



## Getting Started with RTL-SDR and SDR-Sharp

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# Overview



Software-defined radio (SDR) is a technique for turning a computer into a radio. But not just an AM/FM radio - by using the computing power on your desktop you can listen and decode a wide variety of broadcasts. SDR can turn your computer into a weather-band receiver, a police/fire report scanner, a music listening station, and more! Instead of manually tuning inductors, its all done in software by chips fast enough to pick up and decode radio waves on the fly

If you've ever been curious about software defined radio (SDR), this USB stick is the easiest way possible to have fun with a powerful, configurable receiver. Packed with the powerful RTL2832U and R820T tuner, it can tune into signals from 24MHz to 1850MHz. That means you can use a computer (with Windows, Mac, or Linux) to tune into: FM Radio, AM signals (but not AM radio), CW (morse code!), unencrypted radio signals (such as those used by many police and fire departments), POCSAG pagers, and more.

In this tutorial we'll show how to get your very first listening adventure underway - listening to FM radio and decoding the RDS/RBDS data signal that is sent along with many FM radio stations as well.

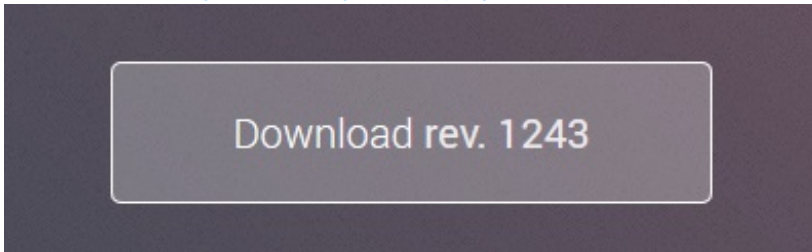
This tutorial is for Windows users only at this time! There's hundreds of tutorials, posts and

projects for a variety of operating systems over at <http://www.rtl-sdr.com/>

# Download & Install Software

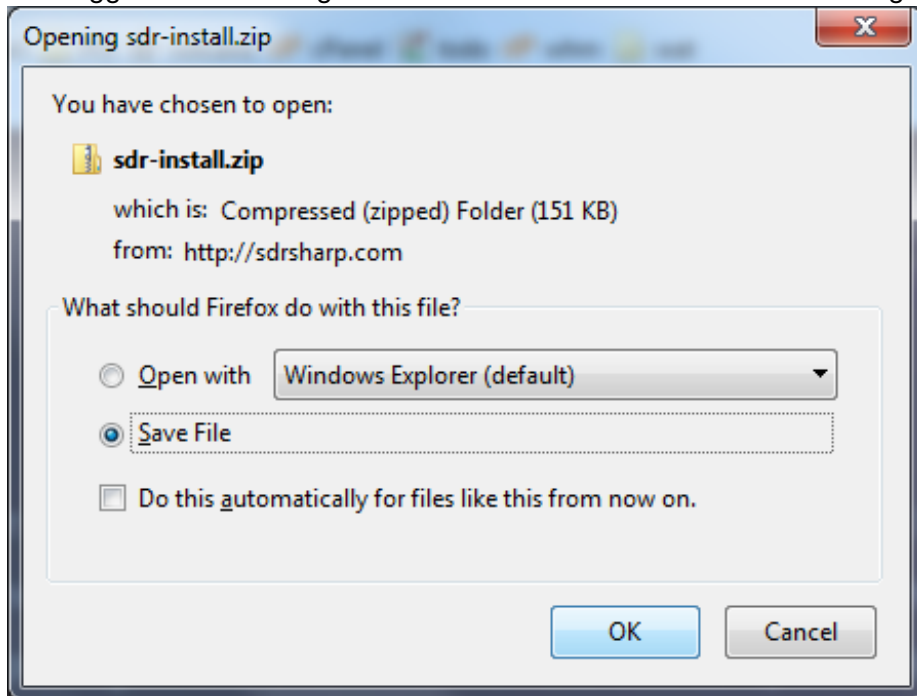


We'll be using the awesome SDR# software for windows, which is really easy to use and very powerful as well! Visit <http://sdrsharp.com/> (<http://adafru.it/dsT>) to download - we're using Rev 1243

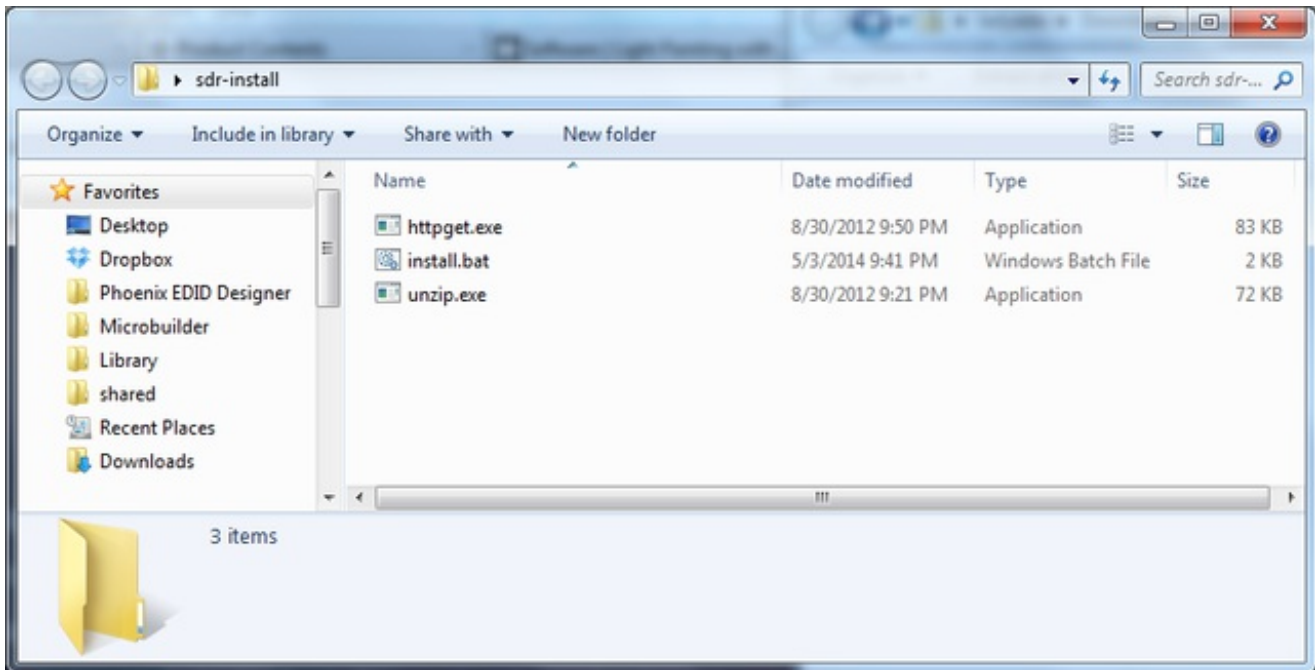


If for some reason the site is down, we have a mirror of the install folder from 5/19/2014 (<http://adafru.it/dsU>)

