Elegant Software Radio Tools for a More Civilized Age

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Elegant Tools

- Enables you without getting in your way.
- Keep easy things easy, make hard things possible.
- Can focus on what matters.
- Provides a delightful user experience.

- Use the best tool for the job.

Elegant Tools

Elegant Tools
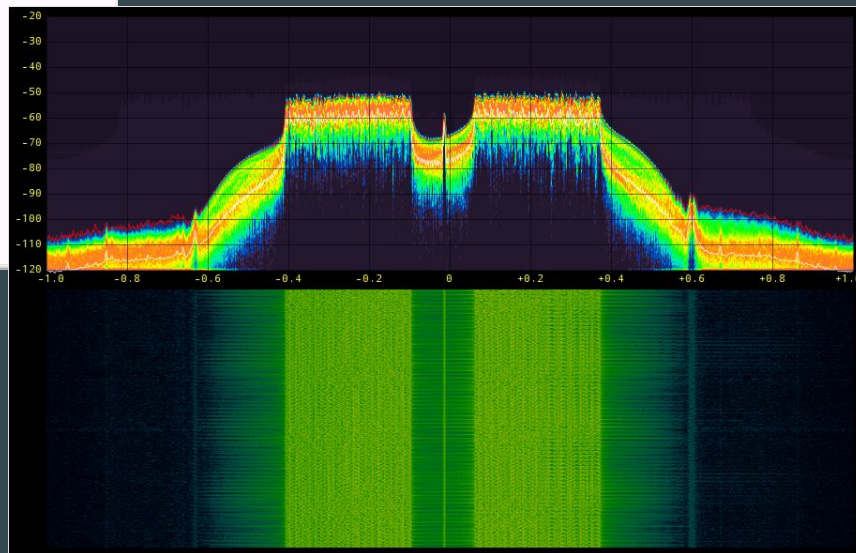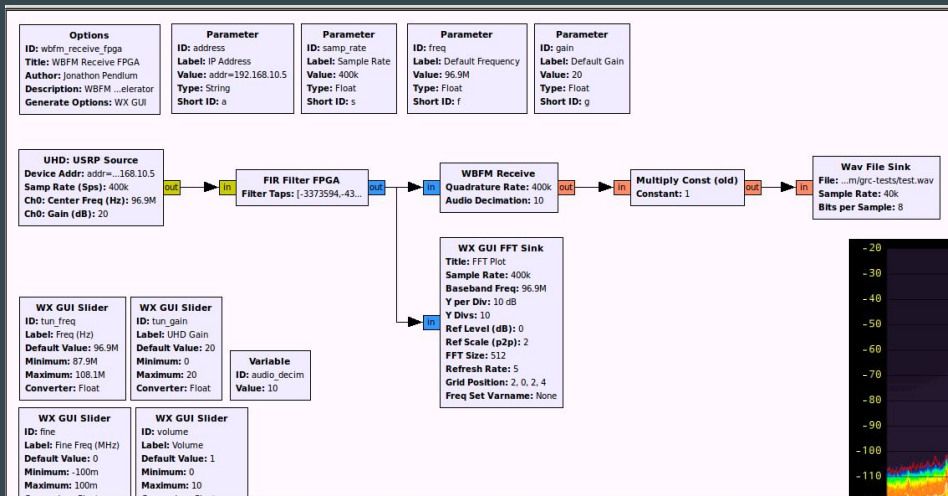
Elegant Tools

Elegant Tools

A Survey of Tools

- There are lots of tools out there!
- Can't cover them all in ~20 minutes.
- Will just cover the tools we see used most commonly.
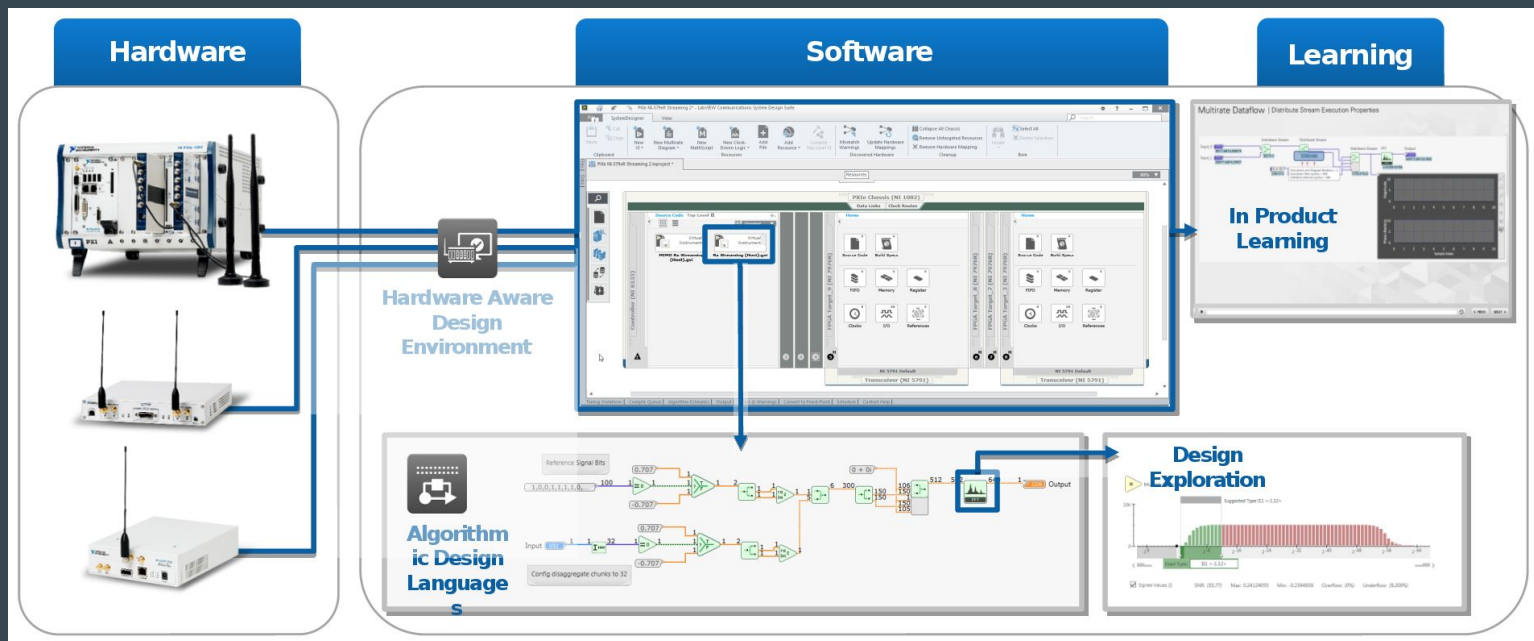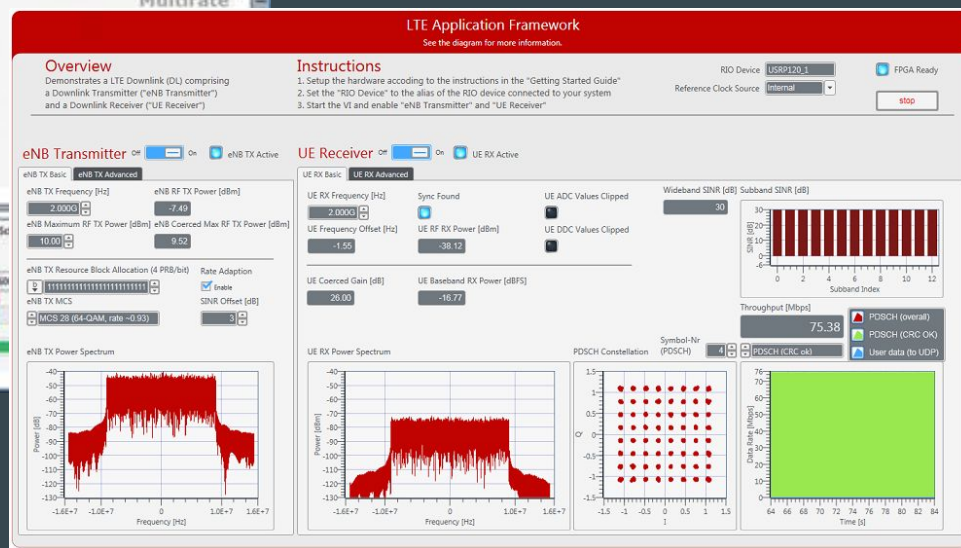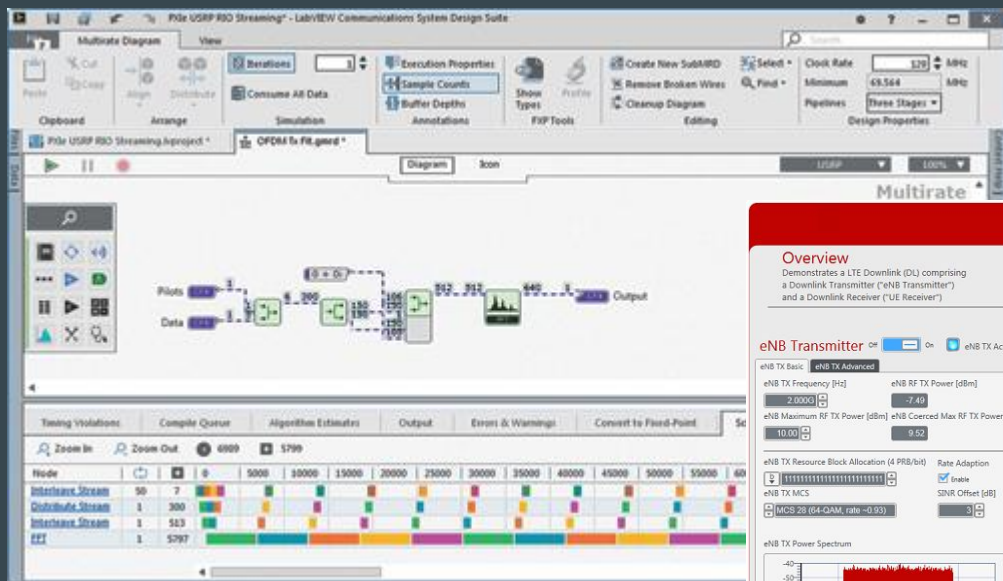
Design Tools

