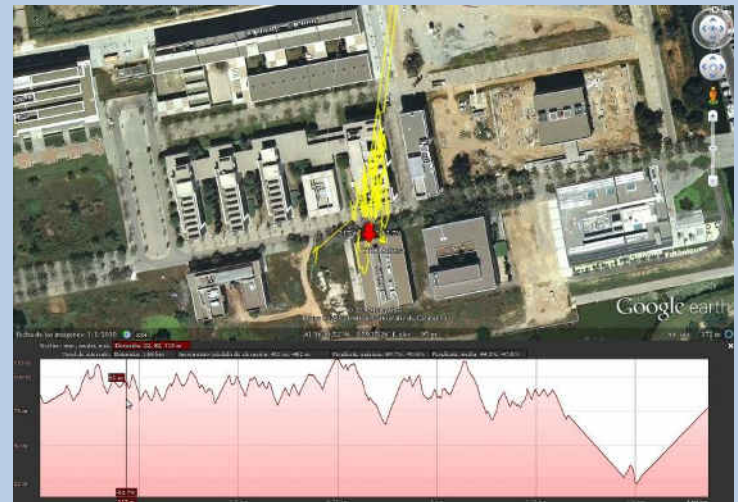
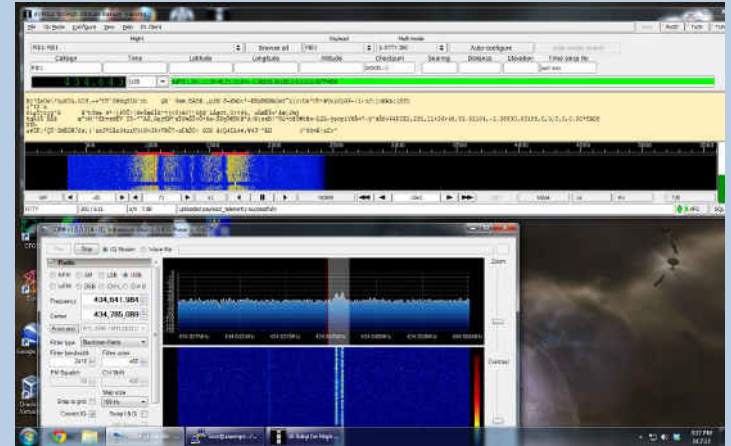
Frequency range :22-2200 MHz

Mode dependant on SDR Software Used



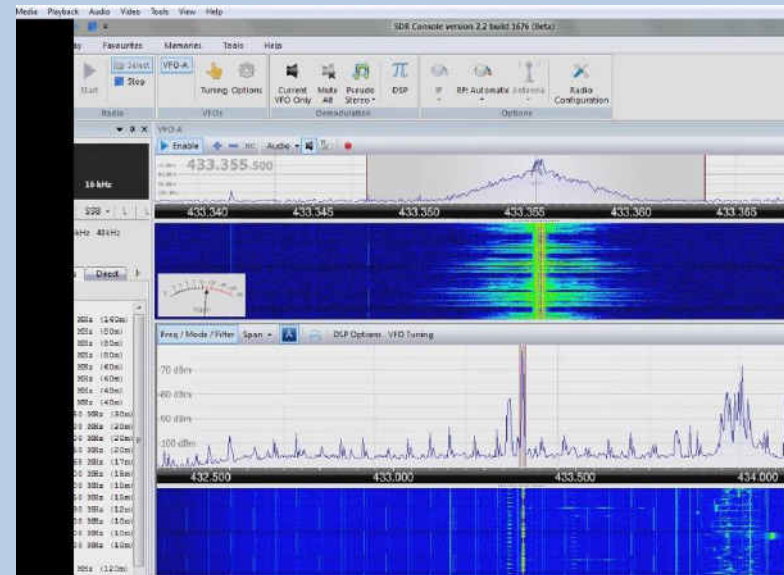
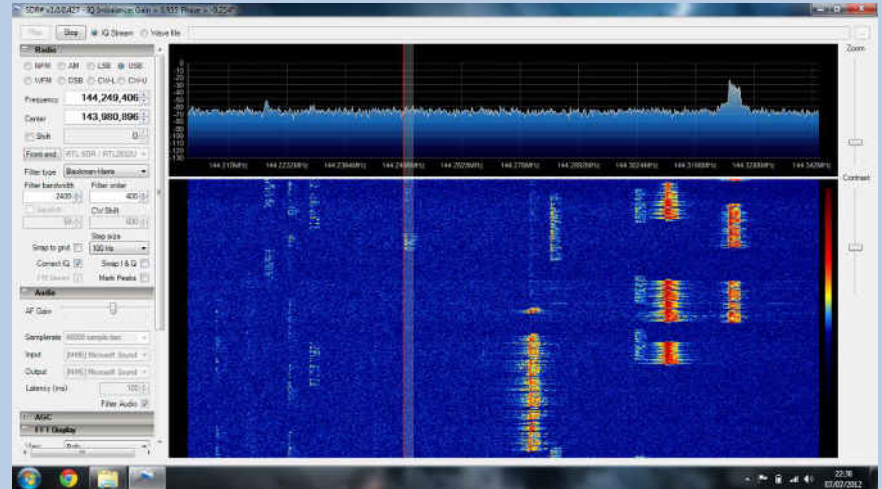
Potential Uses