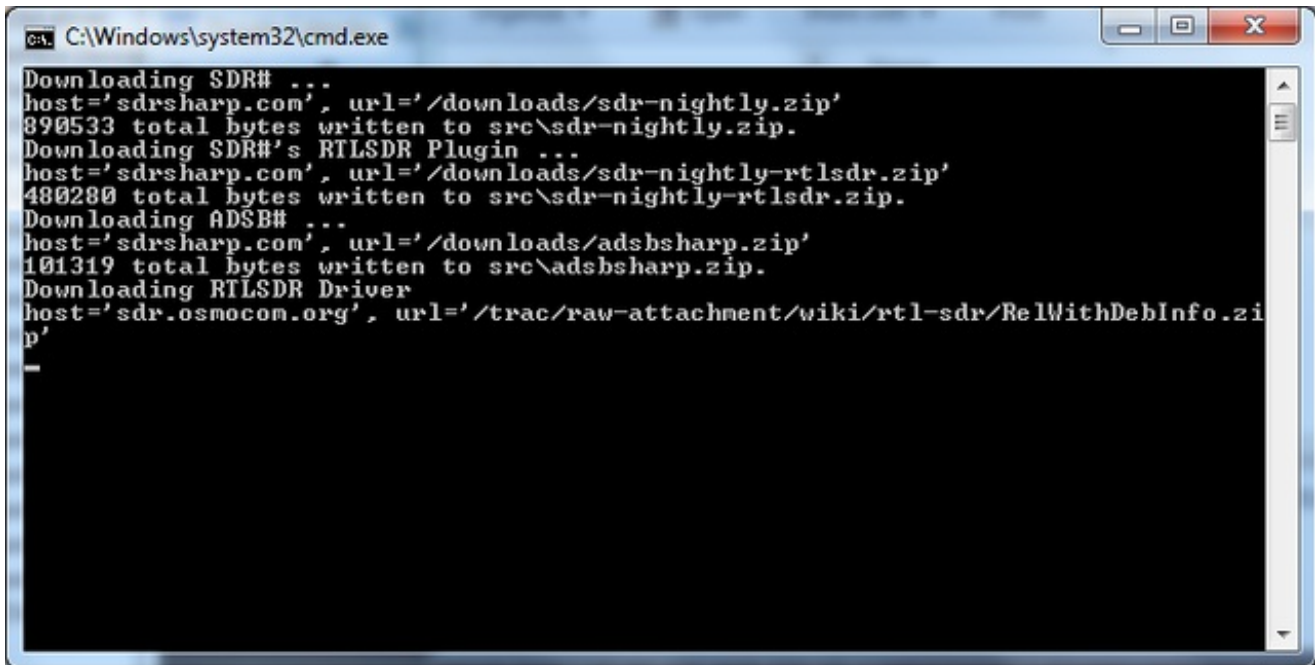
We suggest downloading the latest version as there will be minor bug fixes, etc!



