

Spectral Analysis with your StormLink IQ Receiver

White Paper

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Using your StormLink IQ Receiver as a Spectrum Analyzer

Background:

The StormLink IQ Receiver is capable of listening to a range of frequencies simultaneously. We take advantage of that capability by using software that allows us to display a waterfall display of spectral energy over time. If you think that you may be getting interference on your chosen frequency, you can use this as a tool to visually see other transmissions on nearby frequencies. This allows you to see the timing and frequency spectrum of transmissions.

Let's get started

What you need:

1. StormLink IQ Receiver – USB Dongle
2. Download the following open source spectrum analyzer software
 - a. A list of many freely available spectrum analyzer software are at <http://www.rtl-sdr.com/big-list-rtl-sdr-supported-software/>
The best choice for spectrum analysis is software that provides both a spectral energy graph and a waterfall display to show the energy over time.
 - b. Spectrum Analysis Software – A few options below, you only need one
 - i. <http://www.rtl-sdr.com/rtl-sdr-quick-start-guide/>
 - ii. SDR# for Windows- <http://rtlsdr.org/softwarewindows>
 - iii. GQRX for Mac/Linux/Win- <http://gqrx.dk/download>
 - iv. RTLSDR Scanner – Win/Mac/Linux - <http://eartoearoak.com/software/rtl-sdr-scanner>

Steps to get it running:

3. Download and install the spectral analysis software.
4. <http://gqrx.dk/download>

5. Webpage for download:

Download links for Gqrx SDR

- [Gqrx for Ubuntu Linux](#)
- [Gqrx for Mac OS X](#)
- [Gqrx source code](#)

On other Linux distributions or OS please check the package repositories – Gqrx may already be available there.

On Mac you can also install the latest version through [Macports](#).

Gqrx is now included in the [PothonSDR bundle for Windows](#).

The source code is managed on Github: <https://github.com/csete/gqrx>

6. For this example, we will use GQRX on a Macintosh. You can do something similar with one of the other software packages that supports both a real-time spectral graph and a waterfall display. In addition, for this example, we have turned on the audio out so that you can hear the transmitted chirp to understand the relationship between the chirp and the graphics.

