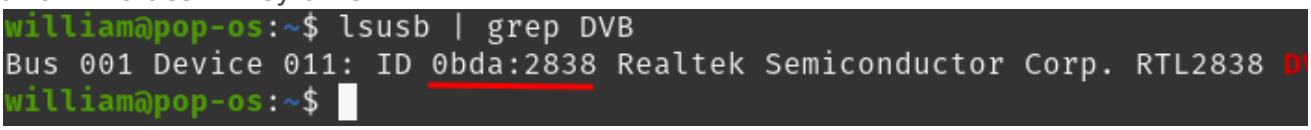
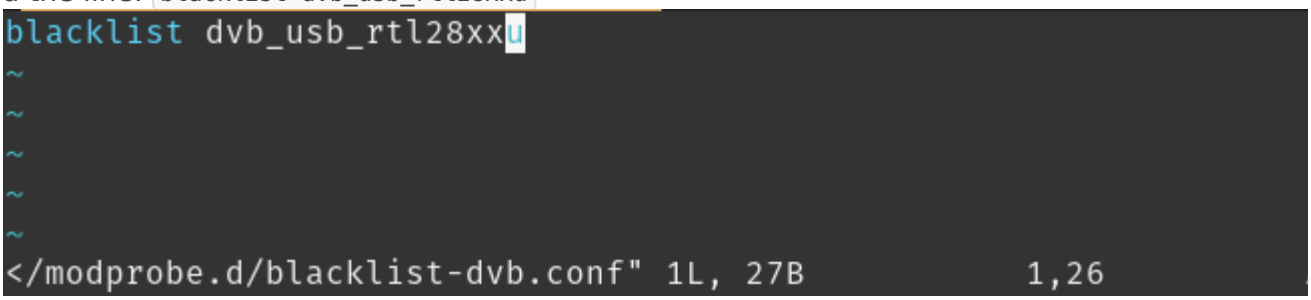
Install & Configure SDR receiver

This guide specifically is for the **Nooelec NESDR Mini 2+** USB RTL-SDR and ADS-B Receiver Set in a Debian or Ubuntu based environment, but should work for other similar SDR receivers (Especially Realtek ones).

- Plug in your SDR receiver to USB
- Run command: `lsusb | grep DVB`
  - If there are no results, make sure the USB device is plugged into a working USB port.
- Note down the two 4-digit values separated by a colon. This is the Vendor ID and Device ID of your SDR receiver. I will use the ones shown in this screenshot for this guide, but use your own values if they differ:
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- Open/Create the following file (as root): **/etc/modprobe.d/blacklist-dvb.conf**
- Add the line: `blacklist dvb_usb_rtl28xxu`
  - 

  - The tildes here represent the end of the file and are not actually part of the file.
- Save and close the file
  - This will block the default driver that is installed for this device. That driver does not work for general SDR purposes
- Install the **rtl-sdr** package: `sudo apt install rtl-sdr`
- Open/Create the following file (as root): **/etc/udev/rules.d/20.rtlsdr.rules**
- Add the line: `SUBSYSTEM=="usb", ATTRS{idVendor}=="0bda", ATTRS{idProduct}=="2838", GROUP="adm", MODE="0666", SYMLINK+="rtl_sdr"`
  - Ensure the Vendor and Device/Product IDs match the ones from before. You can run the command "lsusb | grep DVB" again if you forgot to write them down.

```
SUBSYSTEM=="usb", ATTRS{idVendor}=="0bda", ATTRS{idProduct}=="283
 GROUP="adm", MODE="0666", SYMLINK+="rtl_sdr"
~
~
~
~
<udev/rules.d/20.rtlsdr.rules" 1L, 114B                1,113         A
```

- Save and close the file
- Add your user to the *adm* user group so that it has permission to access the device. In the command below change the end to your ubuntu username:
  - `sudo usermod -a -G adm william`
- Unplug your USB device and then run this command to load the new rule:
  - `sudo udevadm control --reload-rules`
- Plug your USB device back in and run this command to test it: `rtl_test`
  - It should look something like this and not list any errors. If there are errors try running as root. If it works as root that means your user doesn't have proper permissions or the udev rules file is incorrect. Try those steps again.