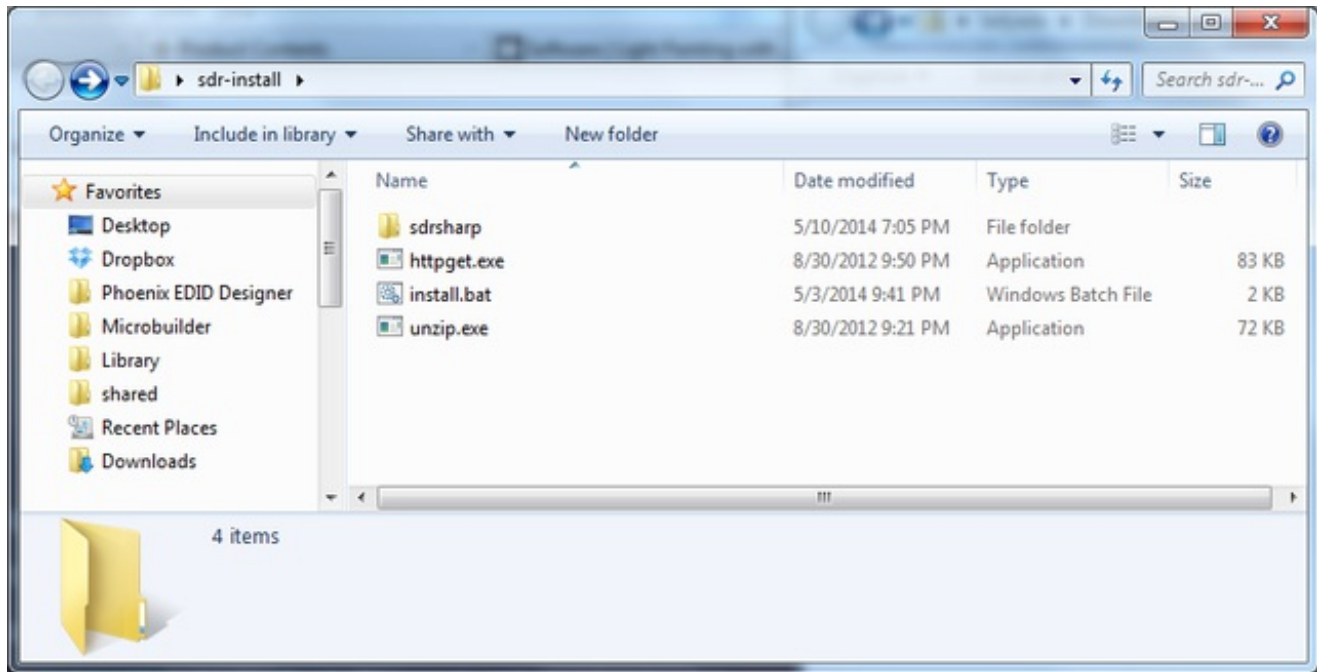
Save and uncompress the zip file



Double-click on **install.bat**



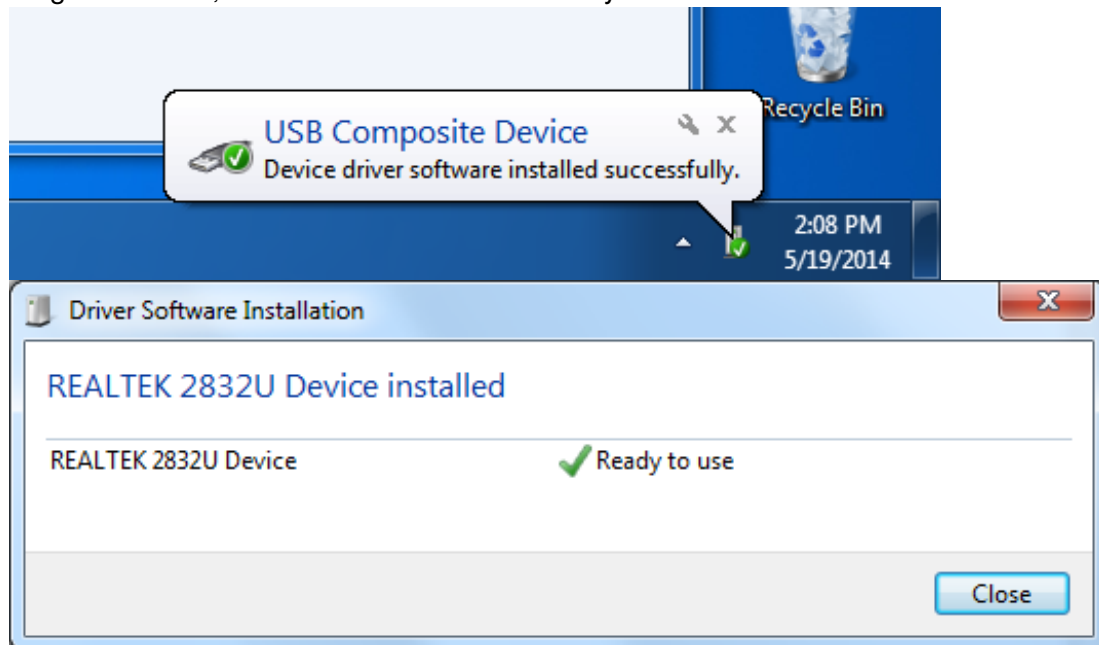
This will download the latest build and extract it into the current folder. SDR# does not install into the toolbar or start menu!



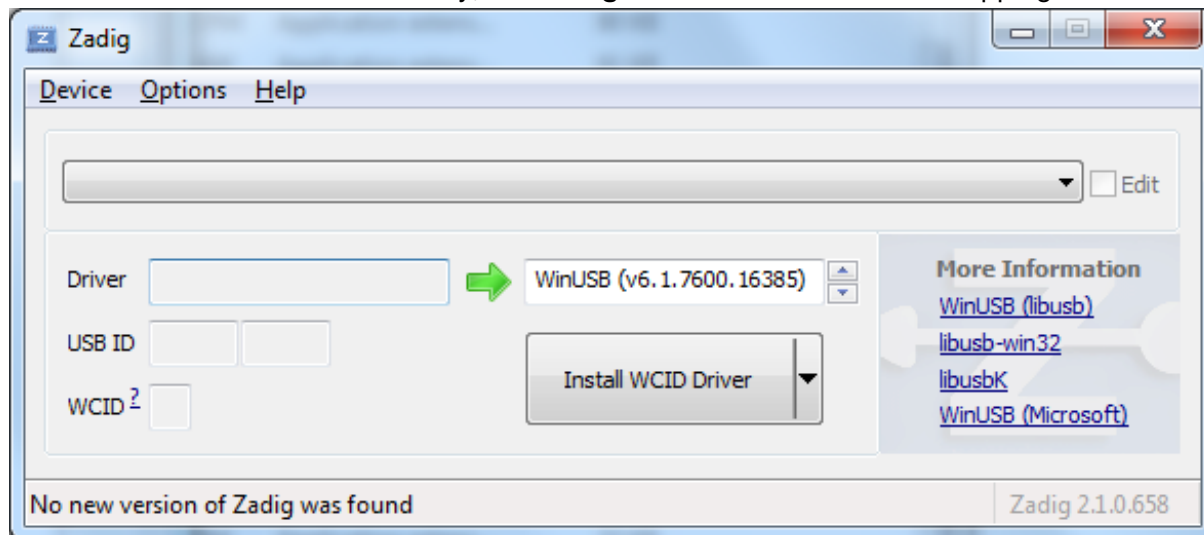
# Driver Fix

Before we continue, we'll have to install the Windows driver for the RTL USB stick and then swap it for a 'low level access' driver. The default driver assumes you'll just be using the RTL-SDR for watching TV or radio but we want to be able to control it to do much more.

Plug in the stick, Windows should automatically install the REALTEK 2832U driver

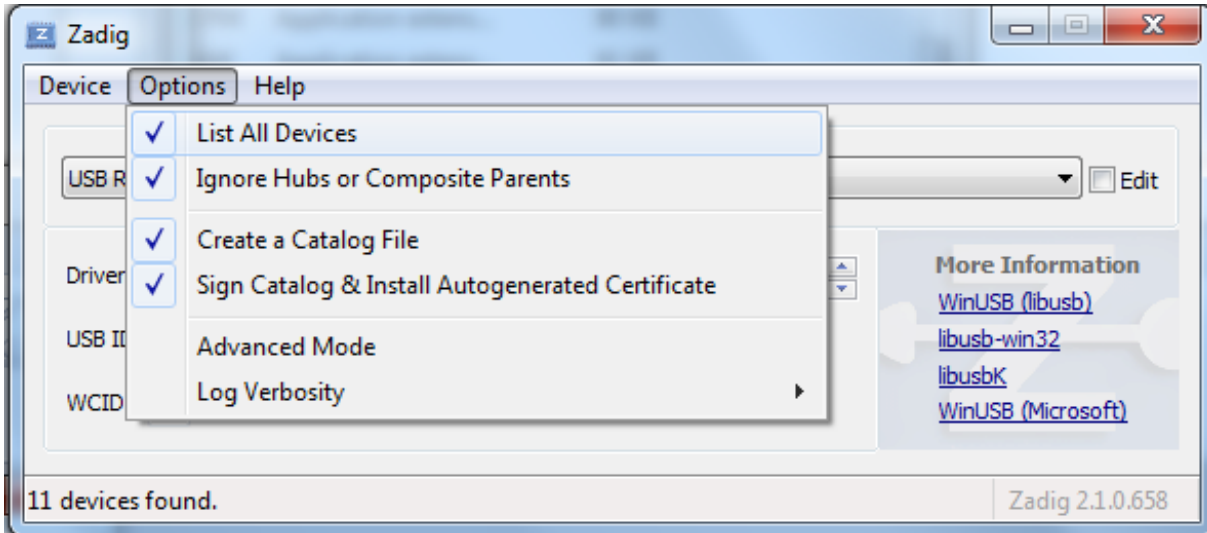


Now from inside the SDR# directory, run **Zadig** which will do the driver swapping for us



