Extend RF Boundaries.

Using HAROGIC Spectrum Analyzer in GNU Radio

V25.11

HAROGIC

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HAROGIC offers a rich variety of product forms and frequency options, covering both modular and handheld devices with USB and Ethernet interfaces. The frequency range includes 4.5/6/9/20/40 GHz, with a maximum sweep speed of up to 1 THz/s (RBW=250 kHz). All spectrum analyzers are professionally calibrated and are suitable for applications in testing, measurement, and software-defined radio.

HAROGIC developed the GNU Radio module called gr-htra to interface with and uiltize the measurement capabilities of a HAROGIC Spectrum Analyzer. The gr-htra Out-Of-Tree (OOT) module and the SoapySDR-based hardware abstraction layer library treat the HAROGIC hardware as a data source within the flexible GNU Radio platform. Users can acquire real-time IQ data streams from HAROGIC devices within GNU Radio and visualize multiple signal analysis views, including the spectrum, spectrogram, time-domain waveform, and constellation diagram. This integration marks the official inclusion of HAROGIC spectrum analyzers into the GNU Radio open-source ecosystem, offering users a more efficient and flexible solution for signal acquisition and analysis, and accelerating the adoption of high-performance spectrum analyzers in software-defined radio applications.

1 Introduction to Solutions and Application Examples

1.1 GNU Radio Platform Adaptation Solution

The HAROGIC gr-htra module implements driver support and data interaction for the spectrum analyzer in GNU Radio Companion. Users can load the HAROGIC HTRA: IQ Source block in the graphical interface without writing additional driver code, enabling real-time IQ signal acquisition and display.

In addition, HAROGIC supports the universal SoapySDR interface, further enhancing the device's cross-platform adaptability and operational flexibility. The gr-htra OOT module is specifically designed for HAROGIC devices, delivering lower latency and higher execution efficiency on the GNU Radio platform, while the SoapySDR interface offers greater advantages in cross-platform compatibility and system flexibility. Users can quickly build various communication and signal analysis systems using either of these two integration approaches.

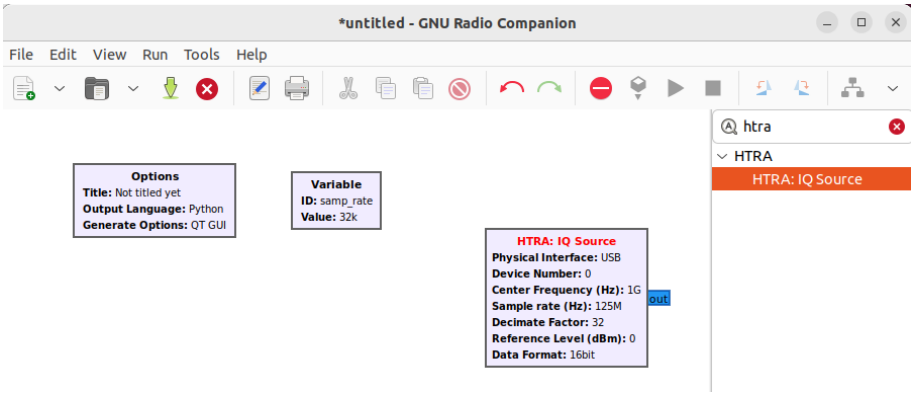

Figure 1 Load OOT module in GNU Radio

1.2 Example and Open-Source Project Support

HAROGIC provides typical signal processing and demodulation examples, including AM/FM analog demodulation and QPSK/QAM16 digital demodulation. It also supports open-source projects such as gr-adsb, gr-dab and gr-ieee802-11, enabling the demodulation of ADS-B signals with flight path visualization, DAB digital broadcast signal demodulation, and WLAN signal demodulation.

All examples can be executed directly in the GNU Radio environment, offering users a rich and reusable framework for signal processing and analysis. This helps users in rapidly validating algorithms, building prototype systems, and conducting diverse communication experiments.

The source code for gr-htra and the associated examples can be obtained from the GitHub links below:

gr-htra project address: https://github.com/HAROGIC-Technologies/gr-htra.git

soapy-htra project address: https://github.com/HAROGIC-Technologies/soapy-htra.git