- WFM, NFM, SSB, TETRA, ...
- Wider Bandwidth stuff
 - ADS-B, GSM, LTE, GPS, ...
- Yes, even GPS!

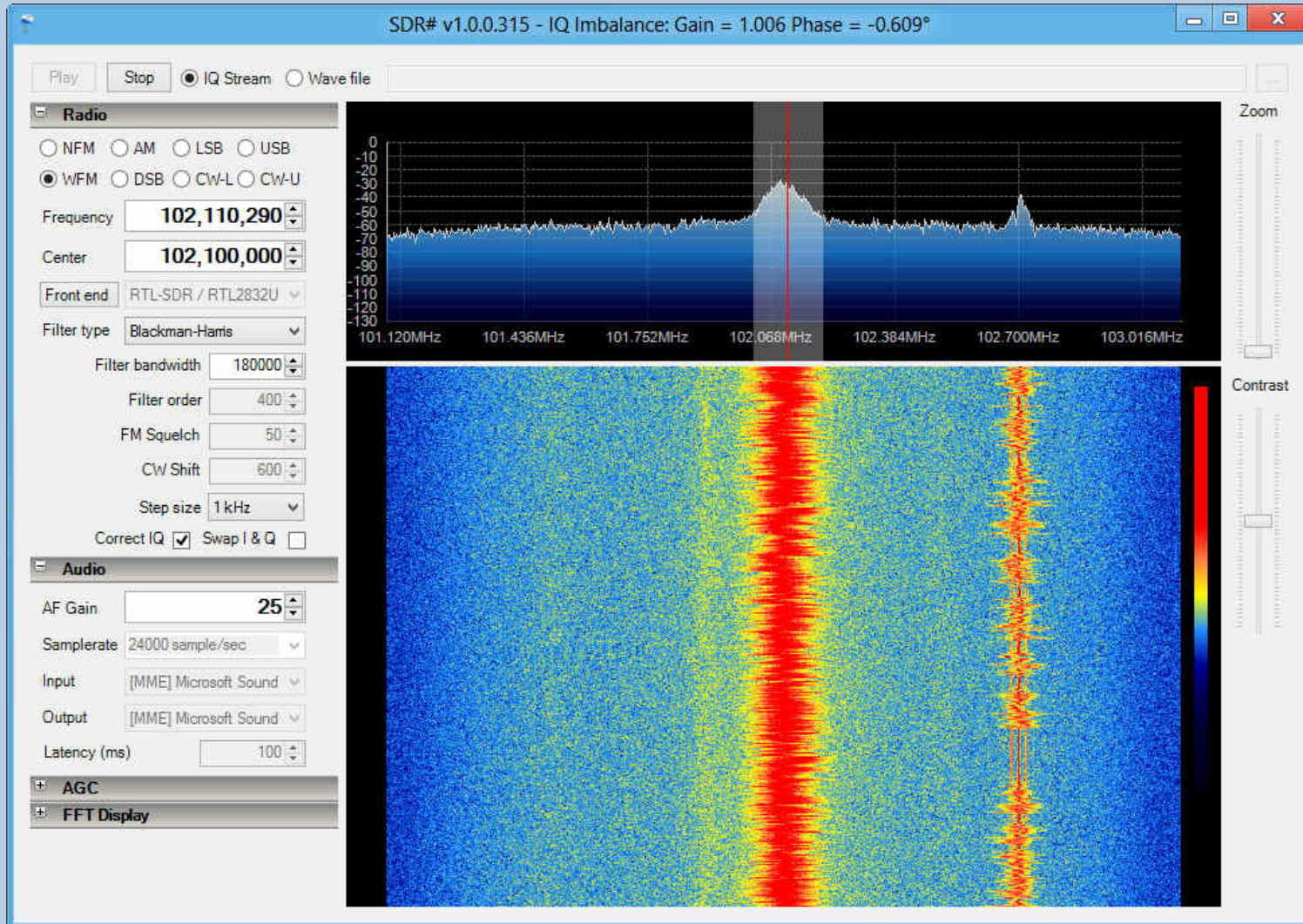