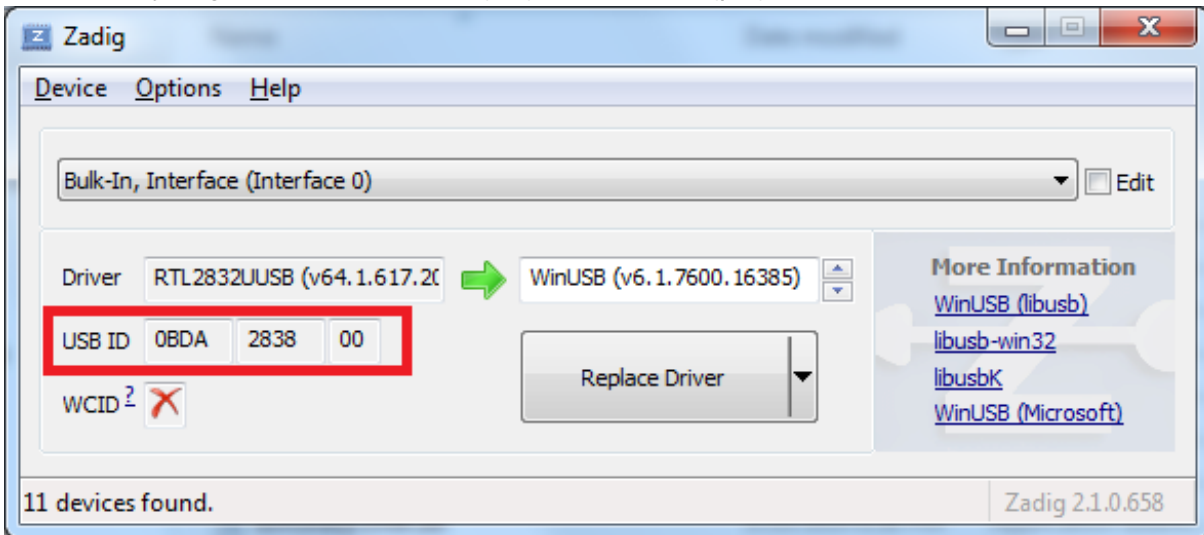
From the Options menu, select **List All Devices**





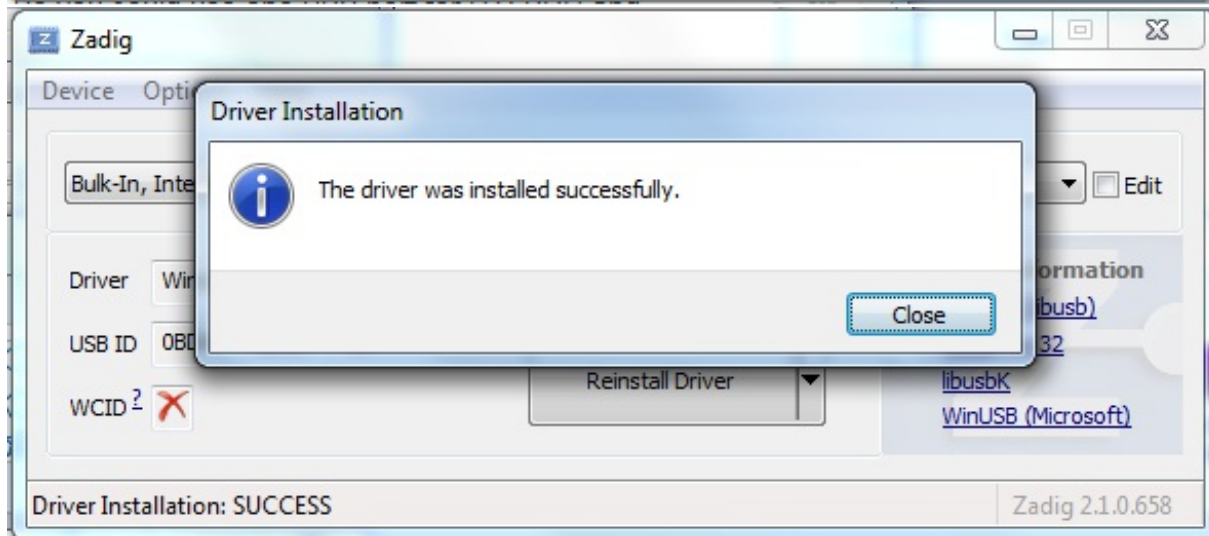
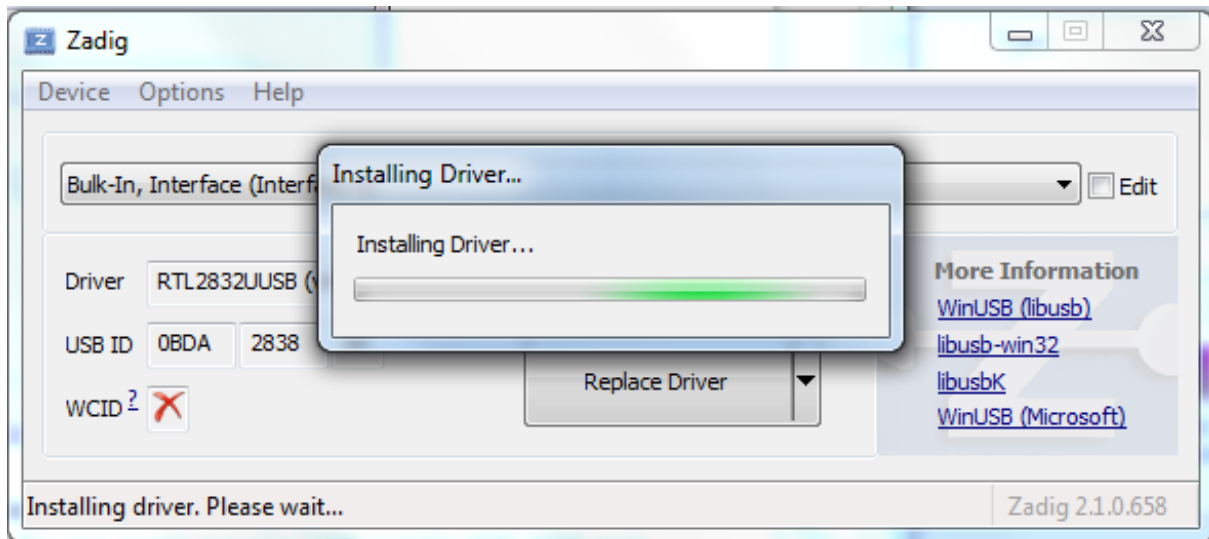
Then from the devices drop-down, find one that says **Bulk-In, Interface (interface 0)**. If there's more than one, select one at a time, and verify below to get the right one.

