

# **DSLWP 卫星 Live CD 用户指南**

## **DSLWP Live CD User Manual**

**Verson 0.1**



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# 1 概述 Overview

## 1.1 关于 DSLWP About DSLWP

DSLWP is a lunar formation flying mission led by Harbin Institute of Technology for low frequency radio astronomy, amateur radio and education. It consists of a pair of 47 kg microsattellites, to be launched into a lunar transfer orbit, and finally enter a 300 x 9000km lunar elliptical orbit. Onboard each satellite, there are two VHF/UHF SDR transceivers to provide beacon, telemetry, telecommand, digital image downlink and a GMSK-JT4 repeater. Onboard transmitting power is about 2 W.

项目网站: <http://lilacsat.hit.edu.cn/>

Website: <http://lilacsat.hit.edu.cn/>

联系邮箱: [lilacsat@163.com](mailto:lilacsat@163.com)

E-mail: [lilacsat@163.com](mailto:lilacsat@163.com)

Link budgets: [http://lilacsat.hit.edu.cn/wp/?page\\_id=676](http://lilacsat.hit.edu.cn/wp/?page_id=676)

Decoder (GNU Radio OOT module): <https://github.com/bg2bhc/gr-dslwp>

Decoder (Linux Live CD): [https://1drv.ms/u/s!Av6J6WjI3UbMhHm8gwMr4Z\\_keqWH](https://1drv.ms/u/s!Av6J6WjI3UbMhHm8gwMr4Z_keqWH)

Decoder (Linux Live CD):

TLE: <http://lilacsat.hit.edu.cn/tle/dslwp.txt>

DSLWP-A Telemetry Display: [http://lilacsat.hit.edu.cn/dashboard/pages\\_en/telemetry-a.html](http://lilacsat.hit.edu.cn/dashboard/pages_en/telemetry-a.html)

DSLWP-B Telemetry Display: [http://lilacsat.hit.edu.cn/dashboard/pages\\_en/telemetry-b.html](http://lilacsat.hit.edu.cn/dashboard/pages_en/telemetry-b.html)

## 1.2 关于此 Live CD About This Live CD

本 Live CD 是一个可启动的 Ubuntu 软件无线电环境, 使用 respin-gtk 制作, 用于 DSLWP 卫星遥测的简易接收与 SDR 实验, 且不必对计算机进行永久性更改。

This Live CD is a bootable Ubuntu SDR environment created with respin-gtk for quick and easy reception of DSLWP telemetry and SDR experiment without having to make any permanent modifications to a PC or laptop.

本 Live CD 以 ISO 镜像的形式发布, 可烧录在 DVD 光盘或 U 盘中启动电脑, 也可在虚拟机中运行。

It is supplied as an ISO image to be downloaded and burned onto a recordable DVD disc or copied to a USB flash drive using a utility such as the Ubuntu Startup Disk Creator (Ubuntu Linux OS) or Unetbootin (Windows, MacOS, Linux). Creating a USB drive from the image will provide much faster booting and operation, and allow making changes and storing files. Finally, the ISO image may be

booted within a virtual environment such as VirtualBox, QEMU/kvm, VMware, or Parallels.

此 Live CD 基于如下软件制作：

- Ubuntu Linux 14.04.2 LTS;
- GNU Radio and GRC 3.7.8;
- gpredict （卫星跟踪）;
- gqrx （通用 SDR 接收机软件）;
- gr-fcdproplus;
- hamlib;
- gr-lilacsat
- gr-dslwp 等。

This Live CD is based on the following software:

- Ubuntu Linux 14.04.2 LTS,
- GNU Radio and GRC 3.7.8,
- gpredict,
- gqrx,
- gr-fcdproplus,
- hamlib,
- gr-lilacsat
- gr-dslwp, etc.