GNU Radio

- Very popular, active community
- Lots of blocks ready-to-use
- GPL

LabVIEW Communications

- From Design to Test
- Reference Designs, Examples, Support
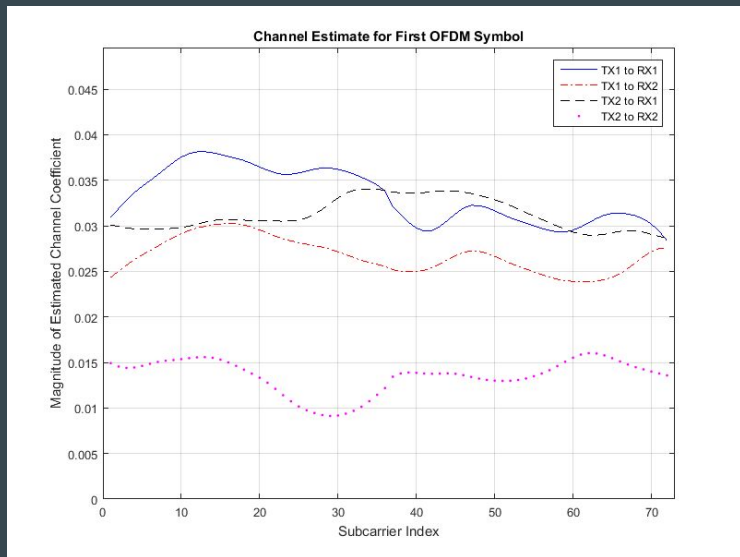- Commercial Product