Check that you get **USB ID 0x0BDA** (vid) and **0x2838** (pid) and the **RTL2832UUSB** driver



Make sure to the right of the green arrow you see **WinUSB**

Click **Replace Driver**



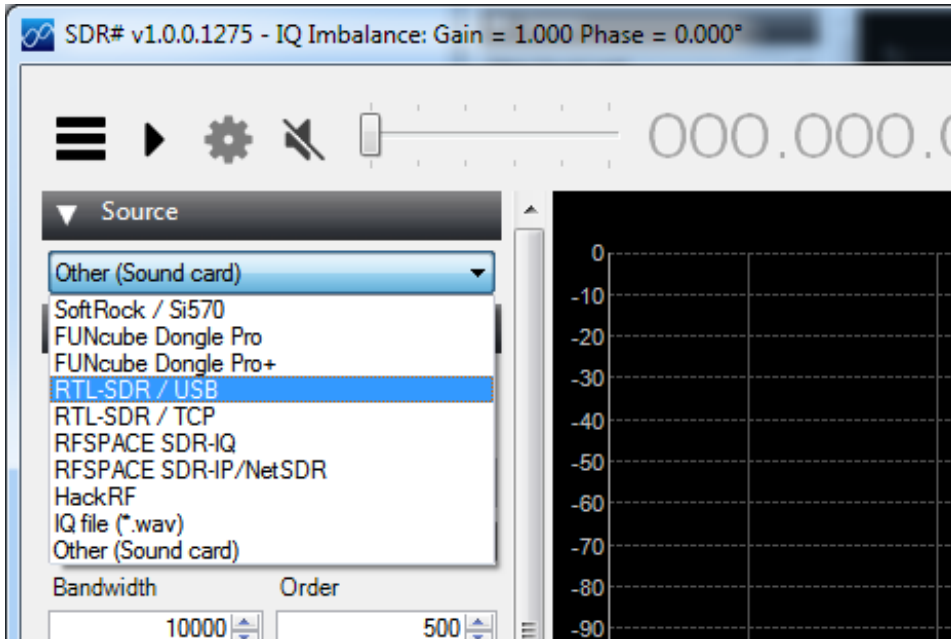
That's it!

# SDR# FM Radio

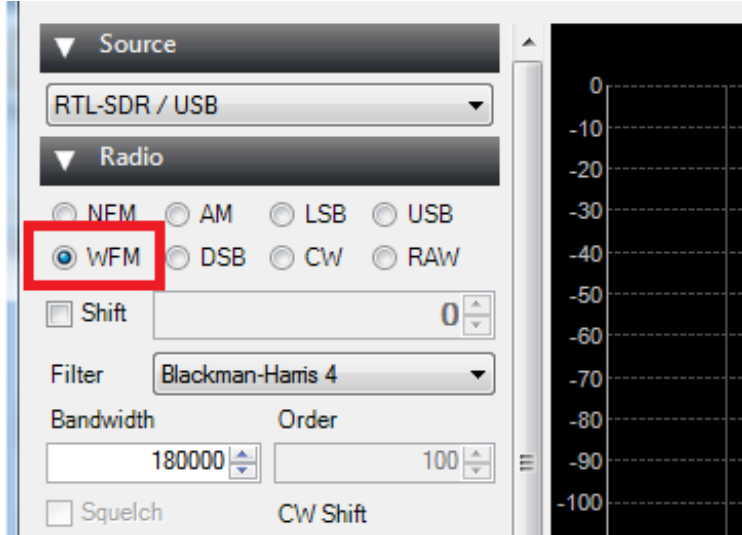
Lets start by just listening to every-day FM radio. Open up **SDRsharp.exe** (you can close Zadig)



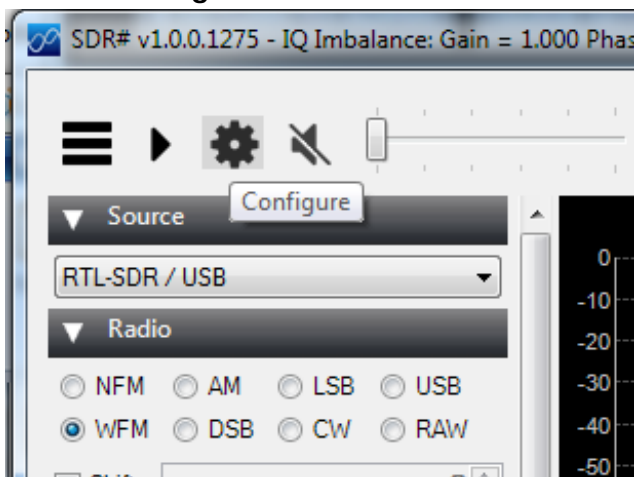
Begin by selecting the RTL-USB dongle instead of audio card



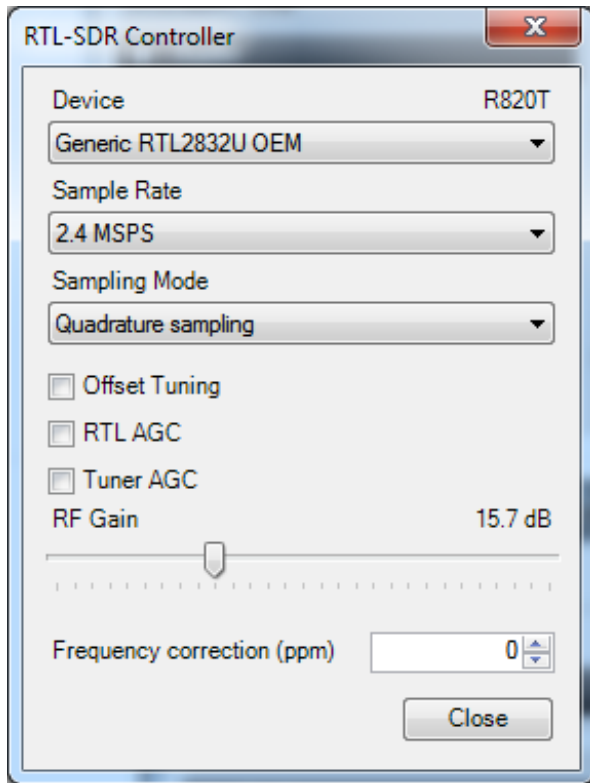
Select **WFM** (wide-band FM radio) under the Radio signal type