## 2 使用示例 Guided Tutorial

在本章中，我们将以使用 RTL-SDR 接收机和卫星的默认遥测模式为例，介绍 Live CD 的使用。您可根据实际的硬件情况与卫星的工作模式选择合适的 GRC 流程图。

In this chapter we will take RTL-SDR and default telemetry mode as example to show how to use this Live CD. Select the correct GRC flow graph depending on your hardware and operating mode of the satellite.

### 2.1 准备 Preparation

使用 Live CD ISO 文件制作 USB 启动盘，并启动电脑。

Make a bootable USB disk from the Live CD ISO file, then boot your computer with it.

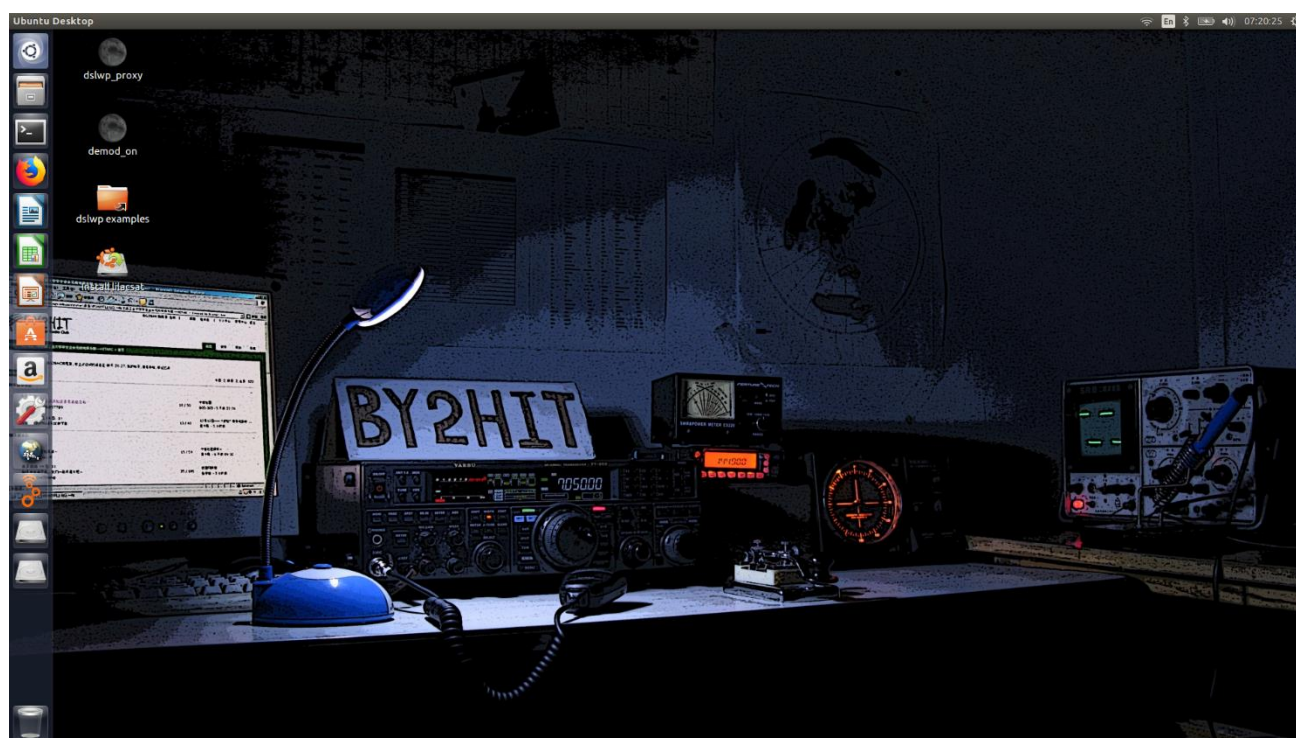


Figure 1

## 2.2 连接至 Internet    Connect to the Internet

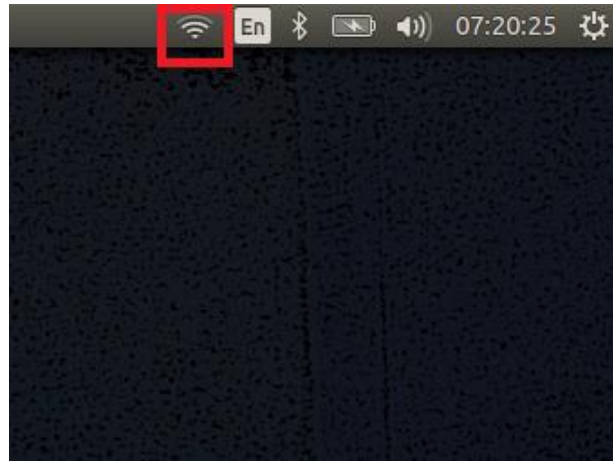


Figure 2

## 2.3 启动下行代理服务器 Start the Downlink Proxy

双击桌面上的图标启动下行代理服务器。

Double click DSLWP\_PROXY icon on desktop to start downlink proxy

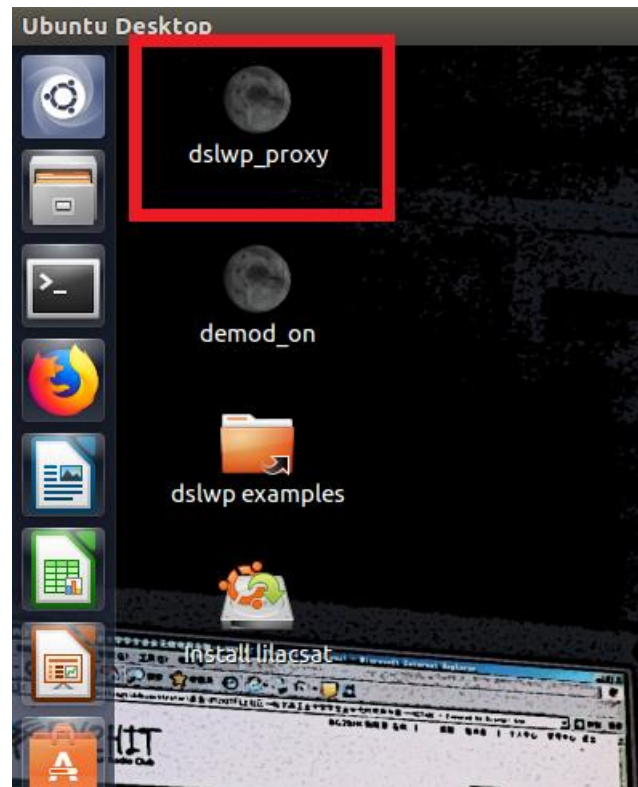


Figure 3

在代理窗口中：编辑个人信息(1)；保存设置；(2)更新轨道信息(3)，在消息窗口(5)中可见成功信息；启动代理服务器(4)。

