

Using Different SDRs On Gnuradio For Windows

Max-Felix Müller

2020
August

Contents

1	Introduction	3
1.1	Gnuradio Version	3
2	RTL SDR	3
3	HackRF One	5
4	Adalm Pluto SDR	6
5	Links	7

List of Figures

1	Replacing the driver with the Zadig tool	3
2	Properties of the rtl-sdr source block	4
3	Properties of the osmosdr source block	5
4	Properties of the pluto source block	6

1 Introduction

Being interested in Software Defined Radios and Digital Signal Processing I decided to invest into some SDR devices.

With Windows as my main operating system (I also run Linux but only as a boot option or on old laptops) there are some additional challenges on getting gnuradio working with those SDR devices. Different steps are necessary for each and I wanted to have them documented in one spot.

1.1 Gnuradio Version

I use Gnuradio 3.7 since at the time of writing this there seems to be a bug in 3.8 for windows where no GUI can be displayed since the path to QT is broken.

2 RTL SDR

The first device I used is a cheap sdr dongle I found on Amazon. It was told to me that it would be nice for beginners since it is rather cheap and offers enough functionality to get started.

First the correct driver has to be installed. A tool called Zadig can be used for this.

Then plug in the dongle and start Zadig. Select “List All Devices” and unselect “Ignore Hubs or Composite Parents”. The SDR dongle should appear as a device called RTL... and two bulk interfaces. Select the RTL:... one and “Replace Driver” with the WinUSB driver selected. A window might pop up warning that you are about to replace system drives, accept that. Then wait until the installation of the driver has completed.

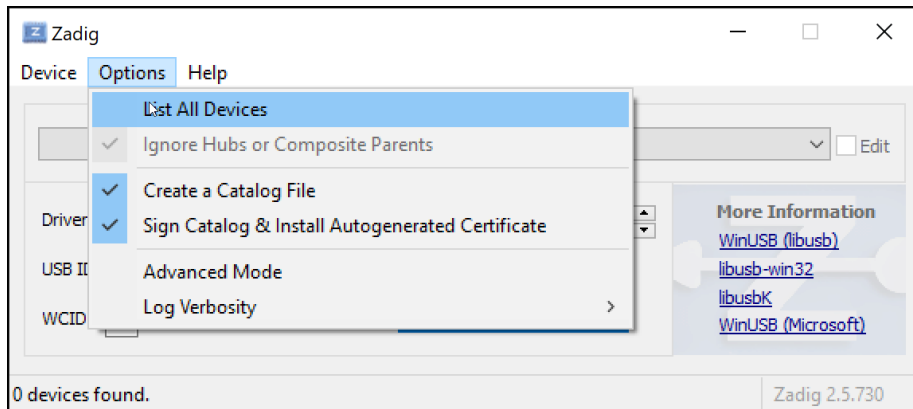



Figure 1: Replacing the driver with the Zadig tool

From the testtools (prebuild binaries for Windows), run rtl.test.exe and look for errors. This step is optional.

Now it is time to create a simple flowgraph in gnuradio. Use the “RTL-SDR Source” block to get the data from the dongle. In the settings of the block, enter the device argument “rtl=0”. This is required and the block will not work properly without it.


 Properties: RTL-SDR Source
 ✕


General

Advanced

Documentation

ID	rtlsdr_source_0		
Output Type	Complex float32	▼	
Device Arguments	rtl=0		
Sync	don't sync	▼	
Num Mboards	1	▼	
Mb0: Clock Source	Default	▼	
Mb0: Time Source	Default	▼	
Num Channels	1	▼	
Sample Rate (sps)	samp_rate		
Ch0: Frequency (Hz)	freq		
Ch0: Freq. Corr. (ppm)	0		
Ch0: DC Offset Mode	Off	▼	
Ch0: IQ Balance Mode	Off	▼	
Ch0: Gain Mode	Manual	▼	
Ch0: RF Gain (dB)	10		
Ch0: IF Gain (dB)	20		
Ch0: BB Gain (dB)	20		

 OK

 Cancel


 Apply

Figure 2: Properties of the rtlsdr source block

Now everything should be working. Have fun exploring the SDR dongle.

3 HackRF One

The HackRF One is a much more capable device than the RTL SDR dongles from above. However the added functionality comes with a price. There is no driver replacement required for the HackRF. It is possible to check the installed driver with Zadig, but I do not recommend to downgrade or replace it.

Instead the source block in gnuradio can be used directly. I use the “osmocom Source” in this case. Again it is required to specify a device argument, in this case “hackrf=0”.