Software

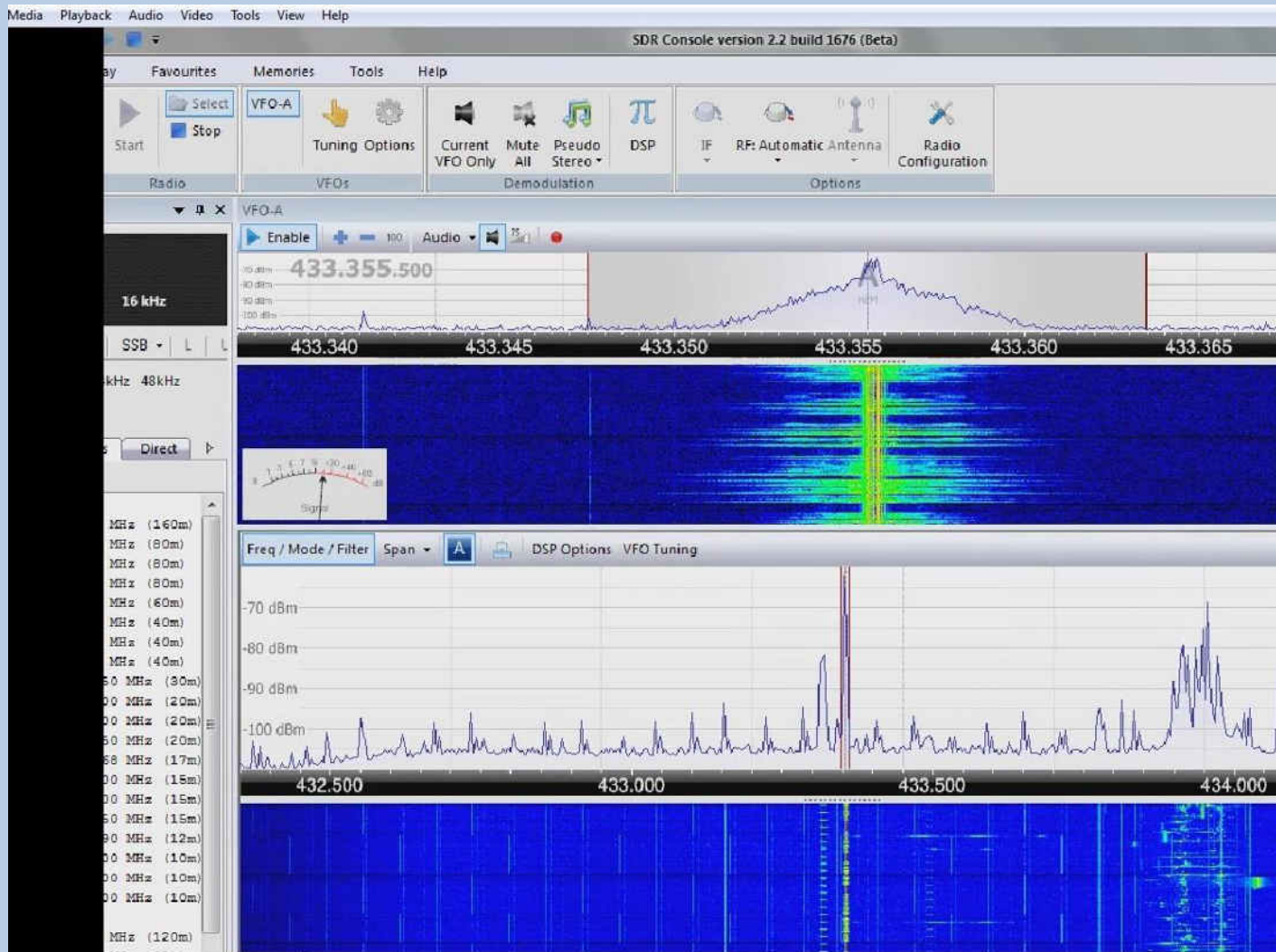
- Windows
 - Zadig for drivers
 - SDR # (SDR Sharp)
 - SDR-RADIO