In the proxy window, edit your user information (1); click SAVE CONFIGURE button (2); update orbit information by clicking UPDATE button (3) and start the proxy (4). If SAVE CONFIGURE (2) and UPDATE (3) succeed, success message will show in message form (5)

Mun Downlink Proxy

### User Information

Nick Name:

Latitude:

Longitude:

Altitude:

### Server Information

e.g. server\_name---->host:port  
DSLWP-->lilacsat.hit.edu.cn:9000 kiss:

Backup Server URL: 
Enable Backup: ☐

### Orbit Update

TLE URL:

### Proxy Status

Server: Not Connected

Backup Server: Not Connected

Port 1: disabled

Port 2: disabled

Port 3: disabled

Port 4: disabled




Port 5: disabled

### Port Configurations

	GRC Port	Satellite	Channel	Server	Protocol	Enable
Port 1	60061	DSLWP-A	0	DSLWP	websocket	<input checked="" type="checkbox"/>
Port 2	60062	DSLWP-A	1	DSLWP	websocket	<input checked="" type="checkbox"/>
Port 3	60063	DSLWP-B	0	DSLWP	websocket	<input checked="" type="checkbox"/>
Port 4	60064	DSLWP-B	1	DSLWP	websocket	<input checked="" type="checkbox"/>
Port 5	1001	DSLWP-C	0	DSLWP	websocket	<input type="checkbox"/>

4.