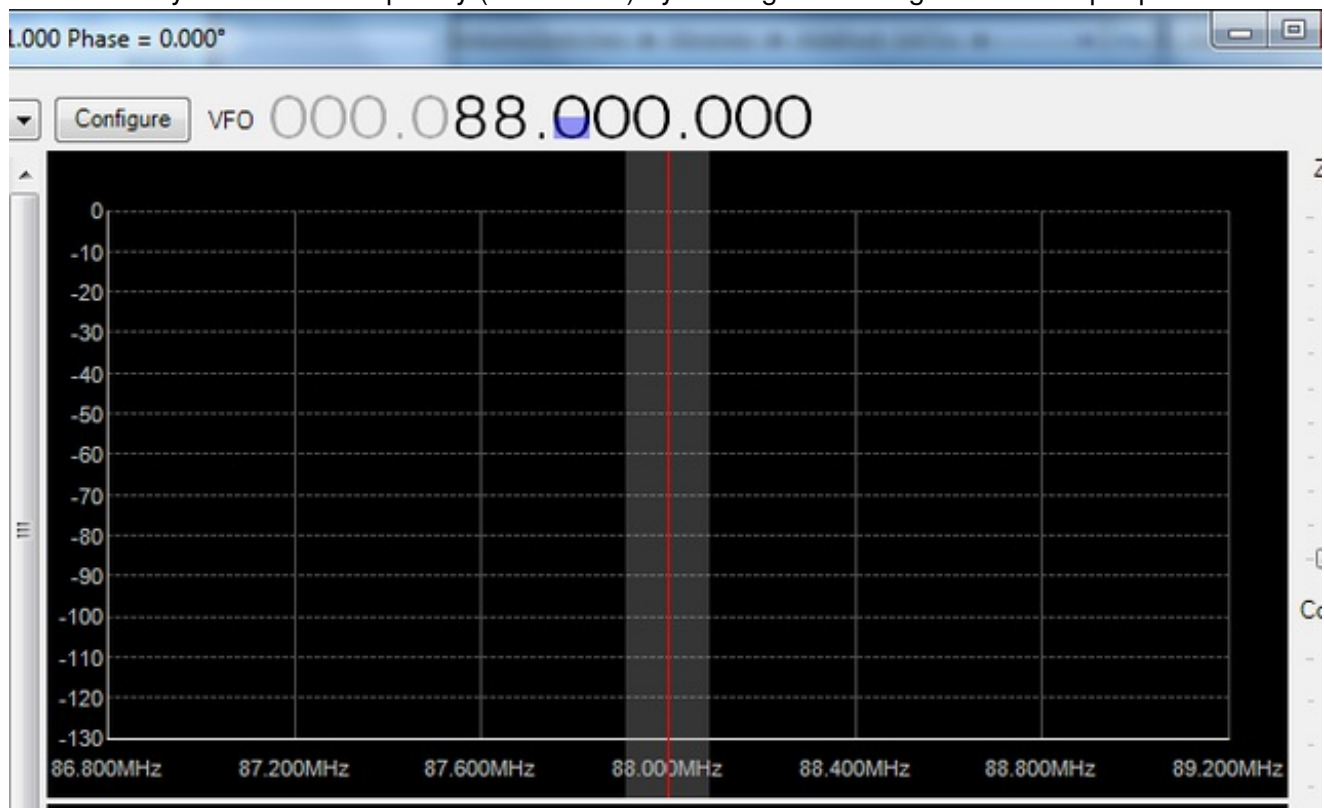
Click on **Configure**



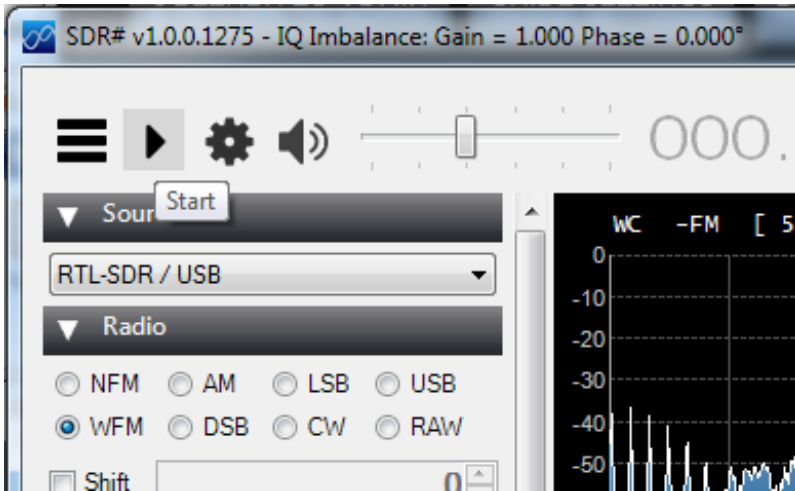
And set the gain about half-way up



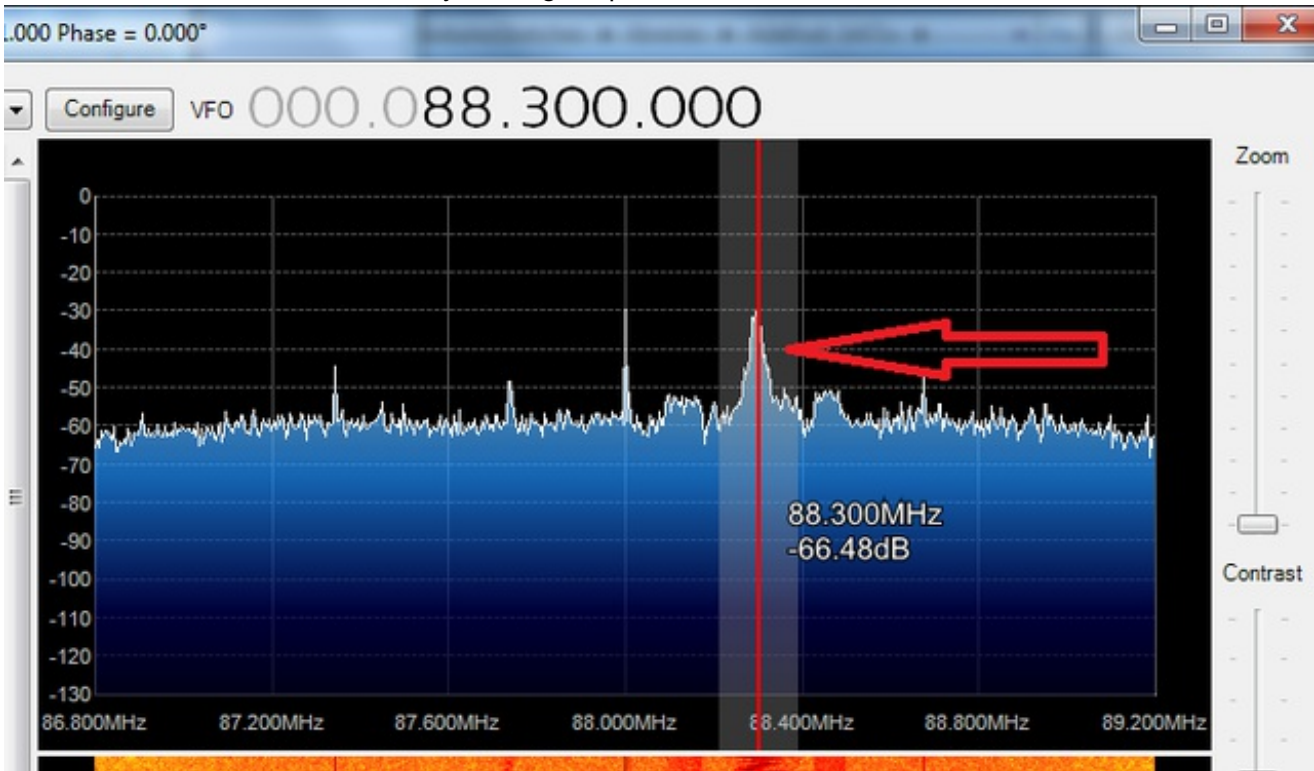
You can set your favorite frequency (FM station) by clicking on the large numbers up top