LabVIEW FPGA

- Graphical FPGA Design
- LTE, 802.11 App Frameworks
- Commercial Product

Matlab

```matlab
radioFound = false;
radiolist = findsdru;
for i = 1:length(radiolist)
  if strcmp(radiolist(i).Status, 'Success')
    if strcmp(radiolist(i).Platform, 'B210')
        radio = comm.SDRuReceiver('Platform','B210', ...
                   'SerialNum', radiolist(i).SerialNum);
        radio.MasterClockRate = 1.92e6 * 4; % Need to exceed 5 MHz minimum
        radio.DecimationFactor = 4;          % Sampling rate is 1.92e6
        radioFound = true;
        break;
    end
    if (strcmp(radiolist(i).Platform, 'X300') || ...
        strcmp(radiolist(i).Platform, 'X310'))
        radio = comm.SDRuReceiver('Platform',radiolist(i).Platform, ...
                   'IPAddress', radiolist(i).IPAddress);
        radio.MasterClockRate = 184.32e6;
        radio.DecimationFactor = 96;         % Sampling rate is 1.92e6
        radioFound = true;
    end
  end
end
```
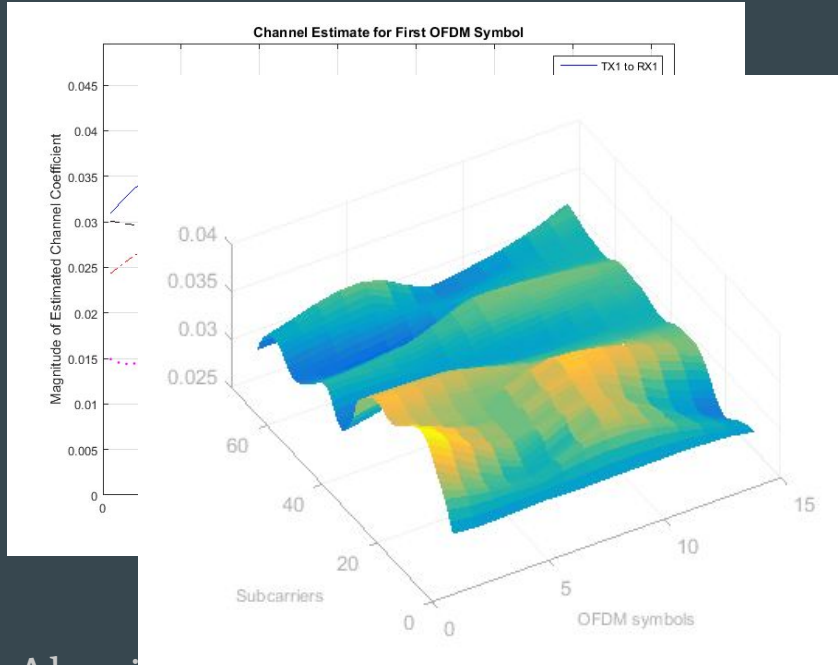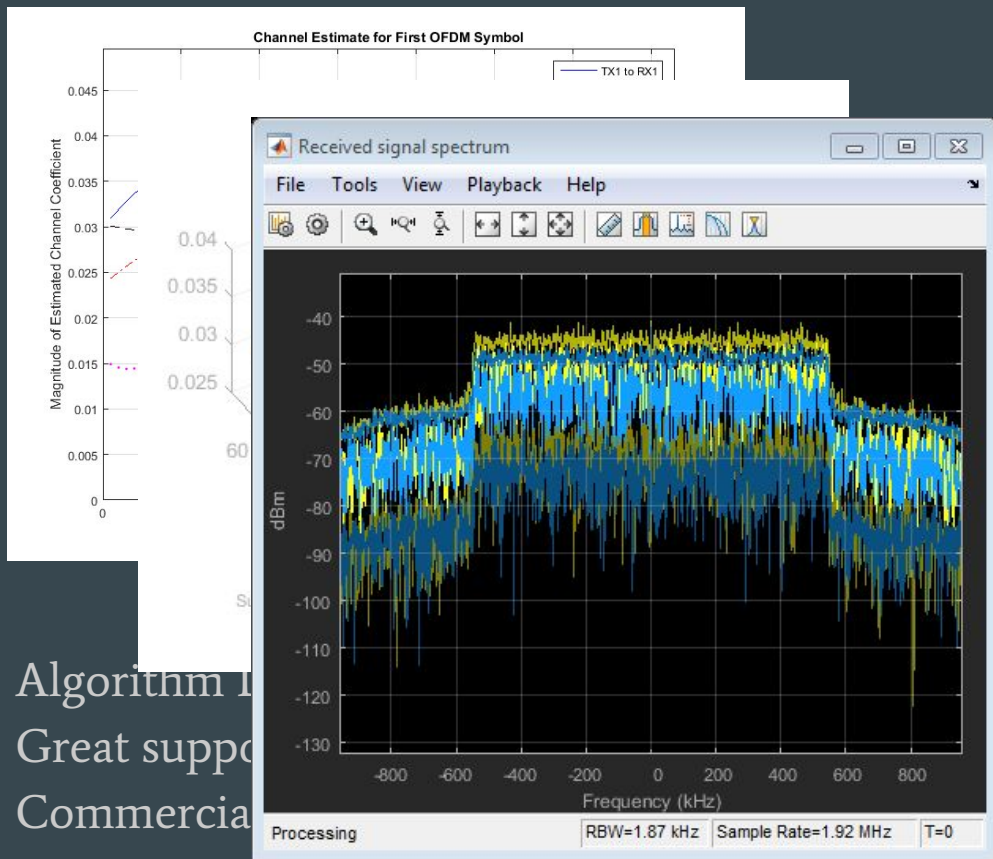
- Algorithm Design
- Great support for USRPs!
- Commercial Product

Matlab

- Algorithm Design
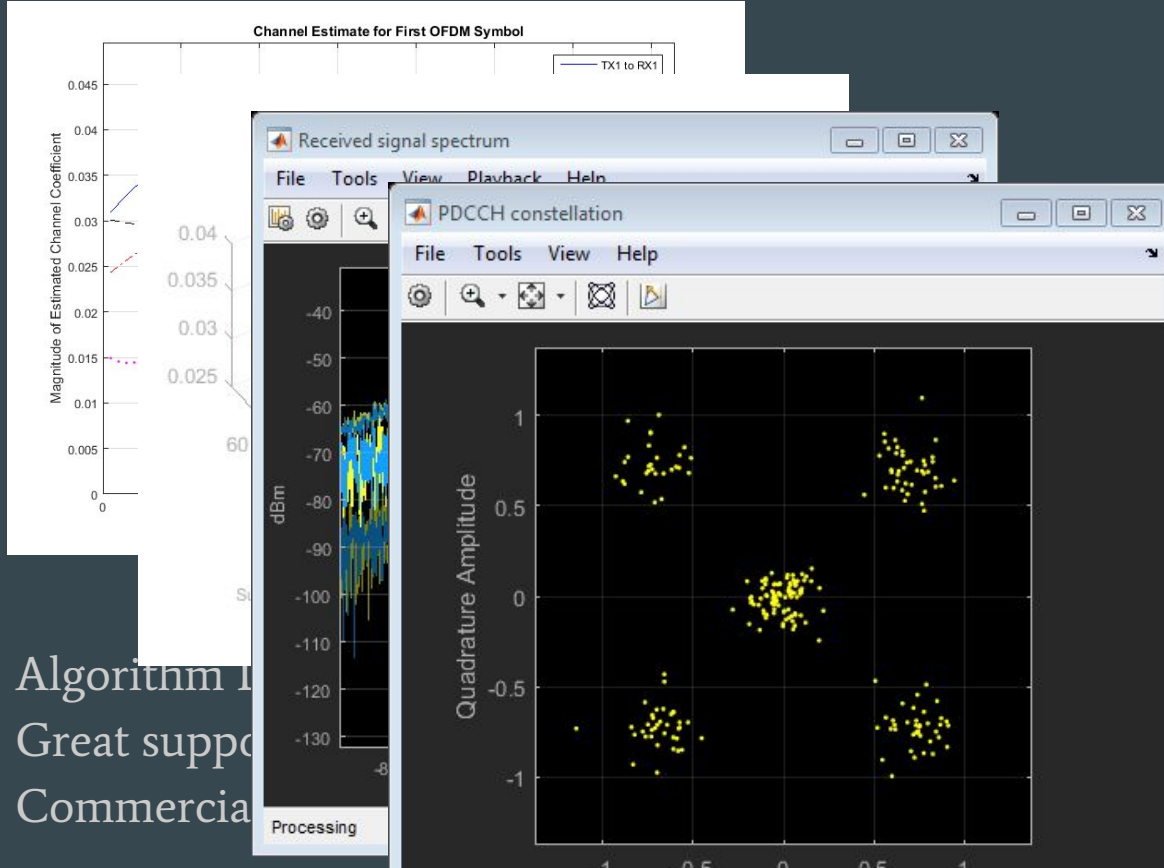- Great support for USRPs!
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Matlab