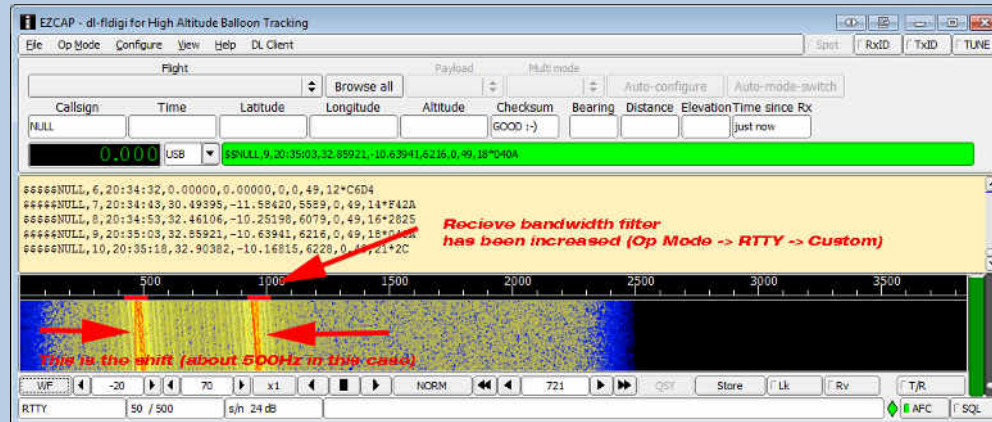
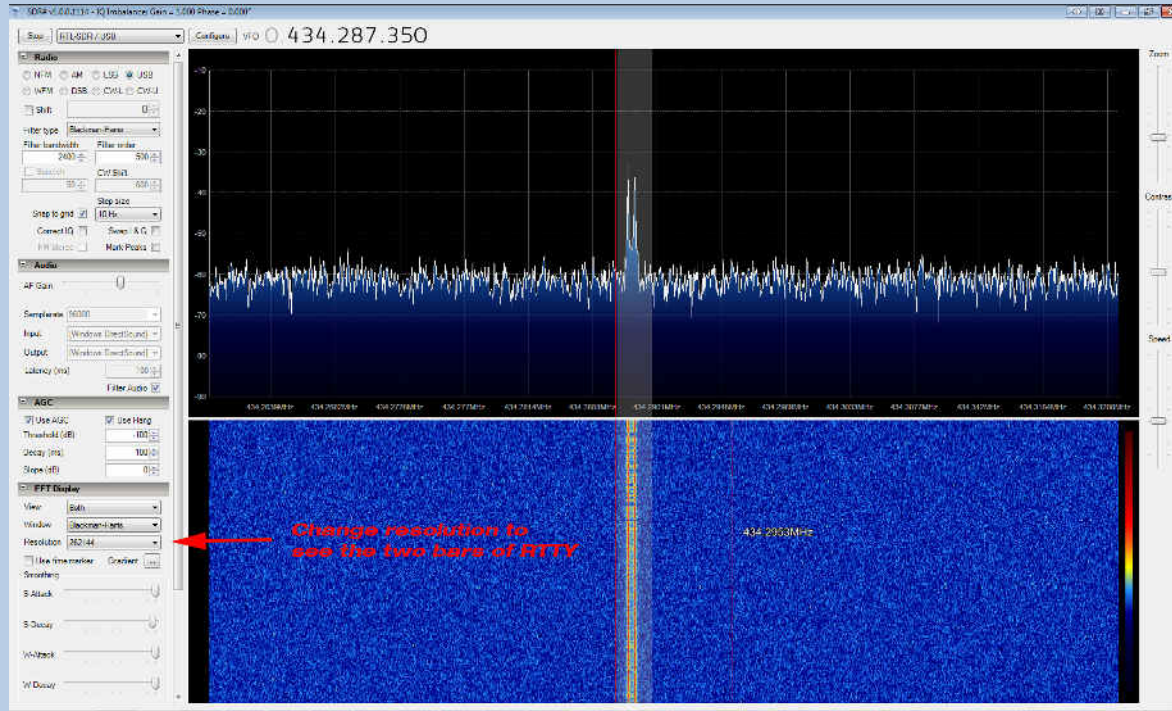
VHF FM Broadcast