2.

5.

Figure 4



## 2.4 启动接收框图 Start the Receiver Flow graph

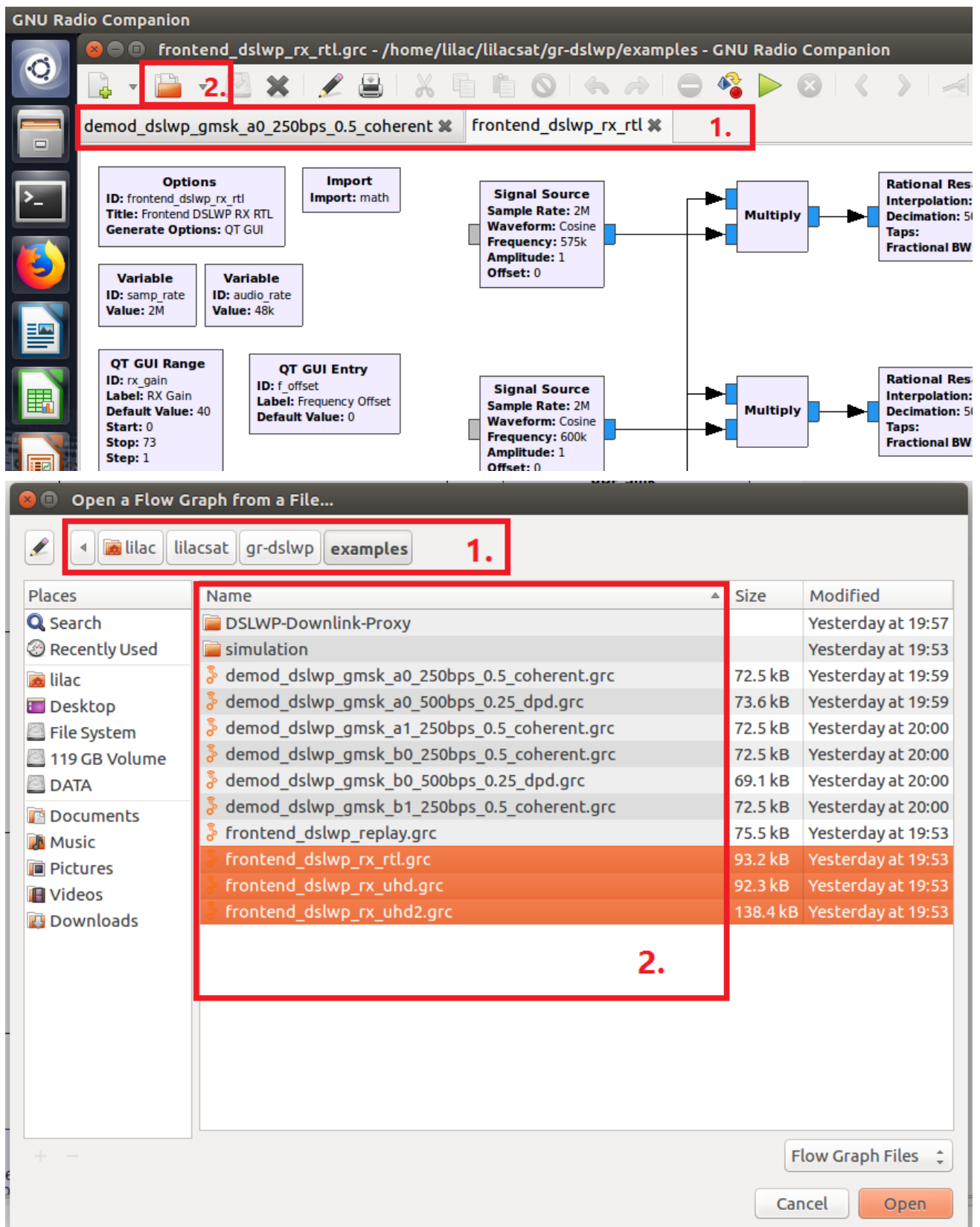
单击图标启动 GRC。

Single click the GRC icon on launch bar to start it.