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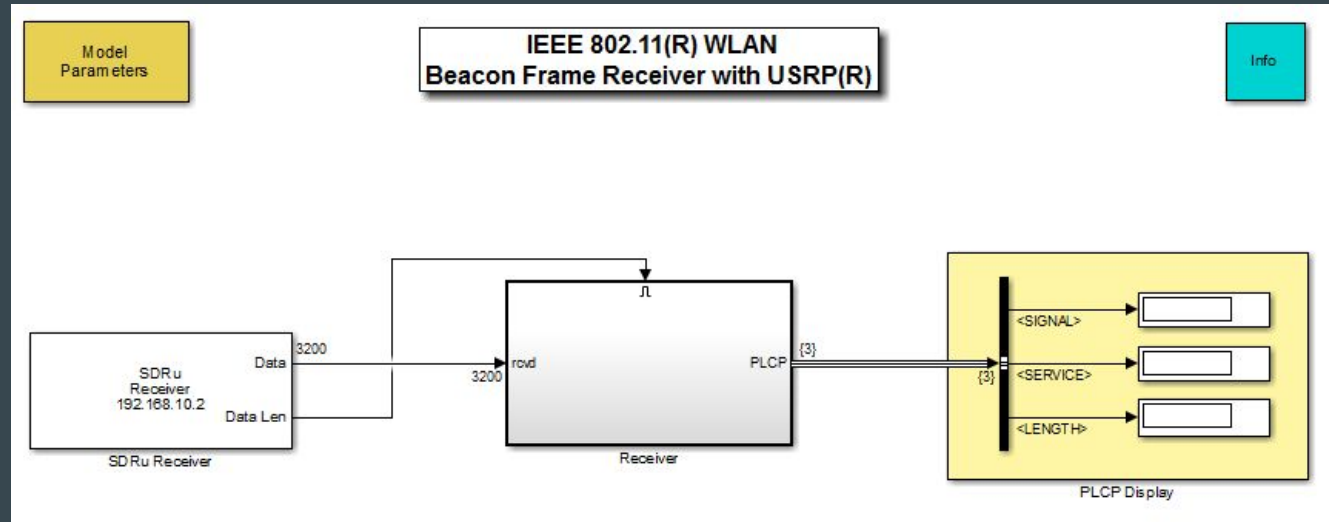
Matlab