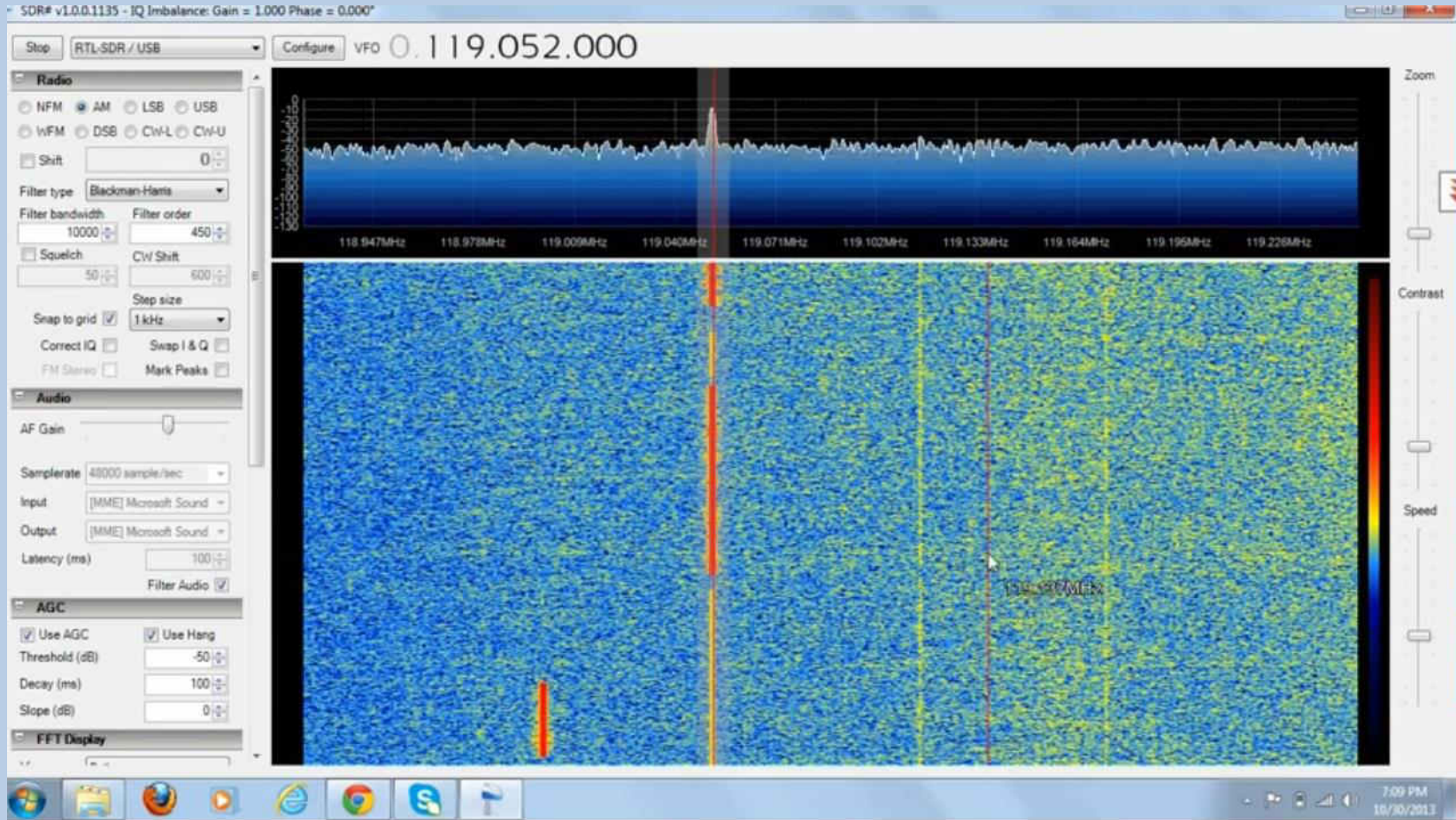
6M/4M/2M/70CM RECEIVER



HIGH ALTITUDE BALLON TRACKING



AIRBAND SCANNER

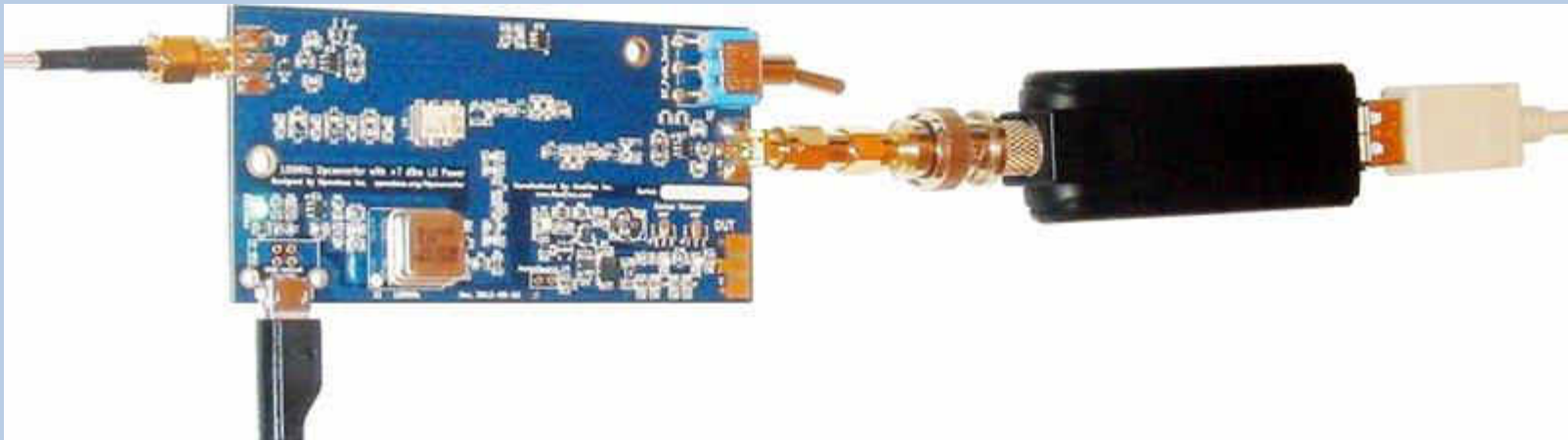


RECEIVE WEATHER SATELLITE PICTURES



HF OPERATION USING UP- CONVERTERS

- Using a HF Up-Converter 0-30Mhz translates to 100 – 130Mhz with 2Mhz Bandwidth.



ADS-B RECEIVERS @ 1090Mhz

RTL1090 Receiver Software + ADBS SCOPE

Using ADBS SCOPE, you can see a radar-like display of all those aircraft around you that are transmitting the appropriate digital messages including ACARS and ADS-B

The screenshot displays the ADBS SCOPE software interface. The main window shows a map of Europe with several aircraft tracks and labels. The interface includes a menu bar (File, View, Colors, Load Maps, Config, Navigation, other, decoder), a toolbar, and a status bar at the bottom. The status bar shows the time as 13:58 on 15/06/2014.