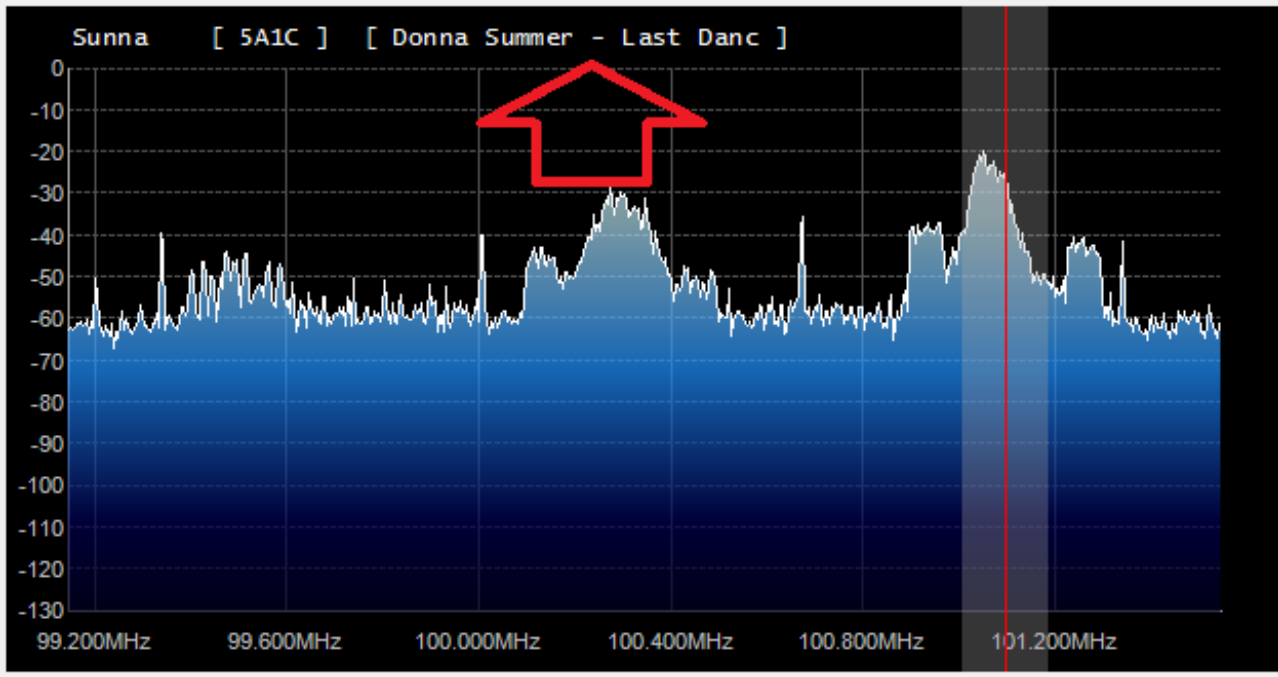
Click **Play/Start** and set the volume starting from low to high so you don't hurt your ears!



You can 'seek' for radio stations by looking for peaks. Click on them to tune in



With the latest versions of SDR-Sharp it will automatically detect and decode RBDS/RDS data that is sent along with FM radio



Chances are your radio station is also playing Donna Summer!

# SDR# SAME (Weather) Radio

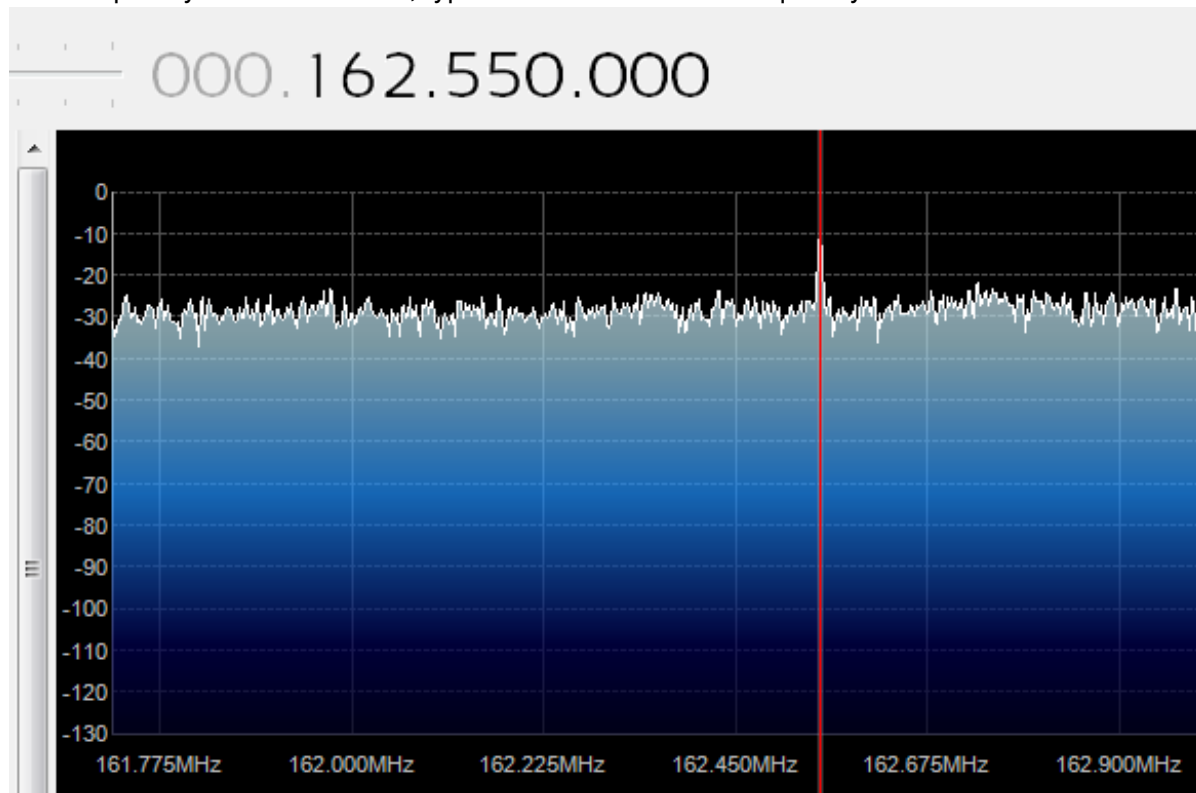
Most every-day AM/FM radios can't tune into the SAME weather network but with RTL-SDR we can! SAME is the national weather alert system, which broadcasts weather data as well as emergency alerts. (<http://adafru.it/dsW>)

