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1. Why this document

I wrote this because when switching to Ubuntu 20.04 I found many trouble installing GNURadio from PPA. GNURadio as a standalone app works, however, it will be broken when you install gr-xxx libraries from PPA.

The origin of the problem is due to the fact that gnuradio libraries are installed (from PPA) in `/usr/lib/x86_64-linux-gnu` while other gr-xx libraries stay in `usr/local/lib/x86_64-linux-gnu` when installed from PPA

This document give a solution to get a functional GNURadio (3.8.2) with gr-osmosdr (rtlsdr dongles), gqrx, gr-limesdr (LimeSDR dongles) and gr-rds. The method used is of course extendable to any gr-xx library.

2. Read this before using it !

This documentation was written in september 2020 , for gnuradio installation from PPA under Ubuntu 20.04.

This document is given whitout any warranty, if could be out of date in some week or some month when gnuradio PPA will be upgraded

3. For the impatient

If you are confident with source compiling you can simply install :

- gnuradio using `ppa:gnuradio/gnuradio-releases`, and
- compile other software from source following these simple rules :
- first remove all gr-xxx installed from PPA
- remove all gr-xxx libraries installed from source without `/usr` prefix (`cd build, sudo make uninstall`)

- use command `ls /usr/lib/x86_64-linux-gnu/libgnuradio*` to check possible remaining 3.8.0 or 3.8.1 libgnuradio libraries (I've got some on my computer after trying different install and uninstall, and had to remove them one by one using Synaptic)
- when cloning gr-xxx libraries, checkout the correct branch (for gnuradio 3.8)
- when compiling gr-xx libraries, use cmake with /usr as prefix :
 - `cmake -DCMAKE_INSTALL_PREFIX=/usr ../`
- others sources don't generate libgnuradio-yyy libraries so they can be compile as usual (using `cmake ../`)

4. Before you start

- If you tried some unsuccessful installation, uninstall all gnuradio libraries (gr_osmosdr, gr-limesdr, gr-rds, ...)
- In my case gr-xxx source are under folder `~/sdr_stuff/`
- `cd ~/sdr_stuff/somelibrary/build`
- `sudo make uninstall`
- `rm -r ~/sdr_stuff/somelibrary/build`

5. Install GNURadio 3.8.2 from PPA

reference : https://wiki.gnuradio.org/index.php/InstallingGR#Ubuntu_PPA_Installation

- `sudo add-apt-repository ppa:gnuradio/gnuradio-releases`
- `sudo apt-get update`

list and choose your desired version

- `apt-cache policy gnuradio`

Note : if you install non candidate version (3.8.1 for example) your system will periodically ask you for upgrading to latest (3.8.2 as of september 2020)

install GNURadio (and UHD (for USRP)

- `sudo apt install gnuradio`
- test gnuradio-companion with command
 - `gnuradio-companion`

N.B. GNURadio libraries are installed in `/usr/lib/x86_64-linux-gnu` (`ls /usr/lib/x86_64-linux-gnu/libgnuradio*`)

Optionnal (this will take several minute and can be done later)

- Optimise GNURadio using Volk library (Vector-Optimized Library of Kernels) with command :
 - `volk_profile`

6. Installation de librtlsdr (requis pour gr-osmosdr)

RTL Dongles RTL28xx need library librtlsdr and gr-osmosdr (for GNURadio)

- Install git et cmake
 - `sudo apt install git`
 - `sudo apt install cmake`
- check the number of processors that make can use

- nproc
- do not use all processors, this break make. In my case I have 8 proc and use
 - make -j 7 (do not run this make command now)
- create one folder for all your sdr stuff :
 - mkdir ~/sdr_stuff
- Install some dependancies
 - sudo apt install libusb-1.0-0-dev liborc-0.4-dev libgmp-dev
- clone a recent librtlsdr repository
- cd ~/sdr_stuff
 - git clone <https://github.com/librtlsdr/librtlsdr.git>
 - cd librtlsdr
- I used development branch which was the most up to date
 - git checkout development
- create build folder, compile and install
 - mkdir build
 - cd build
 - cmake ../
 - make -j 7
 - sudo make install
 - sudo ldconfig

7. Install gr-osmosdr

- Install some dependancies
 - sudo apt install swig swig3.0
- Clone repository gr-osmosdr
 - cd ~/sdr_stuff
 - git clone https://git.osmocom.org/gr-osmosdr
 - cd gr-osmosdr
- N.B. master branch is the default branch
 -
- create build folder, **cmake with prefix**, compile and install (*)
 - mkdir build
 - cd build
 - cmake -DCMAKE_INSTALL_PREFIX=/usr ../
 - make -j7
 - sudo make install
 - sudo ldconfig
- open gnuradio-companion verify that RTL-SDR and OSMOCOM sources are available
- At this step RTL Dongle are not usable : see below.