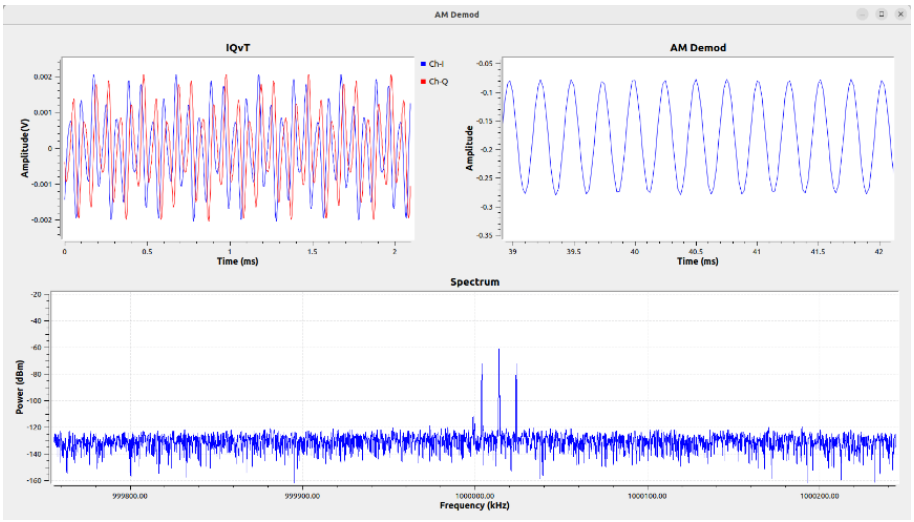

Figure 2 AM demodulation

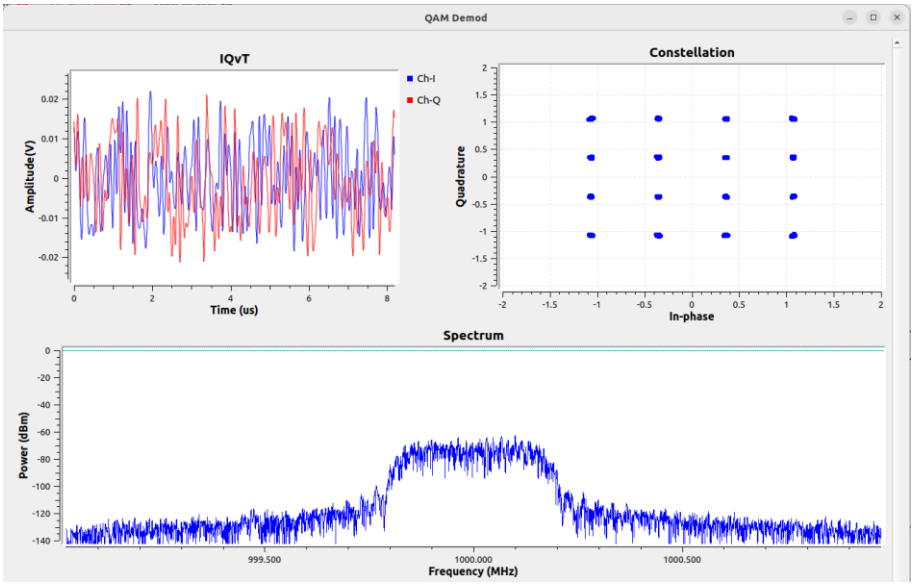

Figure 3 QAM16 demodulation

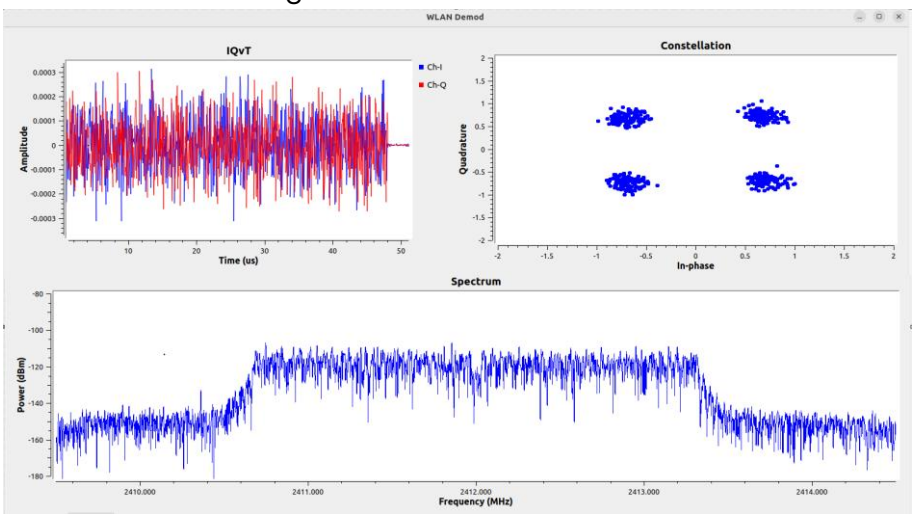

Figure 4 WLAN demodulation

2 Extended RF Boundaries

HAROGIC is continuously deepening its integration with the open-source ecosystem, providing users across various fields with efficient and flexible signal processing solutions that expand the boundaries of their applications. Building on the example projects provided by HAROGIC, users can rapidly perform algorithm verification, system integration, and prototype development. In addition, the devices can be connected to real-world wireless communication environments to enable practical applications such as spectrum monitoring and signal demodulation.

3 About HAROGIC

HAROGIC combined compact, robust, high-performance RF hardware with agile, intelligent software to help our customers extend RF boundaries.

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