Lets tune into the closest weather station to Adafruit which is in New York City. You'll want to tune into whatever station is closest to you.

To begin, visit the NOAA weather station frequencies-by-county index here (<http://adafru.it/dsX>)

Montgomery	036057	Albany	WXL34	162.550	ALL
Montgomery	036057	Cooperstown	WWH35	162.450	ALL
Montgomery	036057	Middleville	WXM45	162.425	ALL
Nassau	036059	Meriden	WXJ42	162.400	N
Nassau	036059	New York City <b>DEGRADED</b>	KWO35	162.550	ALL
Nassau	036059	Riverhead	WXM80	162.475	Central/E
New York	036061	New York City <b>DEGRADED</b>	KWO35	162.550	ALL
Niagara	036063	Buffalo	KEB98	162.550	ALL
Oneida	036065	Cooperstown	WWH35	162.450	S
Oneida	036065	Middleville	WXM45	162.425	ALL
Oneida	036065	Syracuse	WXL31	162.550	W
Onondaga	036067	Syracuse	WXL31	162.550	ALL

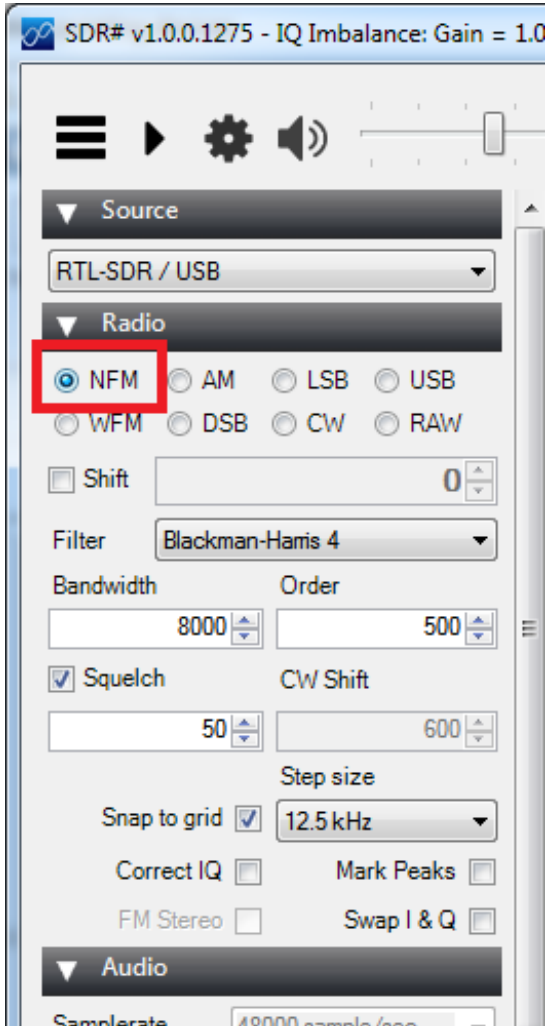
The frequency is 162.550 MHz, type that into the SDR# frequency window



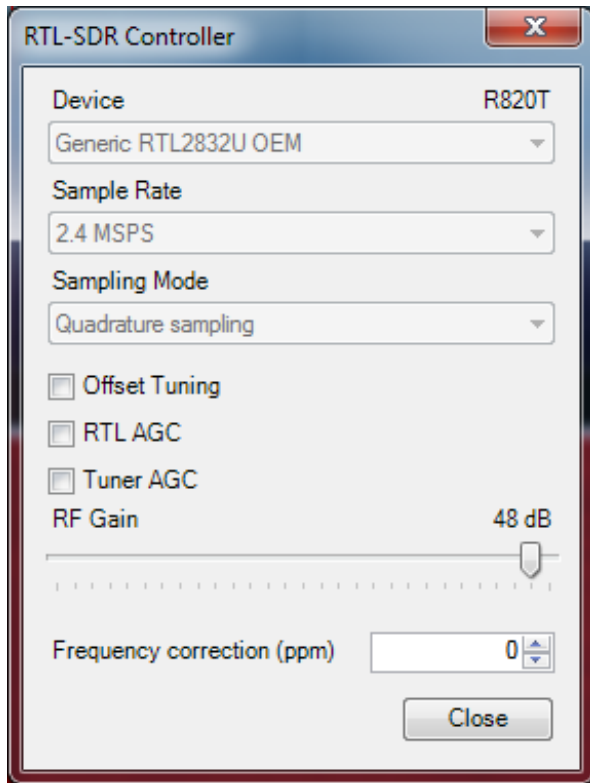
You can see a little peak, its much smaller signal than the FM radio stations. It's also much *thinner*



which makes it a narrow-band FM rather than wideband. Since its voice, not stereo music, they use less of the frequency band, so select **NFM** as the decoding type



The station is marked as degraded, but by amplifying the gain on the RTL-SDR we were able to tune in



You should be able to hear a computer-generated voice speaking out the weather forecast. It's not terribly exciting but it is very thorough, often giving very detailed reports. The signal continuously transmits so you can tune in at any time!

## Going forward

now that you have some basic functionality working, try tuning into other frequencies, and trying the different kind of decoding (e.g. CW/AM/NFM) to tune into AM radio!

# F.A.Q.

The SDR dongle seems to get hot!

Yep, these run pretty warm. As long as it's still working, you should be good to go. There's a pretty advanced chipset inside which can consume a lot of power

What kind of computer do I need?

You need a computer with at least one USB 2.0 or higher port. You will also need admin privs to install the software, we used it on Windows 7, XP should be the same. There's also software for Mac and Linux but we don't have tutorials for it. Google around for RTL-SDR and what you wanna do for lots of ideas!