- Algorithm
- Great supp
- Commercia

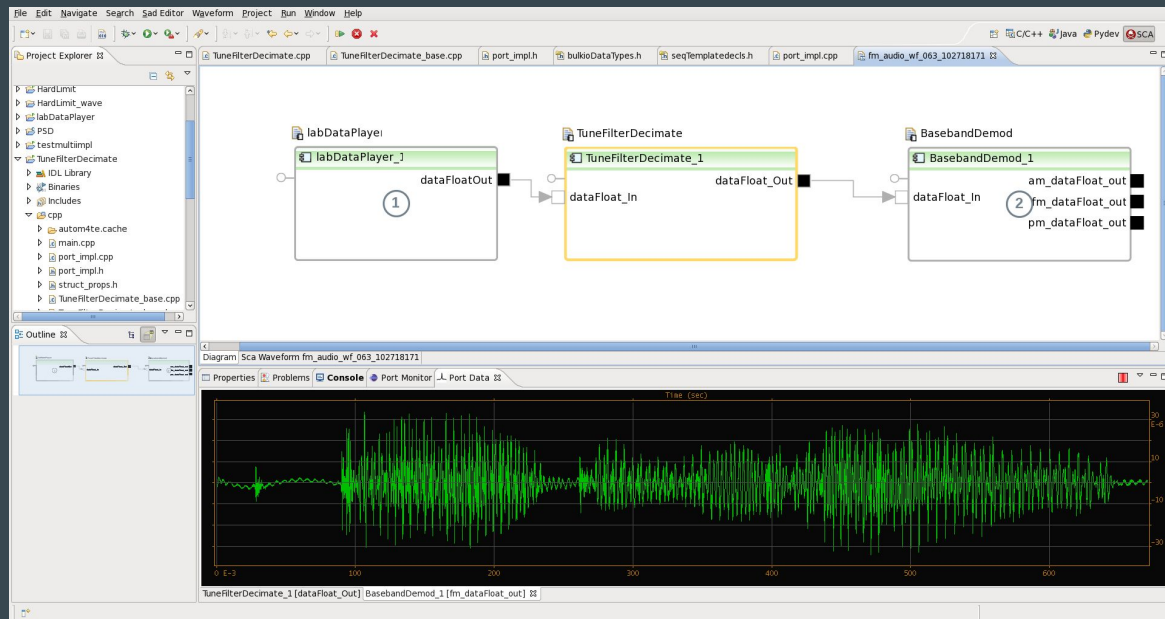# Matlab

- Algorithm
- Great suppo
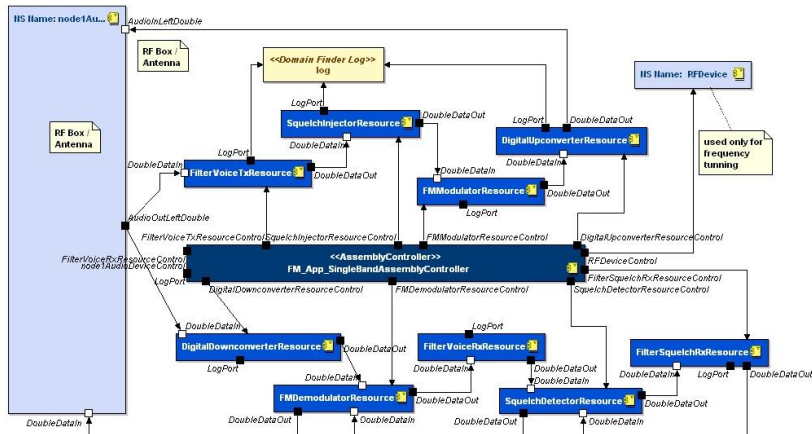- Commercia

Simulink

- Model-Based Design
- Generate HDL from Block Diagrams
- Commercial Product

REDHAWK

- Eclipse-based Design Tool
- SCA Framework
- LGPL

NordiaSoft SCARI

- SCA CF & Design Tools
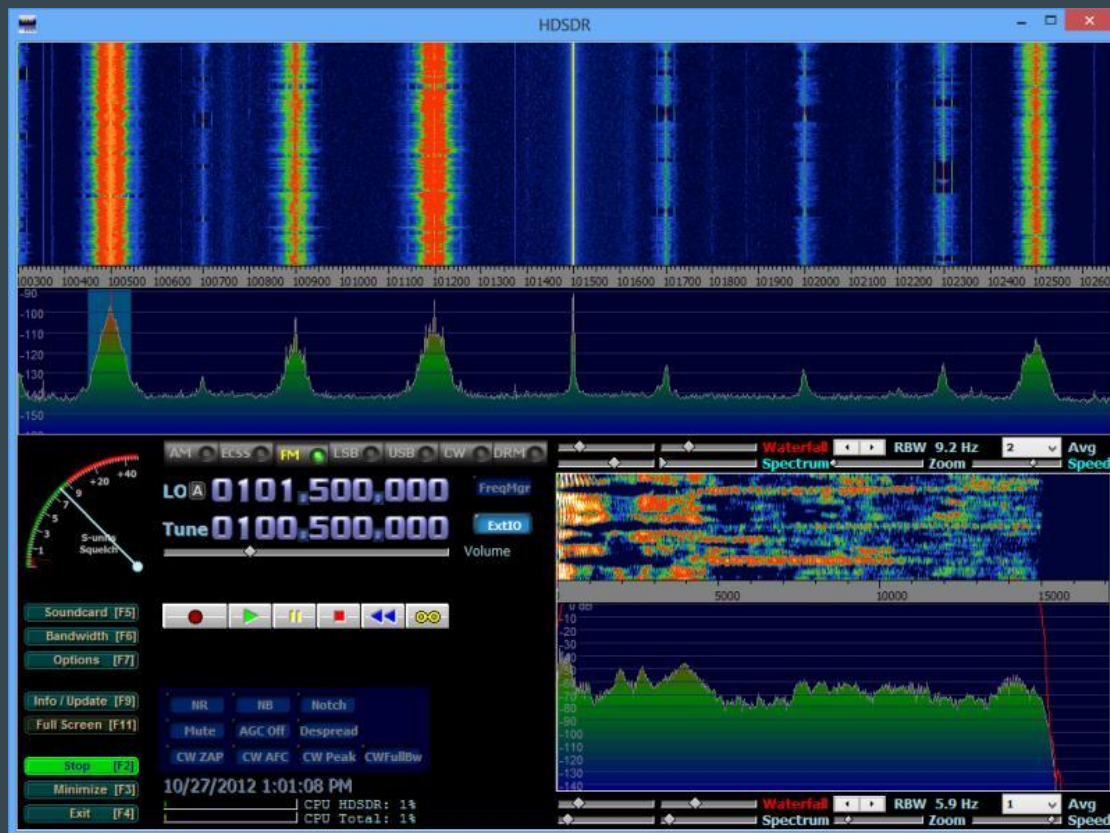- SCA Compliant!!
- Commercial Product

RFNoC
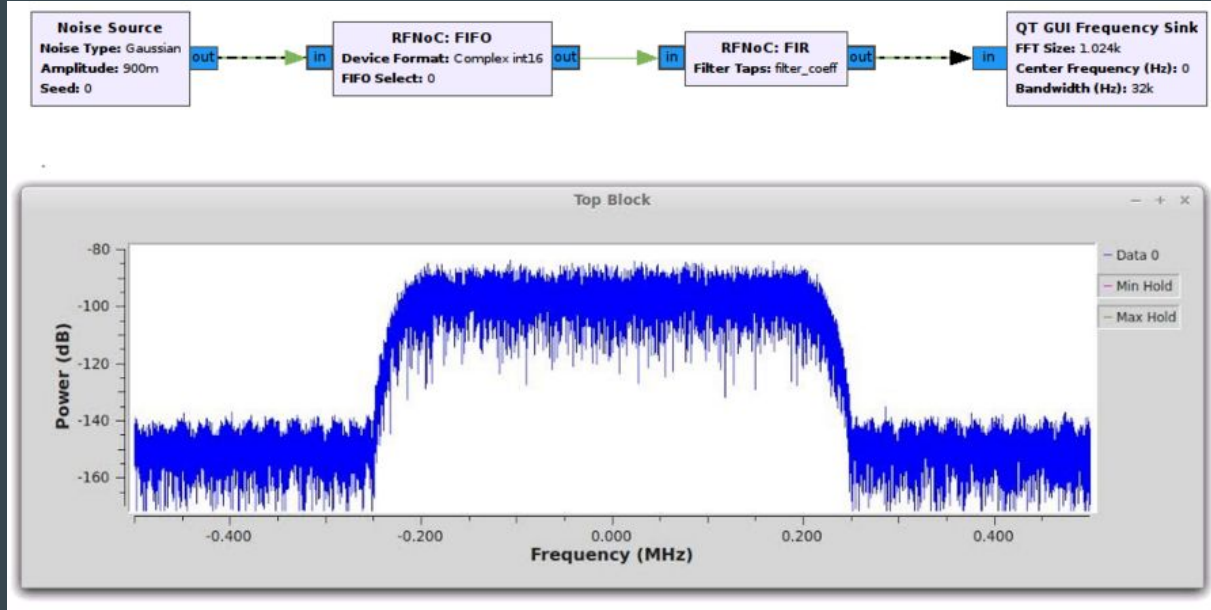
- Heterogenous Processing (focused on FPGA right now)
- Built on GNU Radio
- GPL

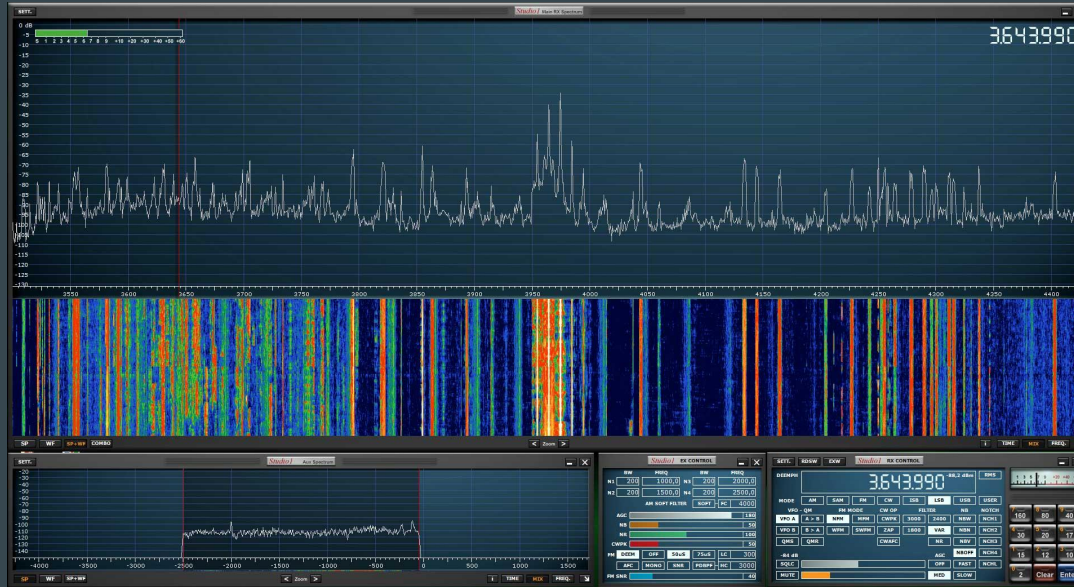# User Front-Ends

HDSDR

- Spectrum Analysis
- Click-to-Tune!
- Send to Audio
- Windows Only
- Proprietary