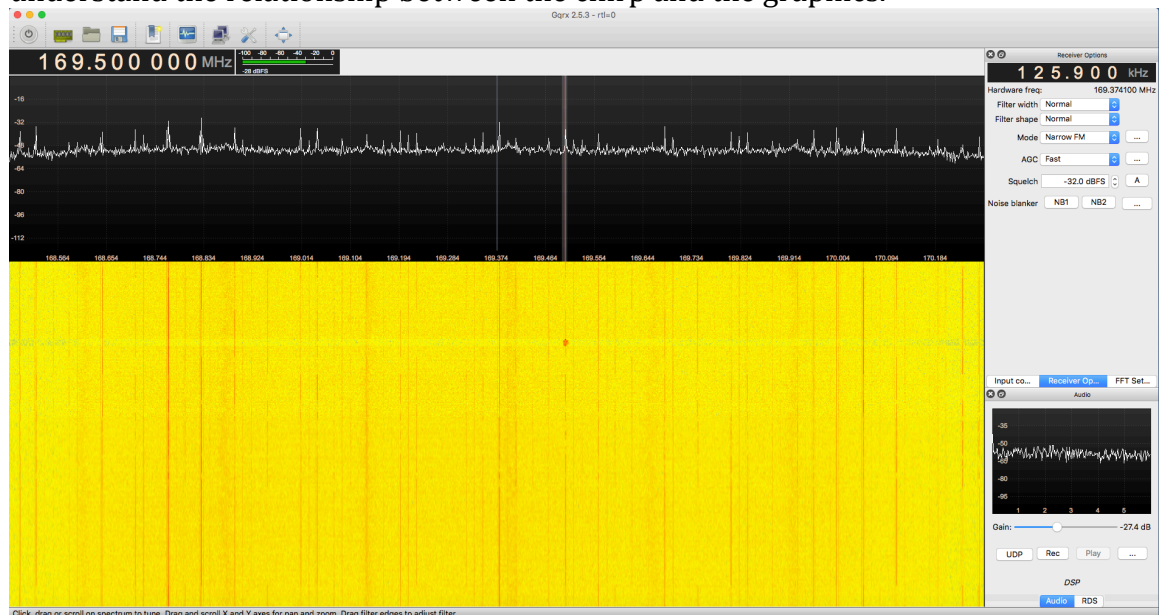


Figure 1 GQRX Display with sample ALERT transmission

7. This example shows an ALERT transmission on 169.500 MHz

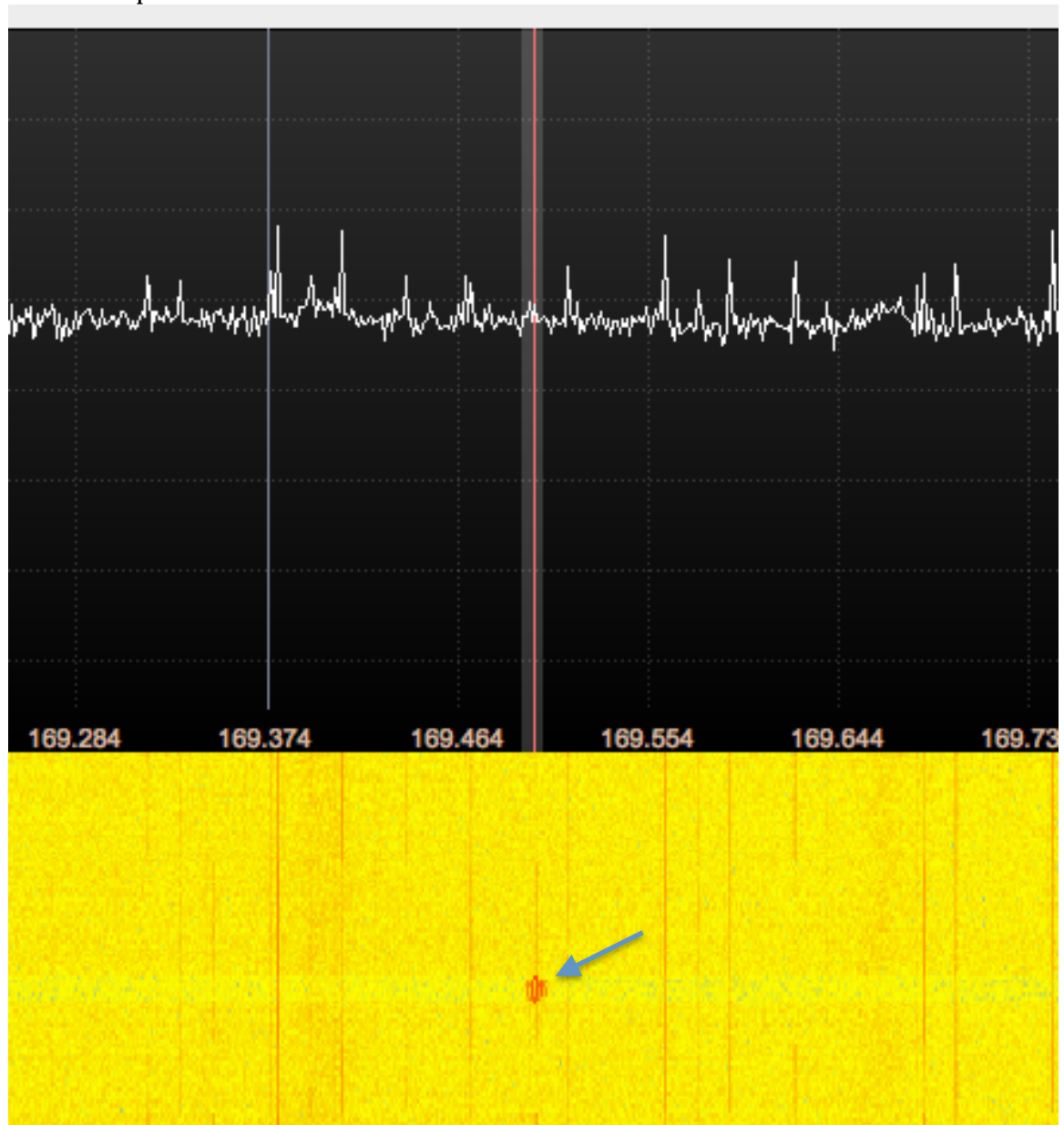


Figure 2 Example ALERT transmission on waterfall display

8. We will walk through the different sections of the screen to help you understand what they represent.

- a. Frequency tuned and signal strength of that frequency.