8. If SDR dongles are not functionals

- rtl_test command list your RTL-SDR devices
 - rtl_test
 - Found 1 device(s):
 - 0: Realtek, RTL2838UHIDIR, SN: 00000001

- Using device 0: Generic RTL2832U OEM
- and display an error if rtl_test fail to open the device
 - usb_claim_interface error -6
 - Failed to open rtl_sdr device #0.
- you need to blacklist all your rtl dongle so that that are not used by some software at startup
- creat file /etc/modprobe.d/blacklist-dvb.conf
 - sudo gedit /etc/modprobe.d/blacklist-dvb.conf
- and copy some text as follows

```
#=====
```

```
# DVB blacklist
```

```
# Blacklist entries to prevent the DVB side from hooking
```

```
# any RTL28xxx stick from TV usage, to use them as rtl-sdr devices
```

```
blacklist dvb_usb_rtl28xxu
```

```
blacklist rtl2832
```

```
blacklist rtl2830
```

```
#=====
```

- you should have one line by device ID,
- You need to reboot so that blacklisting occurs
- reboot
- you can now test rtl dongle whith GNURadio or one command among :
 - rtl_adsb rtl_ir rtl_tcp rtl_wavestream
 - rtl_biast rtl_power rtl_test
 - rtl_eeprom rtl_raw2wav rtl_udp
 - rtl_fm rtl_sdr rtl_wavestat

9. Install gqrx (v 2.12)

Il faut installer gqrx depuis un dépôt récent.

- Install dependancies
 - sudo apt-get install qtbase5-dev qtdeclarative5-dev libqt5svg5 libqt5svg5-dev libasound2 libasound2-dev libjack-dev libportaudio2 portaudio19-dev libpulse-dev
- clone one recent repository such as <https://github.com/csete/gqrx>
 - cd ~/sdr_stuff
 - git clone <https://github.com/csete/gqrx>
 - cd gqrx
- create build folder, compile and install (*)
 - mkdir build
 - cd build
 - cmake ../
 - make -j 7
 - sudo make install
 - sudo ldconfig
- Commande `gqrx` launch GQRX

10. Install gr-rds (optionnal)

gr-rds library is used to demodulate and display FM RDS signal in gnuradio-companion

- `cd ~/sdr_stuff`
- `git clone https://github.com/librtlsdr/librtlsdr.git`
- Use default 3.8 branch
 - `cd gr-rds`
- create build folder, **cmake with prefix**, compile and install (*)
 - `mkdir build`
 - `cd build`
 - `cmake -DCMAKE_INSTALL_PREFIX=/usr ../`
 - `make -j7`
 - `sudo make install`
 - `sudo ldconfig`

11. Using LimeSDR dongle (optionnal)

Using LimeSDR dongle (http://wiki.myriadrf.org/Lime_Suite) requires LimeSuite and gr_limesdr (for GNURadio)

- Install some dependancies
 - `sudo add-apt-repository -y ppa:myriadrf/drivers`
 - `sudo apt-get update`
 - `sudo apt-get install limesuite liblimesuite-dev limesuite-udev`
 - `sudo apt-get install soapysdr-tools soapysdr-module-lms7`
- cloner le dépôt de LimeSuite
 - `cd ~/sdr_stuff`
 - `cd gr-limesdr`
- sélectionner la branche gr-3.8
 - `git checkout gr-3.8`
- create build folder, **cmake with prefix**, compile and install (*)
 - `mkdir build`
 - `cd build`
 - `cmake -DCMAKE_INSTALL_PREFIX=/usr ../`
 - `make -j7`
 - `sudo make install`
 - **sudo ldconfig**