http://www.hdsdr.de/index.html
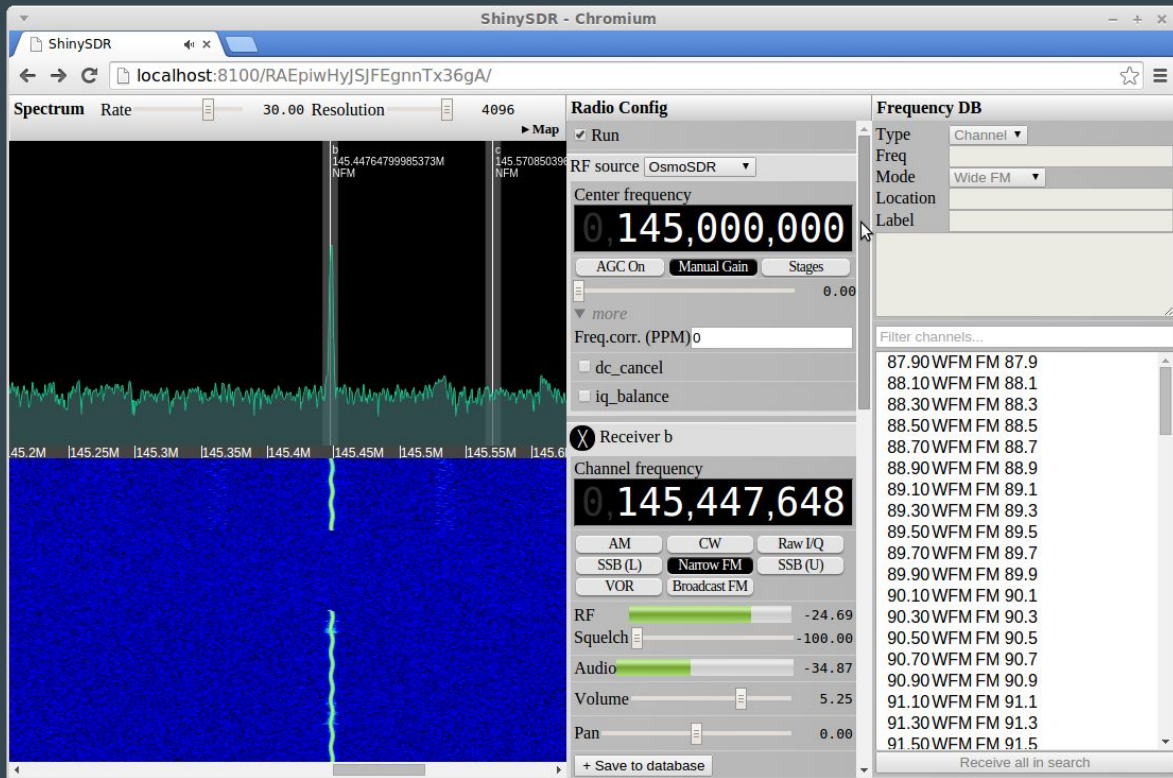
Studio1

- HAM
- Includes Demod
- Windows Only
- Proprietary

http://www.woodboxradio.com/studio1.html

ShinySDR

- Web Based
- Remote Access
- Includes Demods
- Uses GNU Radio
  - Custom Blocks
- GPL

