GNU Radio Workshop

Marcus Müller and Bastian Bloessl

July 2017 ▪ HAMRADIO ▪ SDR Academy ▪ Friedrichshafen, Germany

Master Plan

- GNU Radio 101

- Building an FM receiver

- Using OOTs

- Extending GNU Radio

Hands-On!

Material is Online

https://github.com/bastibl/gnuradio-workshop

About Us: Marcus Müller

- **Research Assistant** @ CEL, Karlsruhe Institute of Technology

- **Engineer** @ Ettus Research
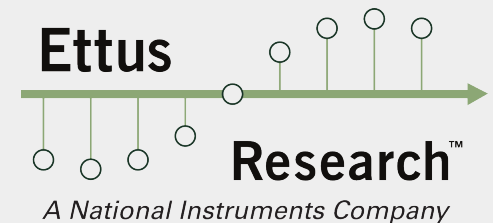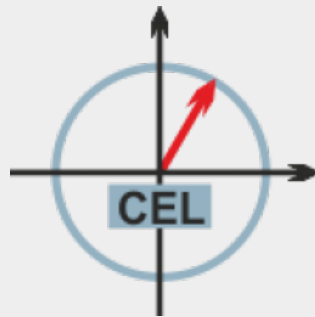
About Us: Bastian Bloessl

- **Researcher** @ Connect Center
  Trinity College Dublin

- **Engineer** @ SRS
  Software Radio Systems
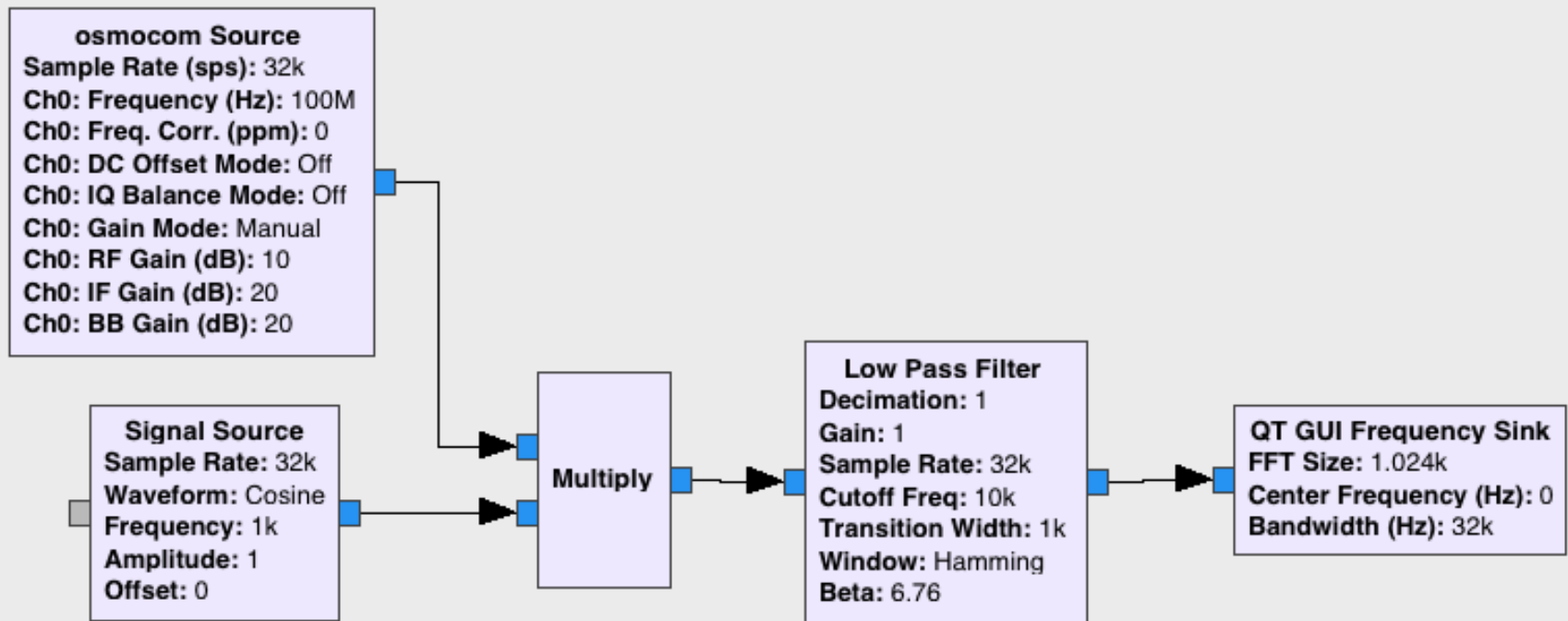
GNU Radio is…