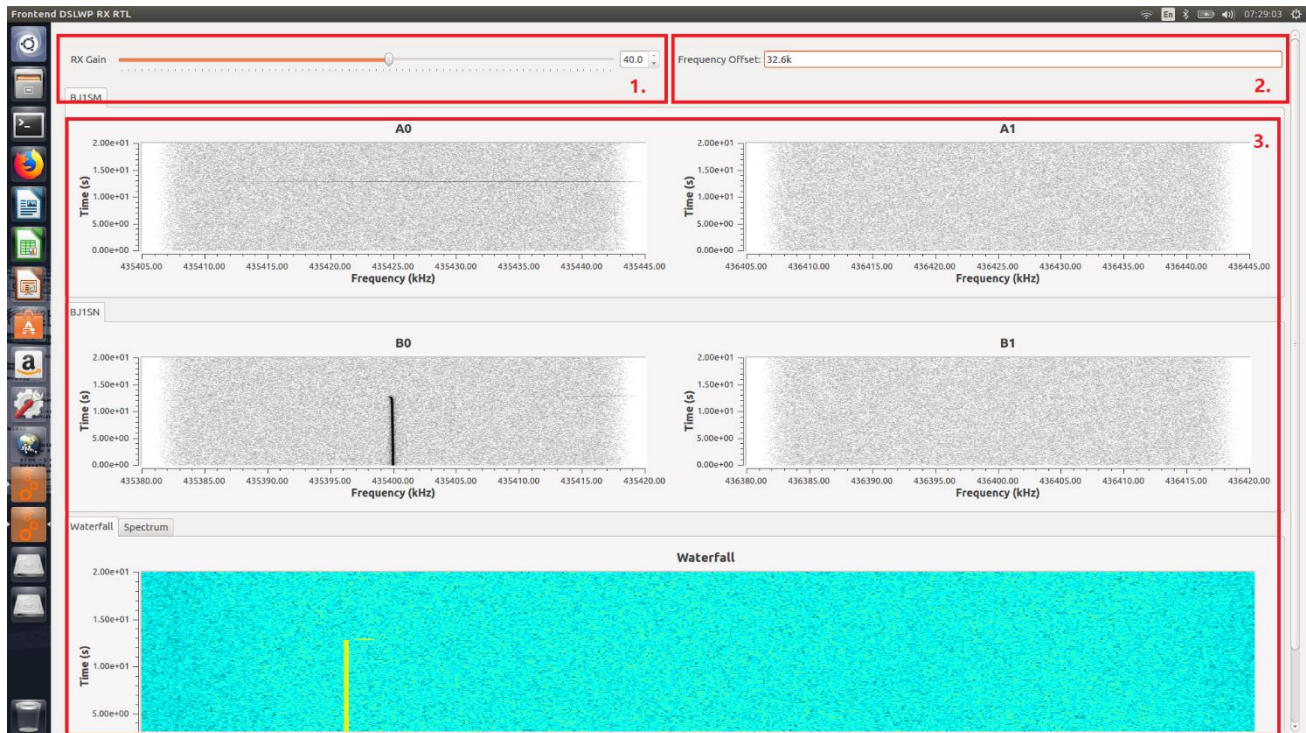
Figure 5

By default there may be no opened flow graphs for receive frontend. If there is no opened flow graph, click on the OPEN AN EXISTING FLOW GRAPH button, locate to the folder as follows, and then select flow graph which matches your hardware. The three flow graphs starting with “frontend\_dslwp” are for different hardware. If you’re using rtl-sdr, i.e., USB DVB TV stick (TV stick for short), use the flow graph ending with “rtl”. If you’re using USRP please use flow graph ending with “uhd”. The flow graph ending with “uhd2” are for dual polarization configuration, and the other one is for single polarization configuration.