Figure 3 Frequency Tuned and Signal Strength of Frequency

- b. Spectral energy across nearby frequencies. This example shows the spectral energy across a range of 1.5 MHz from 168.500 MHz thru 170.200 MHz. Each peak in the graph represents the energy of some

form of radio transmission at those frequency points. During the ALERT transmission,

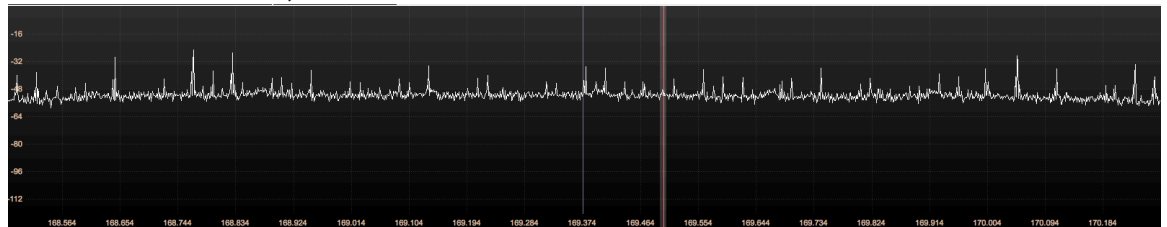


Figure 4 Instantaneous Spectral Energy Graph

- c. Tuned frequency and spectral energy of nearby frequencies. The red vertical line represents the tuned frequency, with the white shadow on both sides representing the width of the FM narrow band pass filter. The peaks at nearby frequencies show RF energy at those other frequencies that potentially could be interfering signal. If the interfering transmissions are intermittent, you will need to keep the application open for a while, and listen for and look for the potentially interfering signal.