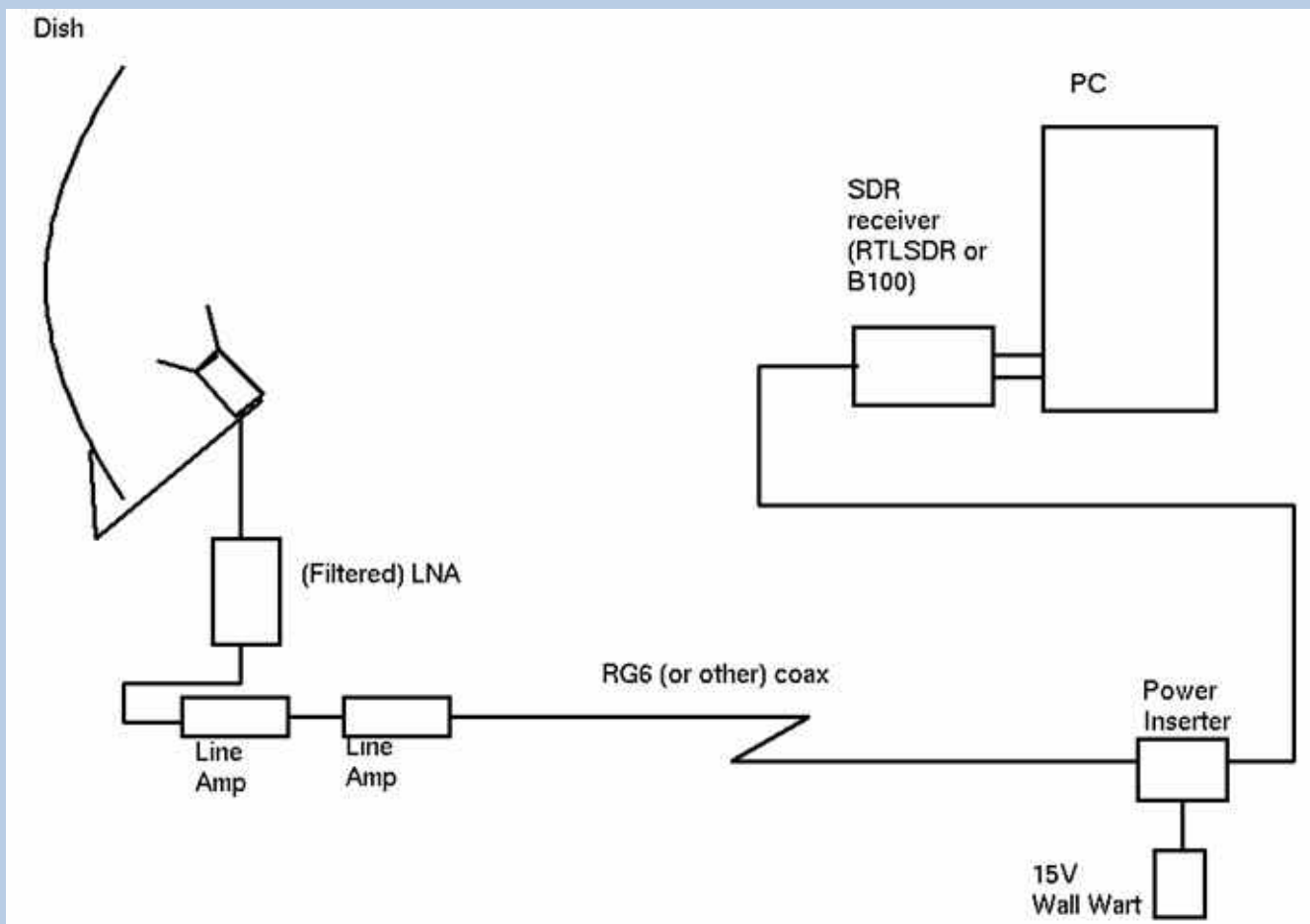
The data table on the right side of the interface lists the following aircraft:

Nr.	ICAO24	Regist.	Ident	Alt	Lat	Long	Speed	Head	Climb	Type	T-out
17	4CA362	EI-GSM	SIGSM	4600						CL02	3
16	4CA042	EI-ELA		38000			400	350		A333	59 M
15	400846	G-CELJ	EX935FE	34000	51.44	-3.79	361	12		B733	193 M
14	4009DF	G-OOBE	70M3FP	25700	51.09	-3.36	341	358	-1984	B752	287 M
5	406A59	UK	EX935SK	33000	51.14	-3.37	332	6			234 M
4	40628D	G-OTEC								SIDA	75 M
3	A54368	USA		14475							172 M
2	4CA214	EI-DEE	EIM73M	36000	51.17	-4.45	392	336		A320	2
1	4068B6	UK	MON581	36000							2
0	406782	G-EZNA		23480						A320	3

The bottom right corner of the interface shows the following information:

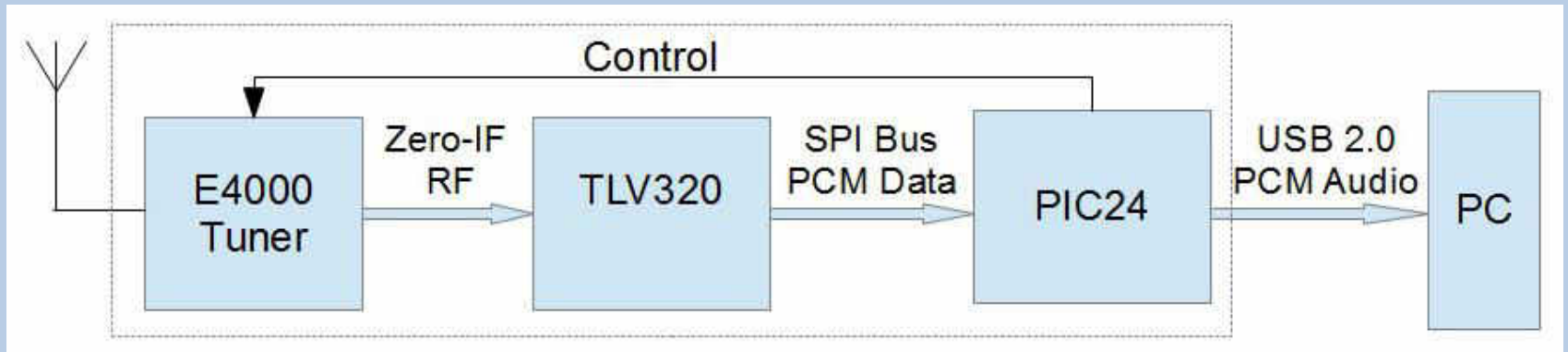
- U-signal =
- U-ref =
- Stohr =
- Frames/s: 165 Frames/Avk [50]
- Data Quality: 100 %
- Time: 13:58:26

BUDGET RADIO ASTRONOMY

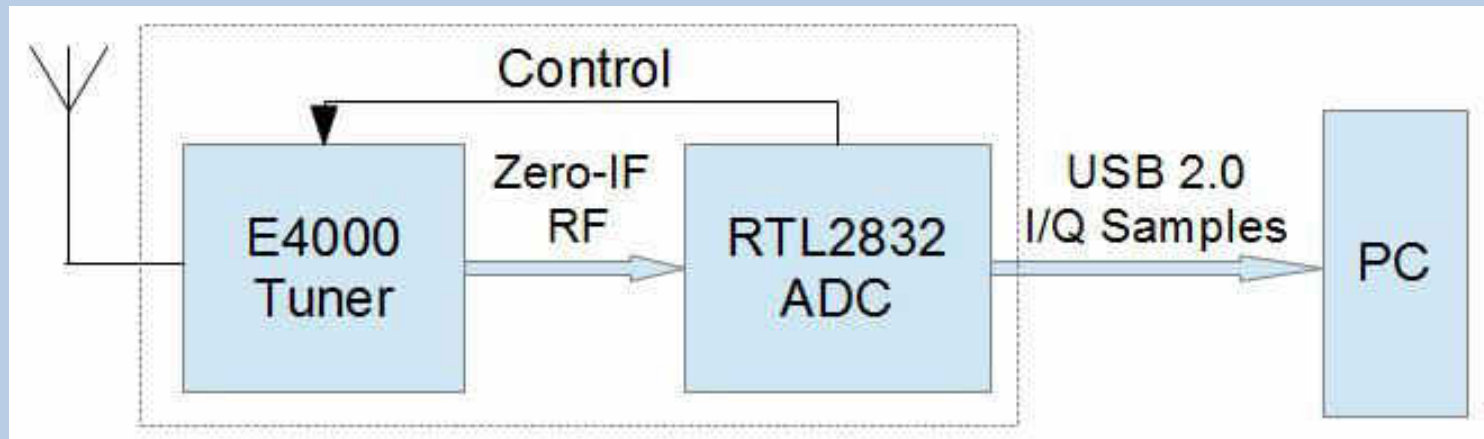


Vs Funcube Dongle

Funcube Dongle Pro



RTL-SDR TV Dongle



Vs Funcube Dongle (Specs)

	FCD Pro +	RTL-SDR (E4000)
Bandwidth	192KHz	3.2 MHz
ADC Resolution	24 bits (~20 actual)	8 bits (~7 actual)
Dynamic Range	~120dB	~42dB
XTAL Accuracy	0.5ppm TCXO	~200ppm
Cost	£125	~£10

Where next for SDR?

- Appearing in a shack near you.
- Baofeng UV-5R.



- Elecraft KX-3



Questions?