

gr-soapy: A handy SDR hardware interface module for GNU Radio

Nestoras Sdoukos, George Vardakis

Fosdem 2019

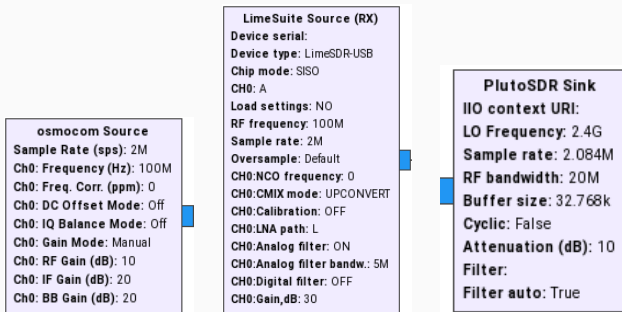


Roadmap

- Motivation
- Introduction to SoapySDR & gr-soapy
- gr-soapy Features
- Maintaining gr-soapy
- Conclusion

Motivation

- Plenty SDR devices with different blocks
- Need to change devices in the same flowgraph
- Hard for the inexperienced users to use a generic block



SoapySDR

- Open source C/C++ API to interface with SDR devices
- Direct support to hardware with SoapySDR modules
- Remote access to SDR devices

gr-soapy

- OOT module for GNU Radio
- Source & sink blocks using SoapySDR API
- Dynamic xml fields for each supported device

General Options

- Device driver & arguments
- Sampling Rate
- Number of Channels
- Clock Source & Rate
- Stream Format

RF Options

- Center Frequency
- NCO Frequency
- Gain Mode
- Gain Values
- Automatic Gain Control
- Antenna
- Filter Bandwidth
- Automatic DC Offset
- DC Offset Correction
- Frequency Correction
- IQ Balance Correction

Generic gr-soapy General Tab

The screenshot shows a window titled "Properties: Soapy Source" with a standard Linux window title bar (minimize, maximize, close buttons). The window has four tabs: "General", "RF Options", "Advanced", and "Documentation". The "General" tab is selected and contains the following configuration fields:

<u>I</u> D	soapy_source_0
<u>D</u> evice	driver=fosdem2019
Args	
Sampling Rate	0
Num Channels	1
Master Clock Rate	0
Clock Source	
Output Type	Complex float32 ▾

At the bottom of the dialog are three buttons: "OK", "Cancel", and "Apply".

Generic gr-soapy RF Tab

Properties: Soapy Source

General RF Options Advanced Documentation

<u>Ch0: Center Freq (Hz)</u>	0
<u>Ch0: NCO Freq (Hz)</u>	0
<u>Ch0: Gain Mode</u>	Auto
<u>Ch0: Gain Value</u>	0
Ch0: Automatic Gain	False
<u>Ch0: Antenna</u>	
<u>Ch0: Bandwidth (Hz)</u>	0
Ch0: Automatic DC Offset M	False
Ch0: DC Offset	0
Ch0: Frequency Correction	0
Ch0: IQ Balance Correction	0

OK Cancel Apply

Airspy gr-soapy General Tab

The image shows a configuration window titled "Properties: Soapy Source" with a sub-tab "General". The window contains several configuration fields:

Property	Value
ID	soapy_source_0
Device	driver=airspy
Args	biastee=true
Sampling Rate	2.5e6
Num Channels	1
Master Clock Rate	0
Clock Source	
Output Type	Complex float32

At the bottom of the window are three buttons: "OK", "Cancel", and "Apply".

Airspy gr-soapy RF Tab

The screenshot shows a configuration window titled "Properties: Soapy Source" with four tabs: "General", "RF Options", "Advanced", and "Documentation". The "RF Options" tab is selected. The window contains several configuration fields for "Ch0":

Parameter	Value
Ch0: Center Freq (Hz)	140e6
Ch0: Gain Mode	Manual
Ch0: LNA Gain Value	12
Ch0: MIX Gain Value	10
Ch0: VGA Gain Value	10
Ch0: Automatic Gain	False
Ch0: Antenna	RX
Ch0: Bandwidth (Hz)	0

At the bottom of the window are three buttons: "OK", "Cancel", and "Apply".

gr-soapy is easily maintainable & expandable

- One xml to rule them all
- Simple to support new devices through the xml
- Easy to add new SoapySDR API functions
- New devices can be configured as soon as a new module is released
- Easy to create a module for a new device

Why use gr-soapy

- Soapy is a robust API
- gr-soapy is a convenient way to configure SDR devices
- Easily maintainable & expandable
- Soapy is an active project

Not everything is perfect

- Not all modules are created equally
- Xml file can be overwhelming
- Easy to create a bug in the xml



gr-Soapy