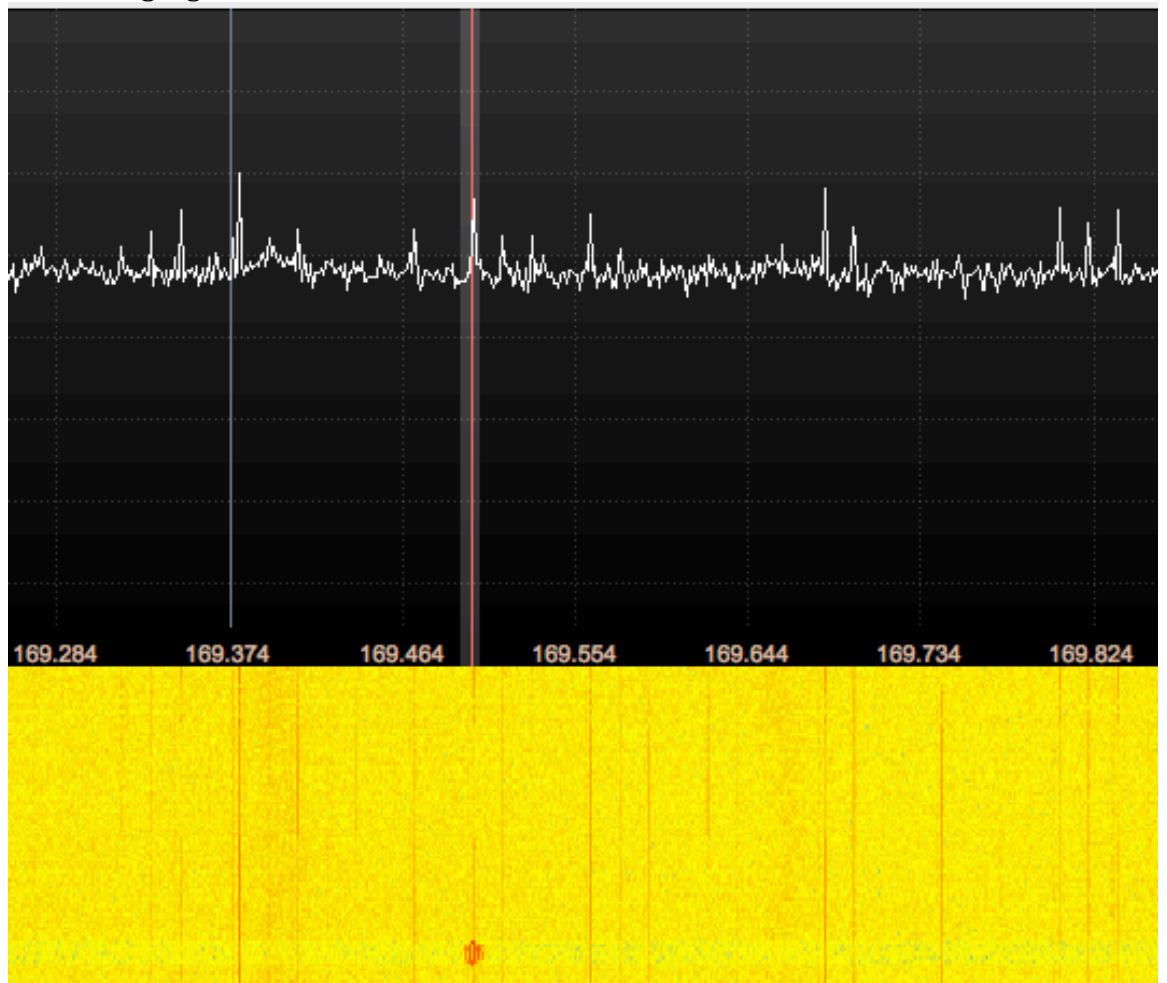


Figure 5 Tuned frequency with nearby spectral energy

d. Input Controls:

