

# Low-cost Software Defined Radio

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# What do you get?

- ▶ Low-cost hardware + free software = low-cost software defined receiver
- ▶ VHF/UHF receiver with  $> 1$  MHz bandwidth
  - AM/FM/SSB/CW capability
- ▶ Spectrum display
  - “cheap spectrum analyzer”
- ▶ An interface to other software decoders
  - Pager, satellite, land mobile radio, etc.
  - Examples on YouTube.com
- ▶ Remote control over TCP connection

# Typical DVB-T Tuner Product



The part you need...



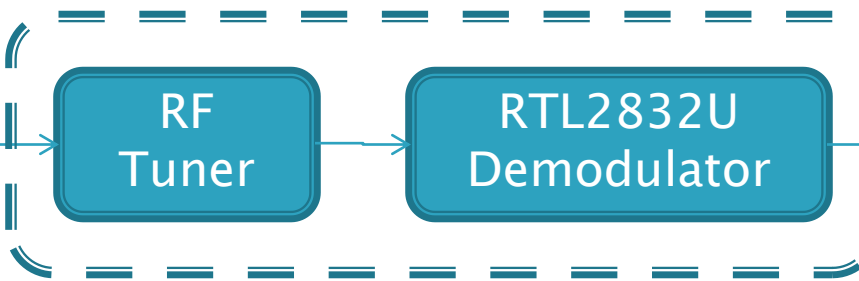
All this, for around \$25...

# The RTL-SDR Hardware

- ▶ Adapted from the European DVB-T market
  - Digital video broadcast-terrestrial
- ▶ Unique “trick” employed to repurpose the receiver
  - Put the device into a test mode
  - Bypass the television-related processing
  - Direct the I/Q samples to the SDR software
- ▶ The “secret” is to look for receivers with the **Realtek RTL2832U** demodulator chip

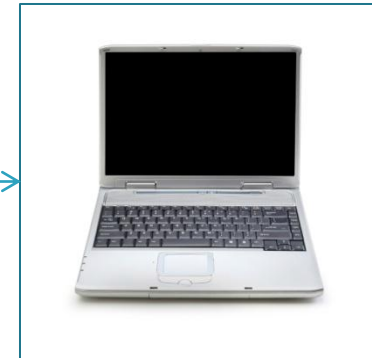
# Functional Block Diagram

Antenna



DVB-T tuner

USB Interface



Computer with  
signal  
processing  
software

PAL Connector Interface

- PAL to F adapter +
- F to BNC adapter
- Or
- PAL to BNC adapter

# RTL2832U

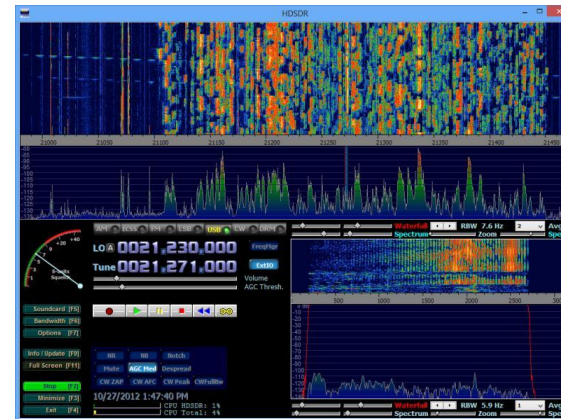
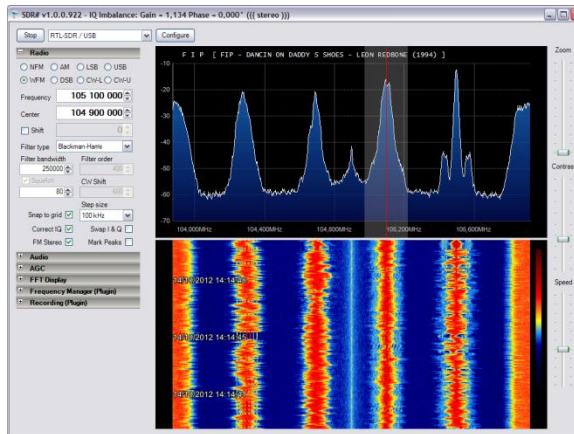
- ▶ The RTL2832U is a high-performance DVB-T COFDM demodulator that supports a USB 2.0 interface
- ▶ The RTL2832U outputs **8-bit I/Q-samples**, and the highest theoretically possible sample-rate is 3.2 MS/s, however, the highest sample-rate without lost samples that has been tested so far is **2.8 MS/s**

# RF Tuner IC

- ▶ Two commonly available parts:
  - Elonics E4000
    - 52 – 2200 MHz with a gap from 1100 MHz to 1250 MHz (varies)
  - Fitipower FC0013
    - 22 – 1100 MHz
- ▶ A more complete list:
  - <http://sdr.osmocom.org/trac/wiki/rtl-sdr>

# The Software

- ▶ Free software supports the tuners:
  - SDR#
    - <http://sdrsharp.com/>
  - HDSDR
    - <http://www.hdsdr.de/>





# Where to get the software...

- ▶ For Windows computers, get the install package here:
- ▶ <http://rtlsdr.org/softwarewindows>

# Where to get the hardware...

- ▶ Do a web search on
  - “RTL2832U”
  - “RTL2832U and Elonics E4000”
  - “RTL2832U and Fitipower FC0013”
- ▶ Amazon.com
- ▶ Deal Extreme ([www.dx.com](http://www.dx.com))