- A signal processing library

- Designed for real-time

- The software part of an SDR

- Not a radio application

- The tool to **build your own** transceivers
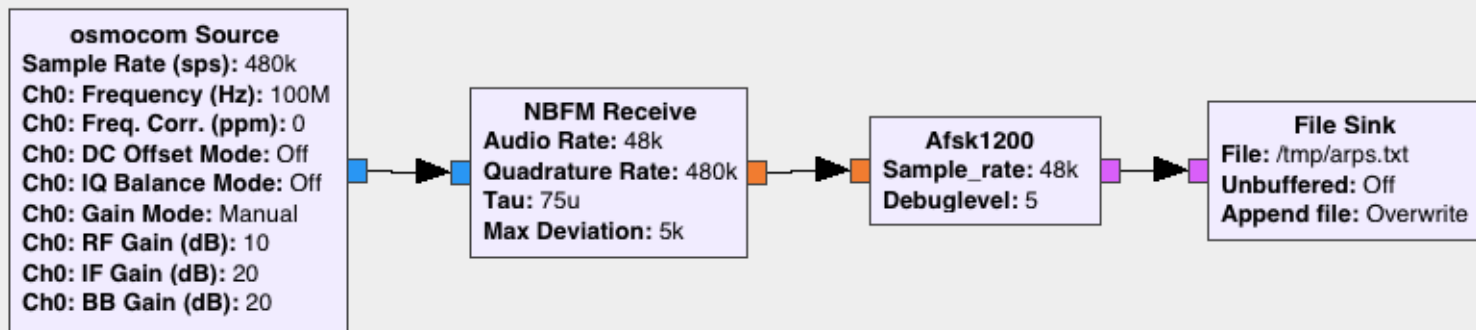
Matches perfectly with the ham spirit

Basic Concept: Flow Graph

- Transceivers are implemented as *flow graphs*
- Similar to Simulink / schematics
- Define structure and parameters of *blocks*
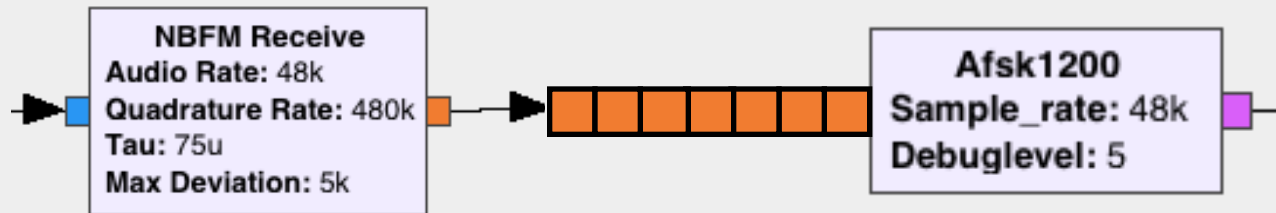
Basic Concept: Block