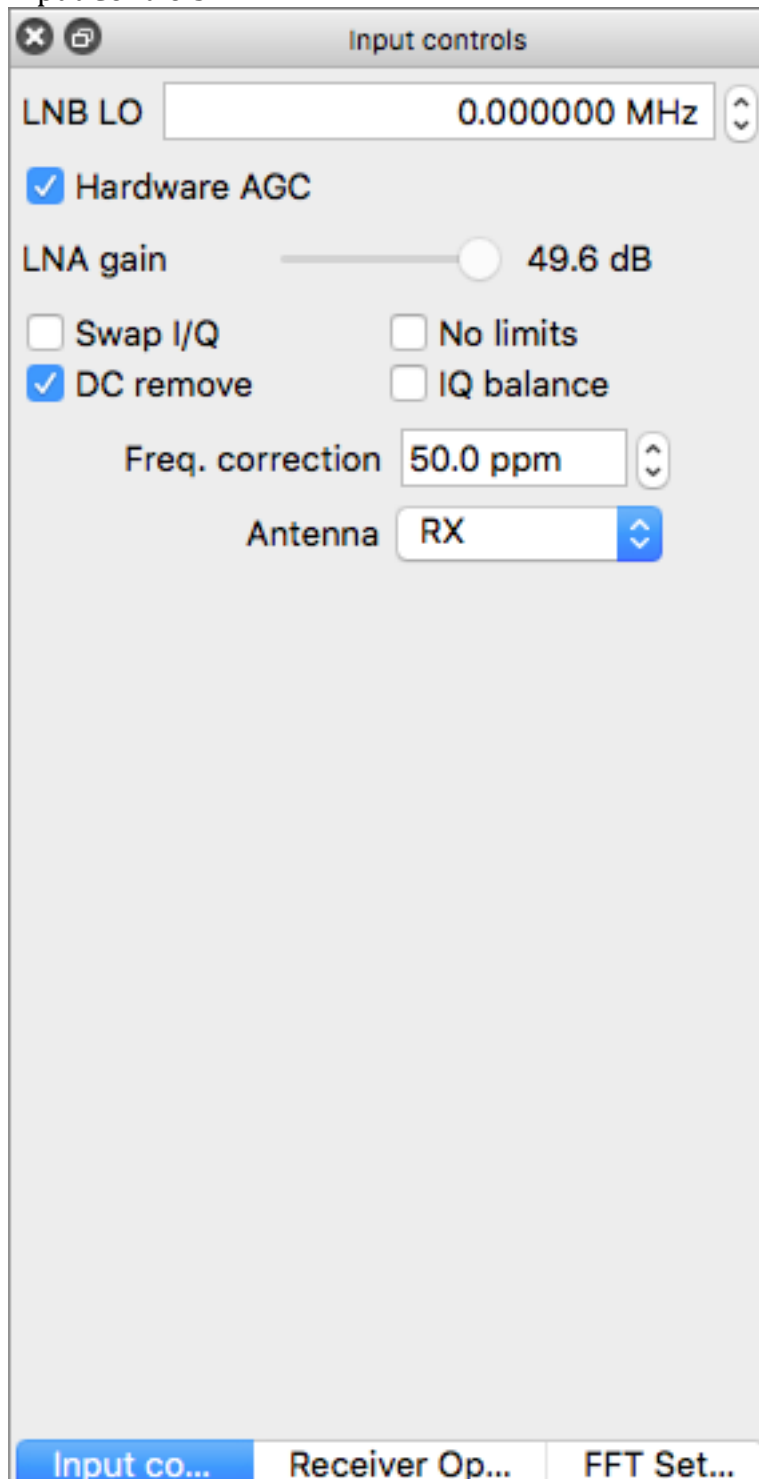


Figure 6 Input Controls

e. Receiver Options: This needs to be set to a non-zero value so that the center frequency of the SDR is slightly offset. The center frequency of an SDR has a false energy signal, so move this far enough away so that

the false signal is not confused with interference.