https://github.com/kpreid/shinysdr

Baudline

- Signals Analysis
- Post Processing
- Proprietary

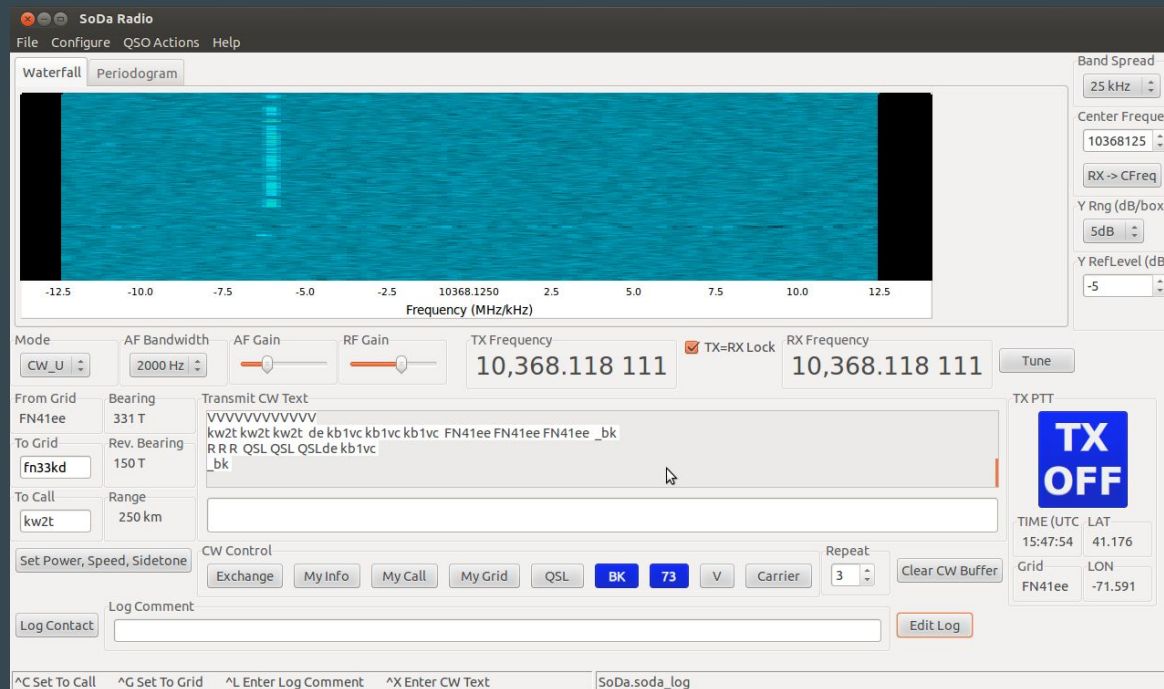http://www.baudline.com/
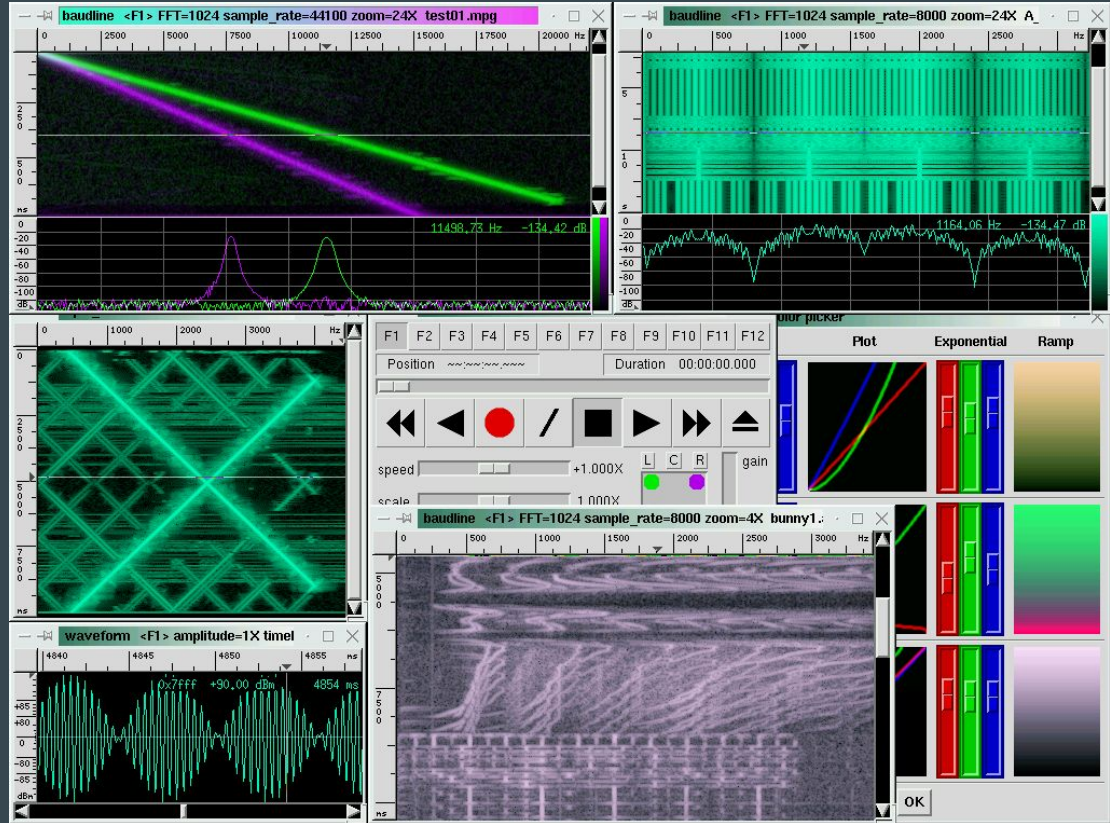
Gqrx
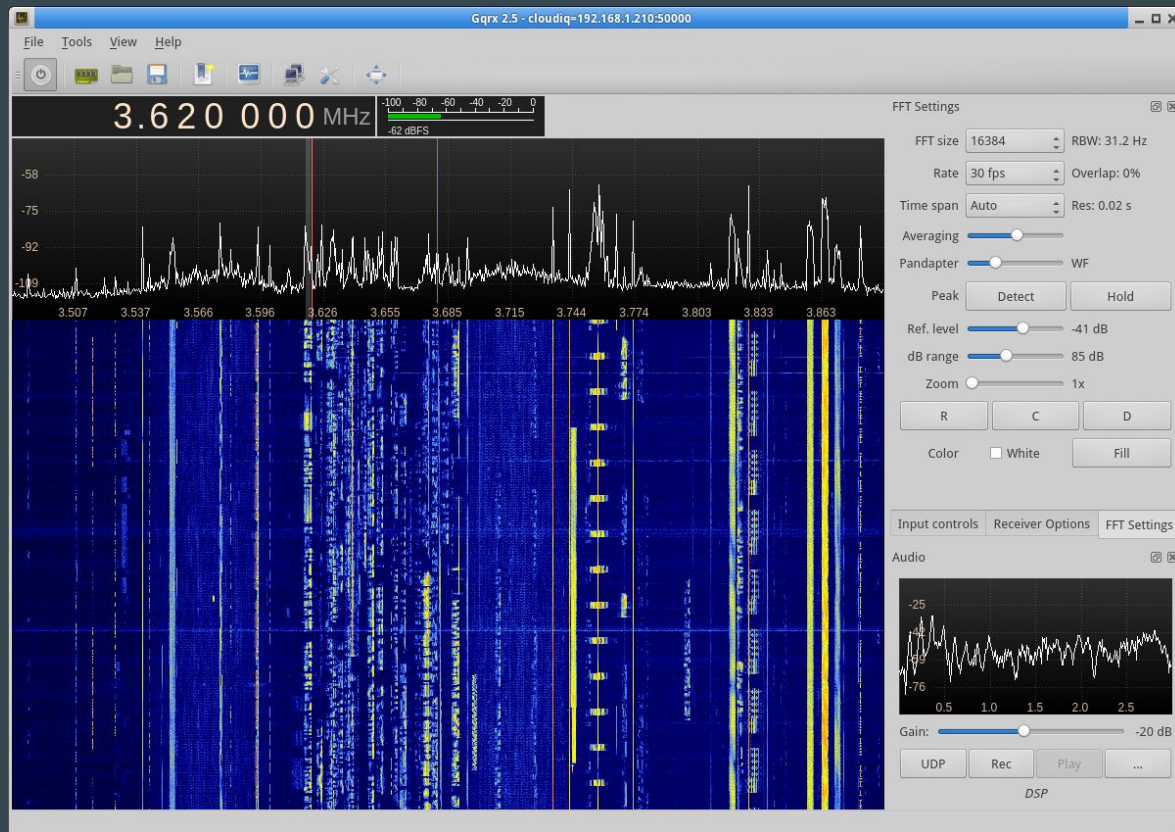
- Spectrum Analysis
- Includes Demods
- AGC, Squelch, etc.,
- Uses GNU Radio
- GPL