- Written in C++ or Python

- Implement one logical step

- Each block run in separate thread

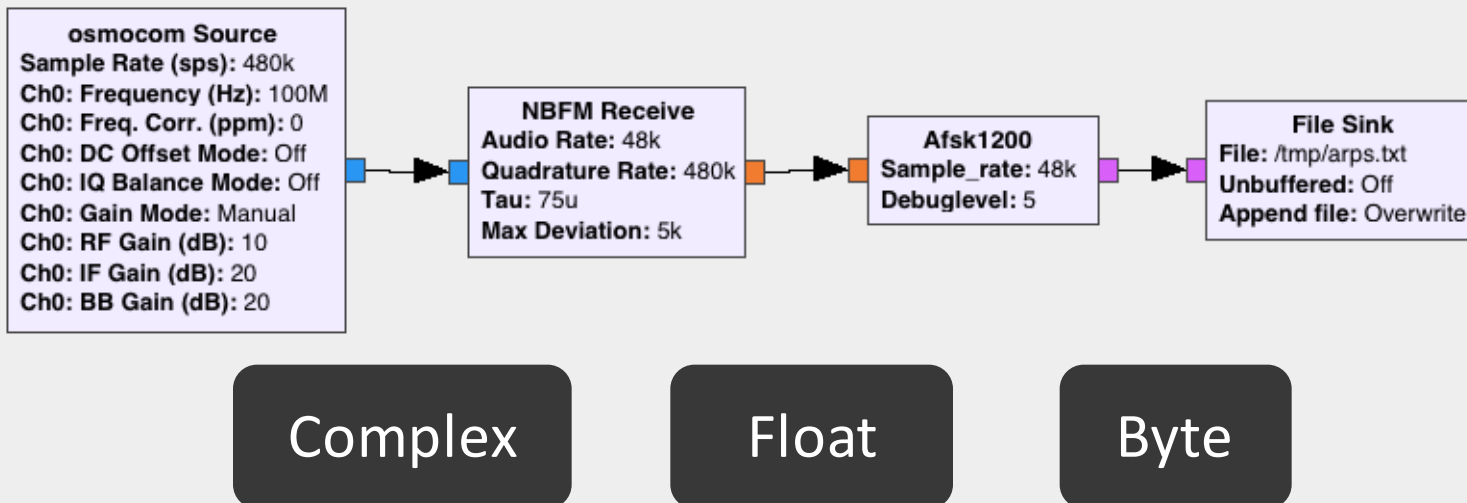- Can be encapsulated into hierarchical blocks