Properties: osmocom Source	
General	Advanced Documentation
ID	osmosdr_source_0
Output Type	Complex float32
Device Arguments	hackrf=0
Sync	don't sync
Num Mboards	1
Mb0: Clock Source	Default
Mb0: Time Source	Default
Num Channels	1
Sample Rate (sps)	samp_rate
Ch0: Frequency (Hz)	freq
Ch0: Freq. Corr. (ppm)	0
Ch0: DC Offset Mode	Off
Ch0: IQ Balance Mode	Off
Ch0: Gain Mode	Manual
Ch0: RF Gain (dB)	10
Ch0: IF Gain (dB)	20
Ch0: BB Gain (dB)	20
OK Cancel Apply	

Figure 3: Properties of the osmosdr source block

That's it already. Have fun.

4 Adalm Pluto SDR

The last device I want to check out is the Pluto SDR from Analog Devices. It can be bought from different sellers.

The wiki from Analog Devices is a good start for help. There I also found the drivers.

Here comes the point where I ran into a problem: The “industrial io” blocks (iio), necessary for operating the Pluto through gnuradio, are not included in the standard windows install for gnuradio. Instead Analog Devices offers a pre built binary to install GRC 3.7 with those blocks included. And while the Pluto SDR block and many other blocks outside of the gnuradio companion core are available, the blocks for the RTL SDR and HackRF One are of course missing.

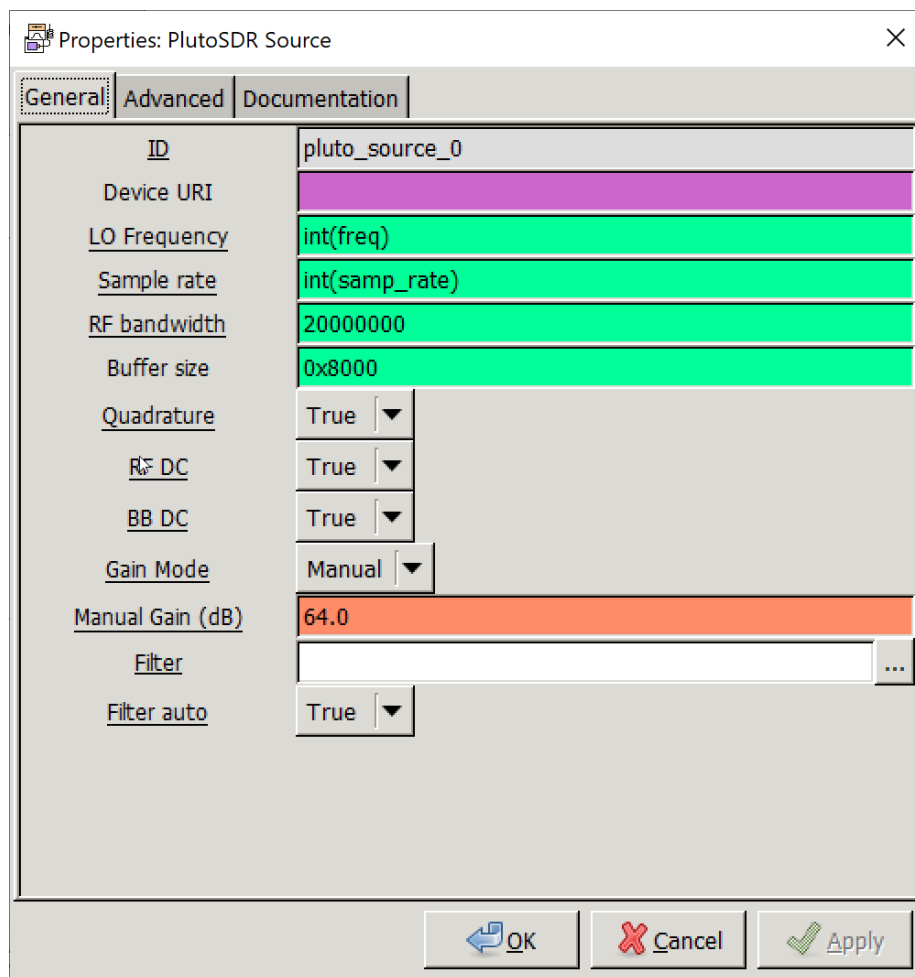


Figure 4: Properties of the pluto source block

The only option to use all three devices at the same time is to use Linux...

5 Links

[Download Gnuradio](#)

[Buy RTL SDR on Amazon](#)

[Download Zadig](#)

[Test tools for rtl devices](#)

[Buy a HackRF One](#)

[Adalm Pluto on Analog Devices website](#)

[Drivers for Adalm Pluto in the Wiki](#)