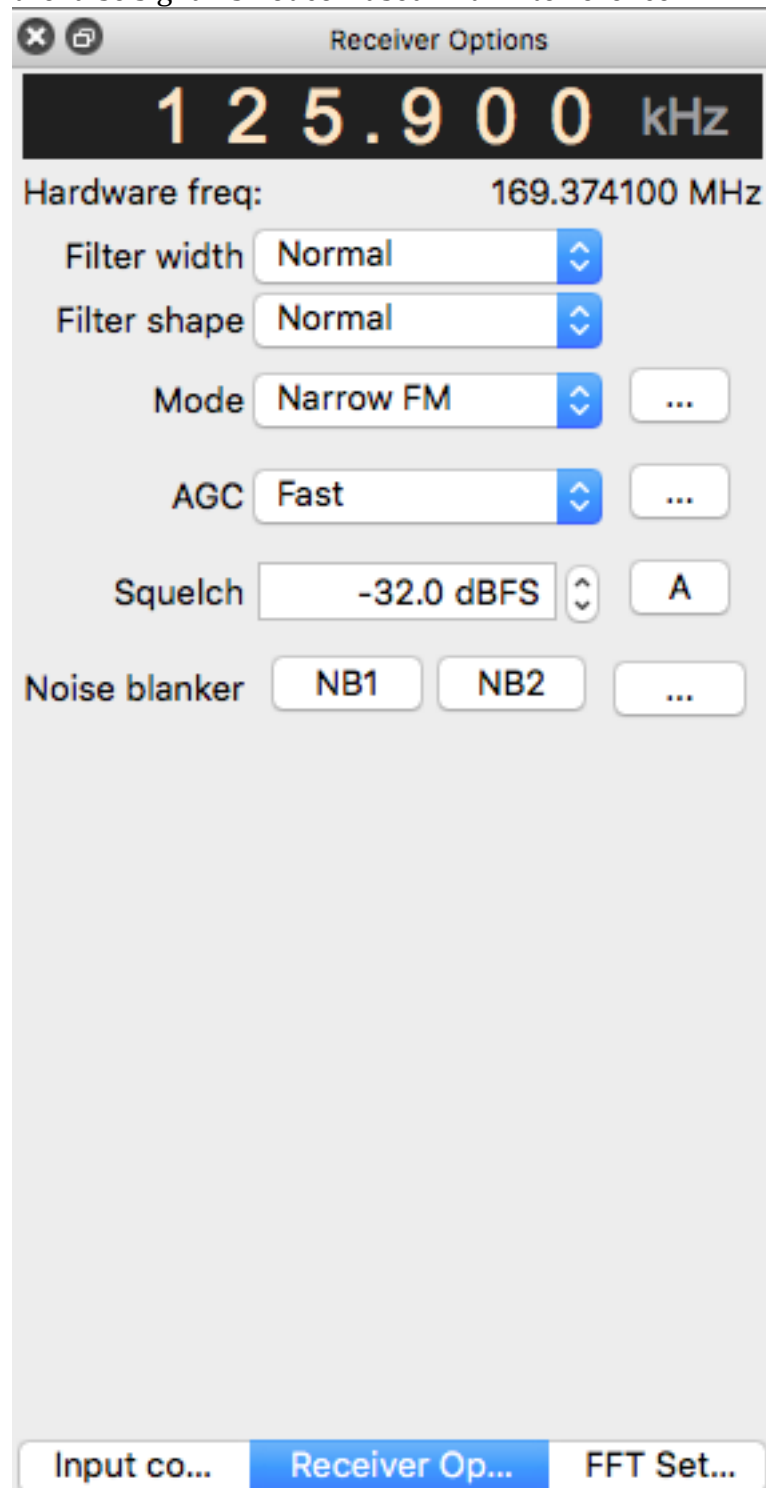


Figure 7 Receiver Options

f. FFT Settings:

FFT Settings

FFT size: 8192 RBW: 219.7 Hz

Rate: 25 fps Overlap: 0%

Time span: Auto Res: - s

Averaging: [Slider]

Pandapter: [Slider] WF

Peak: Detect Hold

Ref. level: [Slider] 0 dB

dB range: [Slider] 131 dB

Zoom: [Slider] 1x

R C D

Color: ☐ White Fill

Input co... Receiver Op... FFT Set...

Figure 8 FFT Settings

g. Audio:

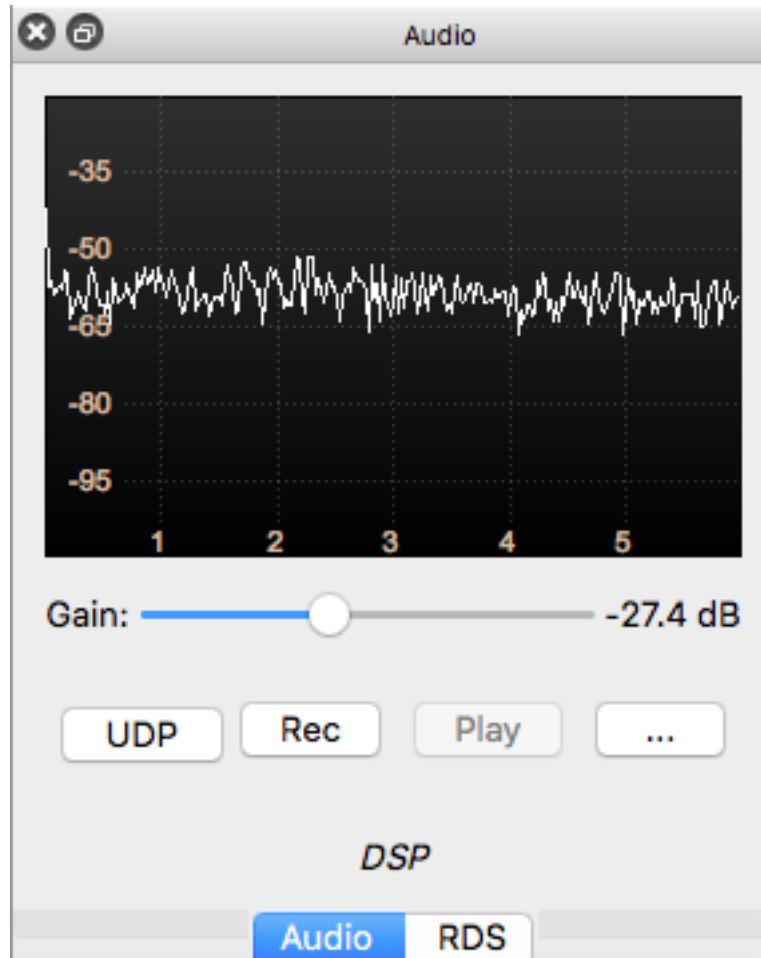


Figure 9 Audio

Summary

9. Hopefully after you play with the settings a while, you will get the feel for tuning and adjustments needed to suite your needs.