http://gqrx.dk/

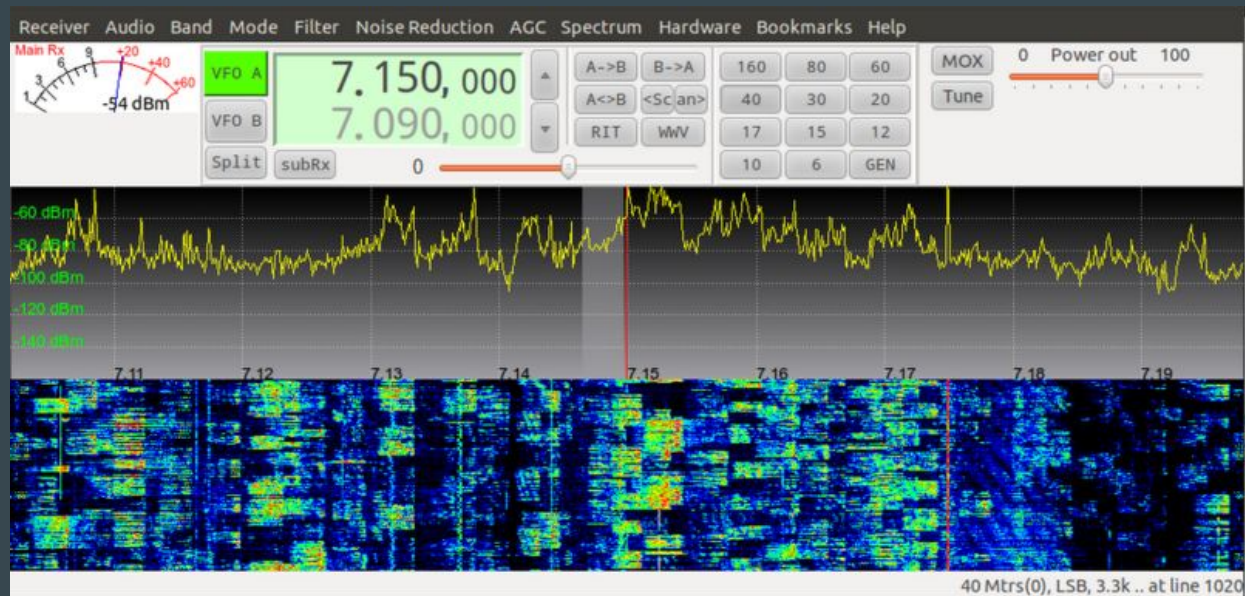# SoDaRadio

- HAM Front-End
- Direct Text Entry
- BSD

http://sodaradio.sourceforge.net/Site/SoDaRadio.html

SDR-Console
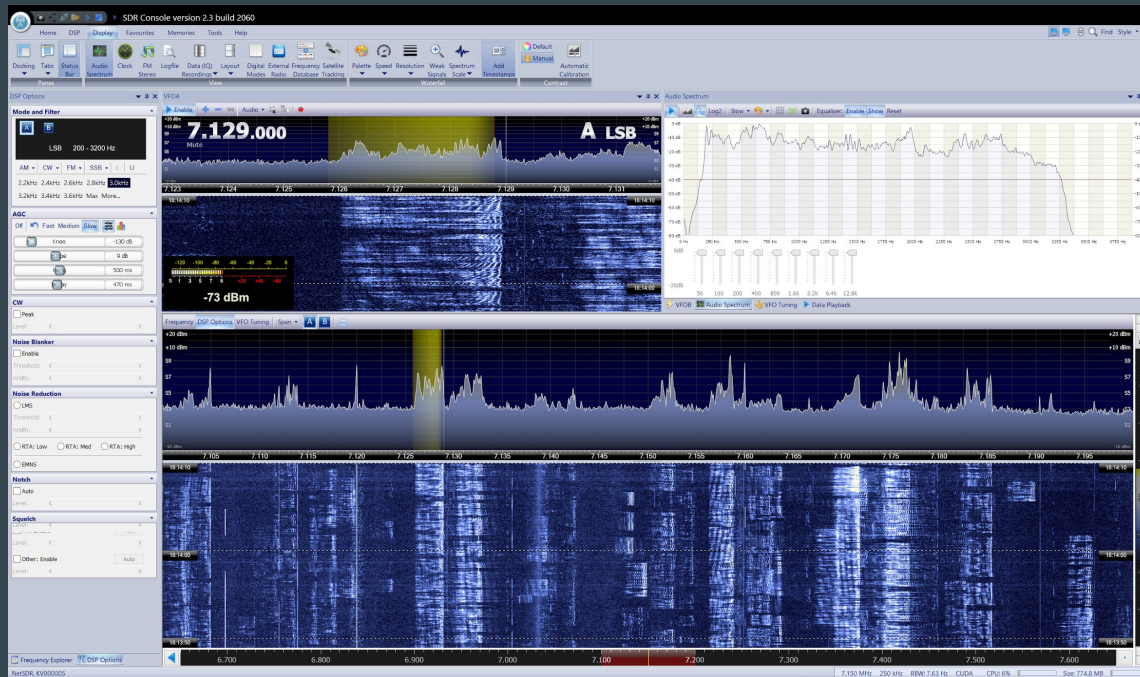
- HAM Focus
- Includes Demods
- Signal to Audio
- Proprietary

http://sdr-radio.com/Software
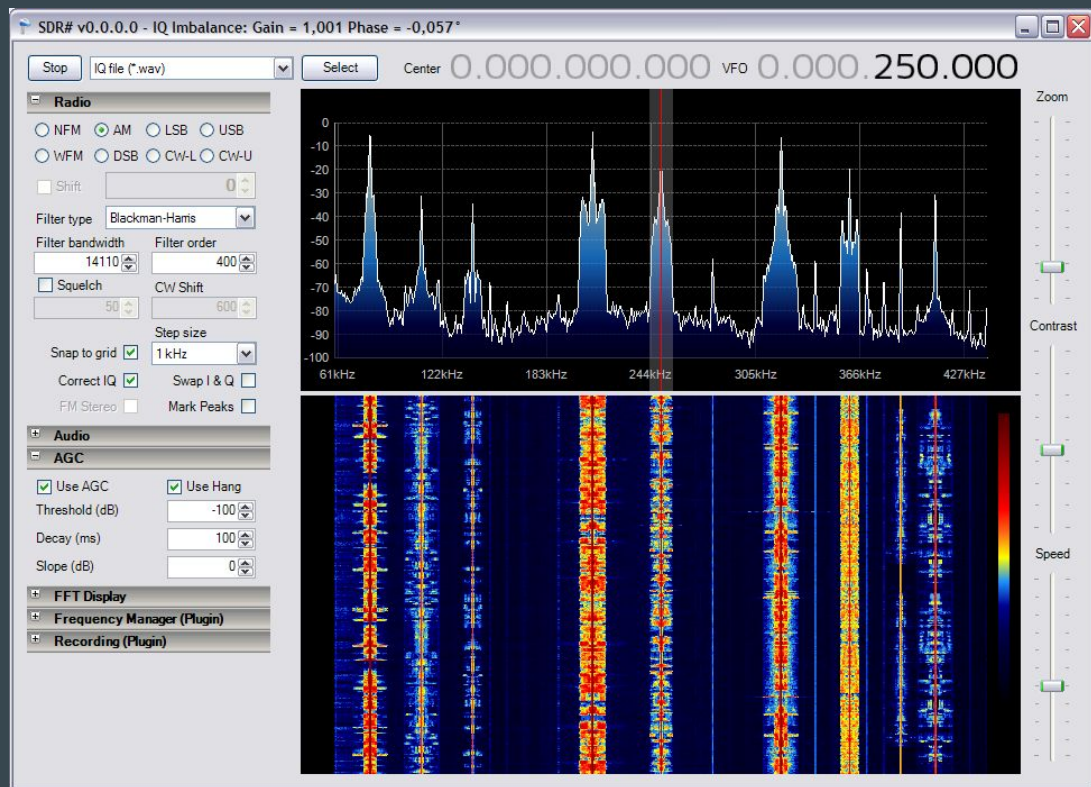
QtRadio / ghpsdr3-alex

- Server / Client
- Remote Access
- Map of Servers
- GPL

http://napan.ca/ghpsdr3/index.php/Main_Page

SDR#

- Monitoring
- Windows Only
- Proprietary

http://airspy.com/download/

Through the magic of software abstraction...

USRP Hardware Driver (UHD)

- Every tool in this presentation uses UHD to talk to USRPs
- C or C++ Interfaces
- Compile into dynamic or static library
  - Easy to package with your own application that uses USRPs!
- GPL or Proprietary Licenses Available

USRP