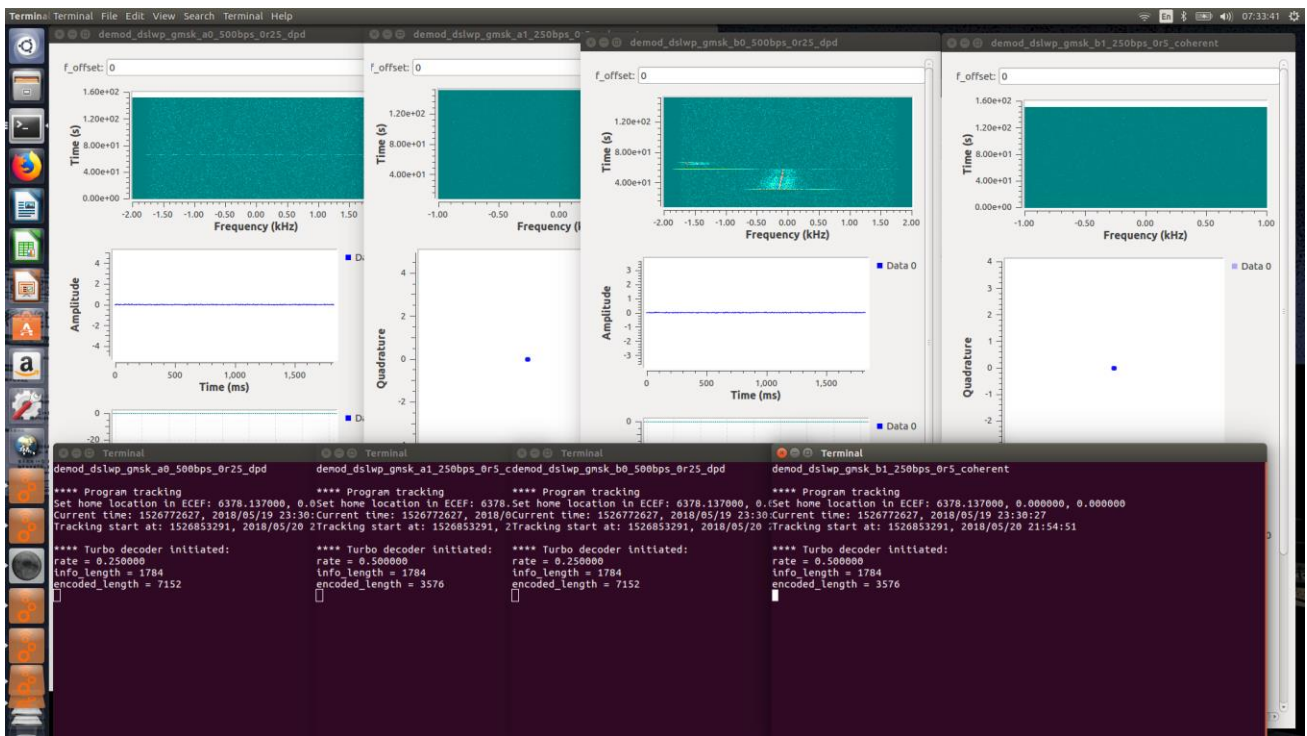
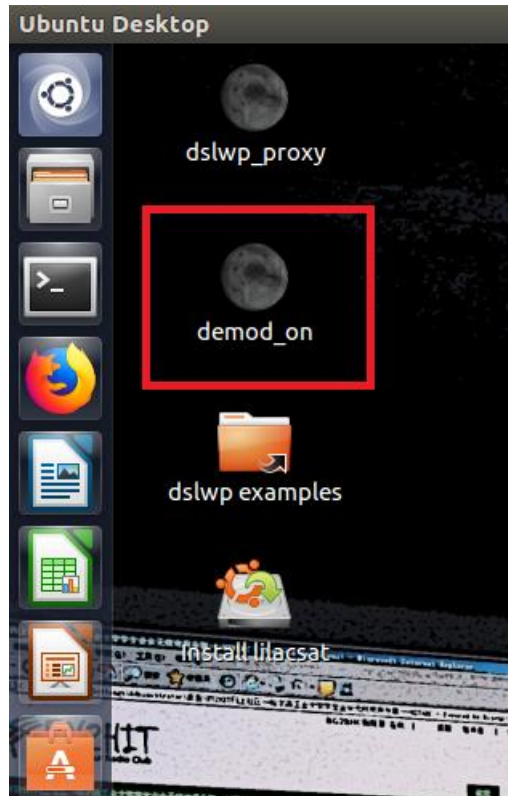