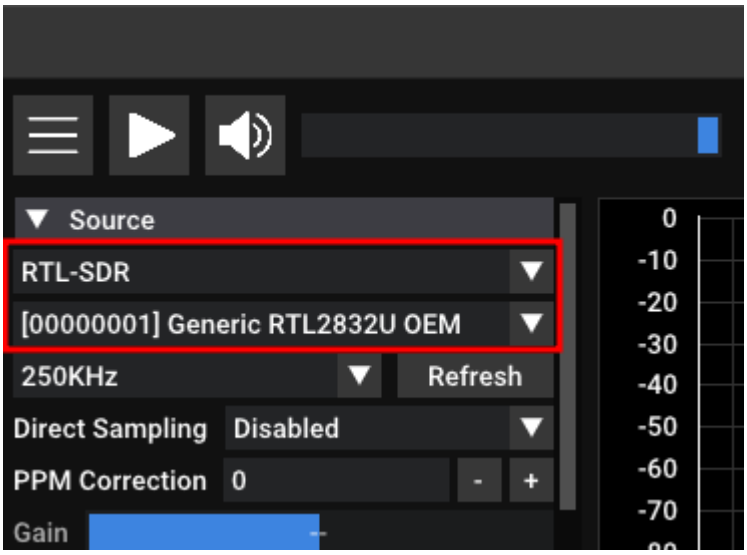
```
william@pop-os:~$ rtl_test
Found 1 device(s):
  0:  Realtek, RTL2838UHIDIR, SN: 00000001

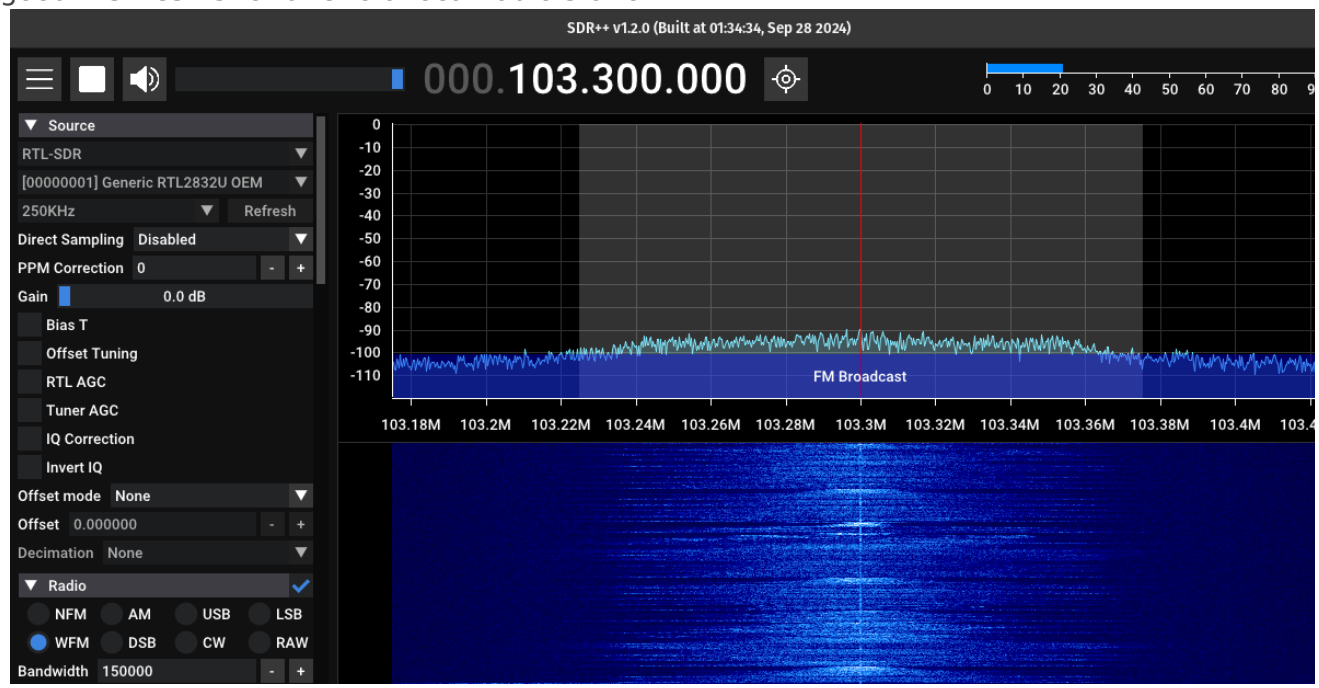
Using device 0: Generic RTL2832U OEM
Detached kernel driver
Found Rafael Micro R820T tuner
Supported gain values (29): 0.0 0.9 1.4 2.7 3.7 7.7 8.7 12.5 14.4 15
6.6 19.7 20.7 22.9 25.4 28.0 29.7 32.8 33.8 36.4 37.2 38.6 40.2 42.1
4 43.9 44.5 48.0 49.6
[R82XX] PLL not locked!
Sampling at 2048000 S/s.

Info: This tool will continuously read from the device, and report i
samples get lost. If you observe no further output, everything is fi

Reading samples in async mode...
Allocating 15 zero-copy buffers
```

- If all is working the process will keep running with no further output. You can use **Ctrl-C** to stop the process now.
- If you have an SDR program (like SDR++), open it and see if you can access the device
  - You may need to change the Device type to **RTL-SDR** before your device is displayed



- A good first test is to tune to a local radio station
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- Congrats! Now it's time to start listening to some stuff
- If you're looking to decode messages from nearby devices you'll likely want **rtl-433** as well: `sudo apt install rtl-433`

Issues

rtl_test Errors

If you receive a "Failed to open rtlsdr device #0" error when running the `rtl_test` command, something is already accessing your USB SDR receiver. Close any applications that might be using it and try again. If you're not sure what application is using it, try unplugging your device and plugging it in again.

If you receive any gibberish characters for the device name, this likely means there is a permissions issue. Try again as root and review the instructions for setting up the udev rules/permissions.

SDR++ app not displaying/receiving

For me, SDR++ sometimes does not start receiving properly. Sometimes it does. I've not found a solution for this and I've not had this issue in other applications, so the only solution I currently have is to use a different app.

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