Data Streams

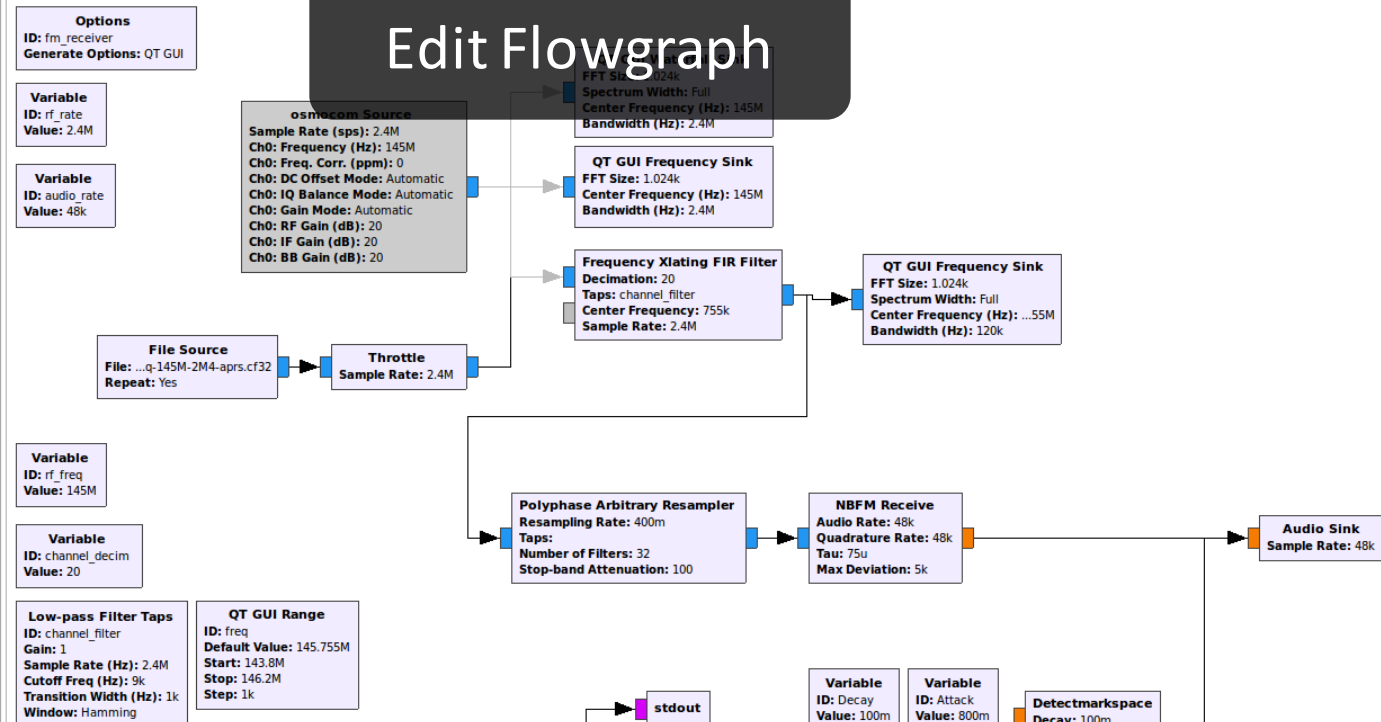- Samples are buffered

- Data types are color-coded

| Complex | Float | Byte |

GNU Radio Companion

GUI Output and Instrumentation
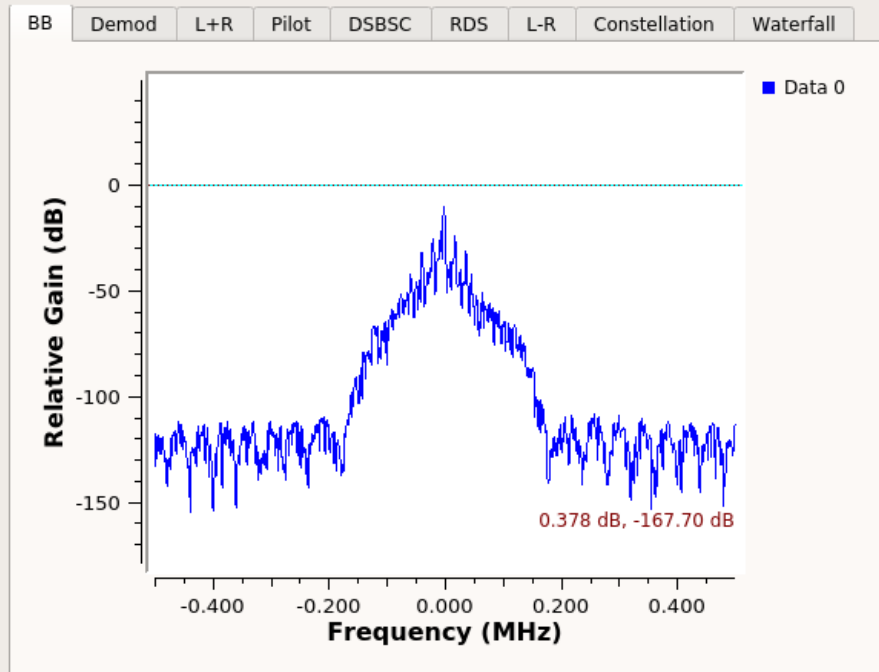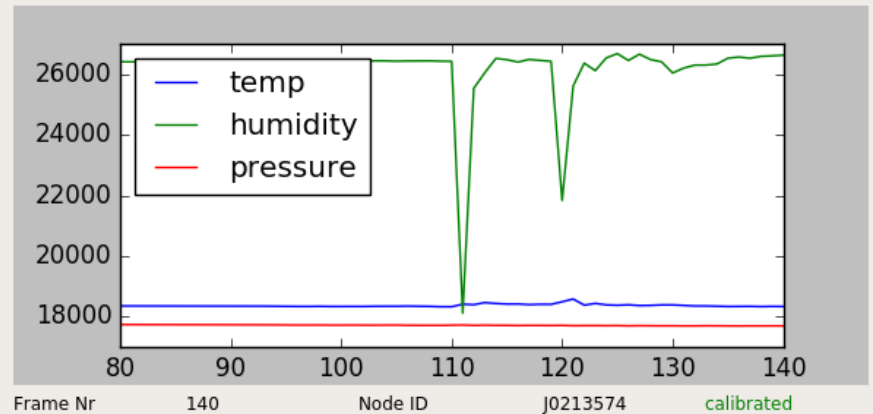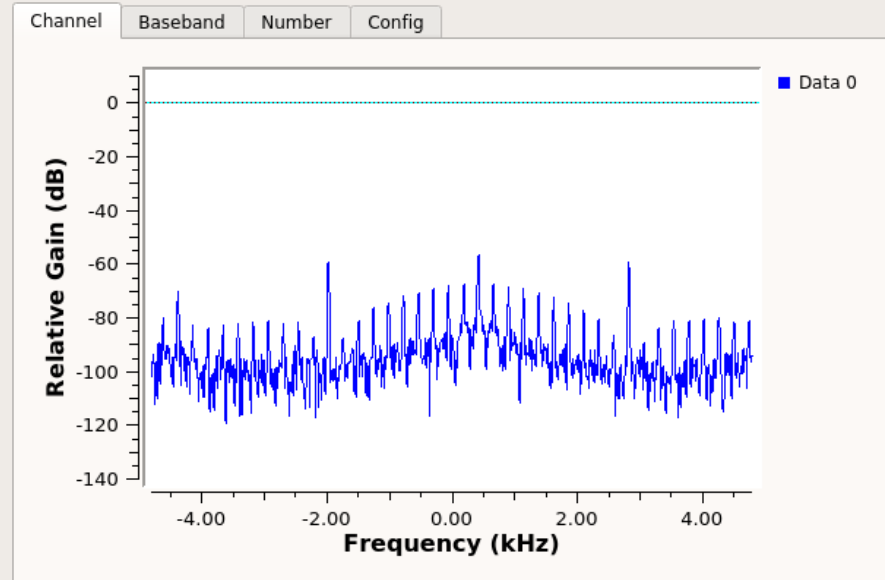
GQRX - a GNU Radio Application
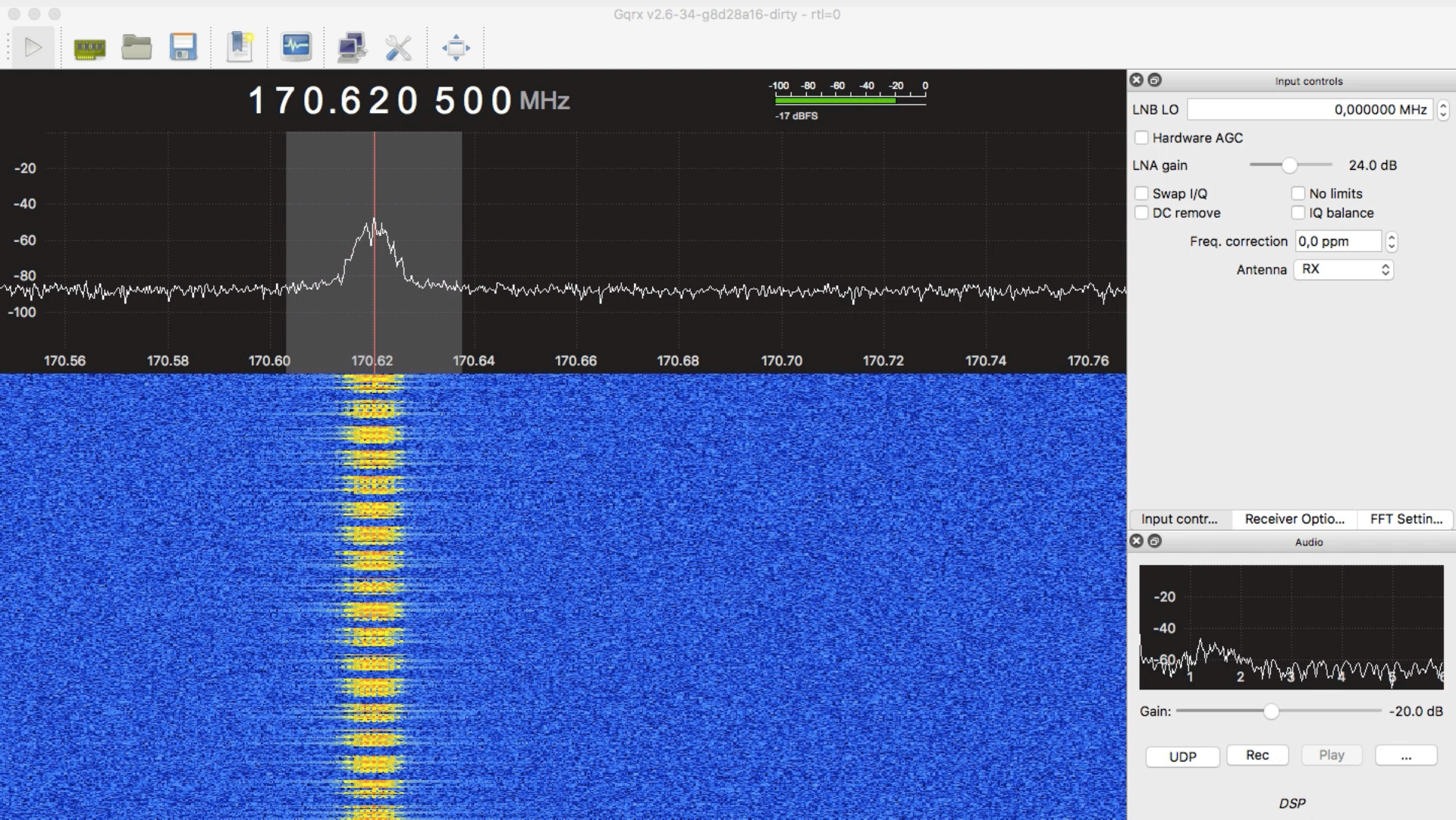
Out Of Tree Modules

- GNU Radio can be extended with OOTs
- OOTs cover more specific functionality
- There is a large number available
- CGRAN is our central database

GNU Radio is used by

Commercial R&D

Defense Research

Infosec Research

Academic Research

Hardware Vendors

Students

Hobbyists

Professional Service Providers

GNU Radio is an Ecosystem

- Active Open Source community

- PyBombs, OOTs

- GRCon

- GNU Radio Foundation

- FOSDEM SDR DevRoom

- GSoC, SoCIS, R&S Competition, SDR Academy

Installing GNU Radio

- From source: GitHub

- Package manager

  - Some are pretty outdated

- macOS / homebrew

- **PyBombs**: integrated dependency management and 3rd party application installation

Learn // Discuss // Connect

- Website: www.gnuradio.org

- Development: github.com/gnuradio

- **Mailing List: discuss-gnuradio@gnu.org**

- Wiki: wiki.gnuradio.org

- Slack: slack.gnuradio.org

- Facebook: gnuradioproject

- Twitter: @gnuradio

GNU Radio Workshop

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