After opening correct flow graph, you'll see window show up as following shown. Adjust RX GAIN to proper level, according to your hardware configuration (1). As the bandwidth of the downlink signal

is quite low, the frequency of the receiver must be calibrated within 500 Hz. First, start frontend grc, and wait at least 15 minutes for the warming up the crystal, then use a precious frequency source, to transmit at either 435.425MHz, 436.425MHz, 435.4MHz or 436.4MHz, and read frequency of received signal on waterfall display (3). Then calculate frequency offset between actual signal frequency and shown signal frequency, and fill in FREQUENCY OFFSET form (2). Copy the gain and frequency offset values for future use.



Then minimize GRC window, double click DEMOD\_ON icon on desktop. Eight window will show up, each representing one demodulator. Since TLE is only for near-earth orbit satellite tracking, DSLWP satellites uses look-up table for orbit determination. If system time is later than table time, an error message will show in terminal window, and the program will exit. If system time is earlier than table time, the program will wait. The current file provides the data for the first launch window, and valid between 2018-5-20 21:54:30 and 2018-5-22 21:54:30. We will update the file everyday and if the launch time changes.



## 3 注意事项 Notes

### 3.1 用户名与密码 User Name and Password

User Name: lilac

Password: lilac

### 3.2 本地安装 Install Locally

为方便使用，您可能希望将解调软件安装在本地。可按照如下步骤进行。

You may want to install the software locally for a better use. Follow the instructions below.

安装 Ubuntu 系统。

Install the Ubuntu operating system.

安装 GNU Radio，推荐使用脚本安装。

```
$ wget http://www.sbrac.org/files/build-gnuradio && chmod a+x ./build-gnuradio && ./build-gnuradio
```

Install GNU Radio. It is recommended to use the build-gnuradio script.

```
$ wget http://www.sbrac.org/files/build-gnuradio && chmod a+x ./build-gnuradio && ./build-gnuradio
```

安装 gr-dslwp。

```
$ git clone https://github.com/bg2bhc/gr-dslwp
```

```
$ cd gr-dslwp
```

```
$ mkdir build
```

```
$ cd build
```

```
$ cmake ../
```

```
$ make
```

```
$ sudo make install
```

```
$ sudo ldconfig
```

Install gr-dslwp.

```
$ git clone https://github.com/bg2bhc/gr-dslwp
```

```
$ cd gr-dslwp
```

```
$ mkdir build
```

```
$ cd build
```

```
$ cmake ../
```

```
$ make
```

```
$ sudo make install
```

```
$ sudo ldconfig
```

安装代理服务器。根据 `gr-dslwp/examples/DSLWP-Downlink-Proxy/readme.md` 中的步骤进行。

Setup proxy. Follow the instructions in `gr-dslwp/examples/DSLWP-Downlink-Proxy/readme.md`.

根据硬件情况，可能需要安装其它软件。

Other software may be required depending on your hardware.

### 3.3 其他问题 **Other Problems**

若出现其他异常，如网络中断，关闭所有程序，按步骤重新启动。

If something else goes wrong, for example a network disconnection, close everything and restart.