

RTK-GPS

Setup Instructions - [ublox ZED-F9P module]

1 Setup on U-Center

To work with a simple ublox ZED-F9P module, we can use their GNSS evaluation software, U-center. We used U-center version 22.07.

To configure the board to receive corrections via the internet, configure the boards using the following steps.

1. On windows, open the U-center software. Connect the serial port and select the baud rate (highlighted in the red box figure 1. We used a baud rate of 57600 for our work, so we will continue using that in the rest of the document.

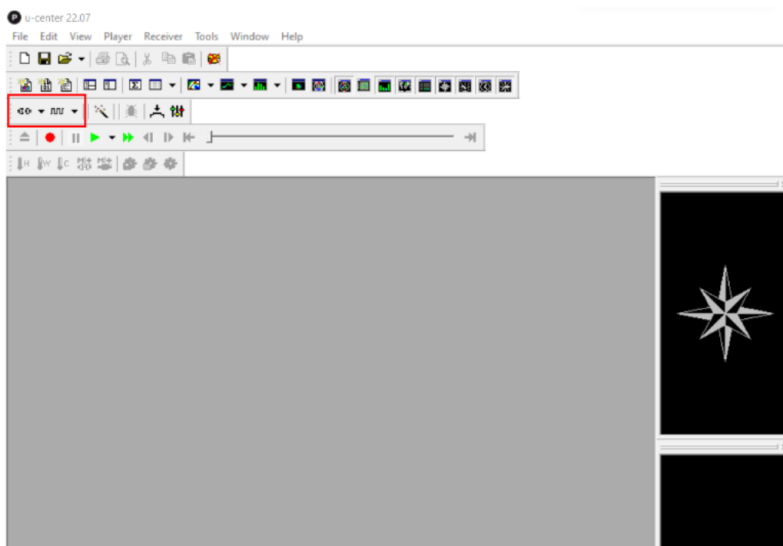


Figure 1: U-center main window.

2. We need to enable the following messages in U-center to work with the ros package - ublox_driver.
 - (a) NMEA→GxGGA
 - (b) UBX→RXM→RAWX
 - (c) UBX→RXM→SFRBX
 - (d) UBX→NAV→PVT
 - To do so for all these message types, let's take the example of UBX→NAV→PVT.
 - To enable this, first press F9. This would bring up the configuration settings.
 - On the left, double-click on the UBX section to expand it.
 - Then click on NAV to expand it.
 - Right-click on the PVT and select *enable message*.
 - If enabled, this message should get highlighted in bold color as shown in the figure 3.

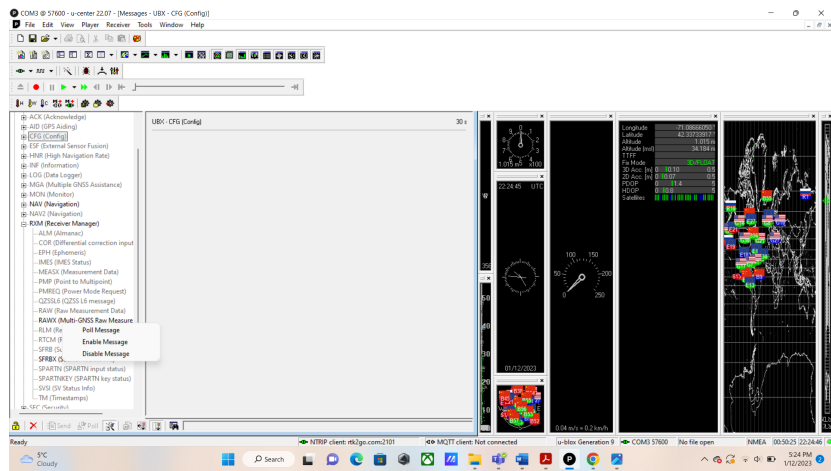


Figure 2: Expand tree on left to enable and disable messages.

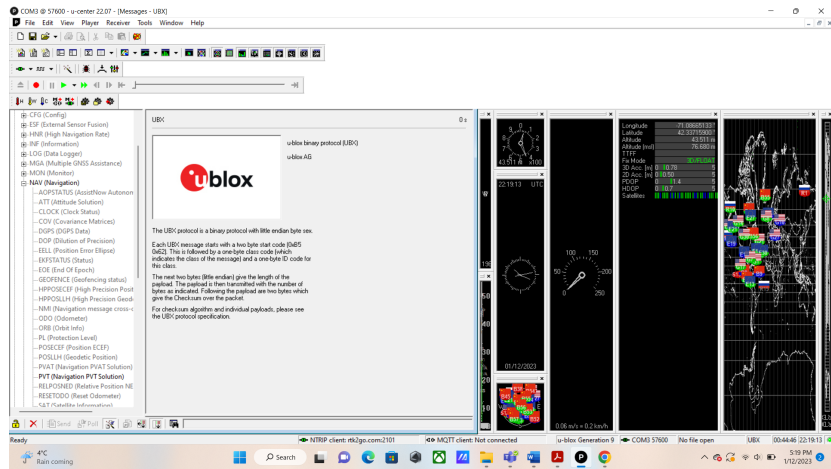


Figure 3: Enabled messages will be highlighted in bold color

3. We need to correctly set the UART port of your F9P module to work with ublox_driver. Go to the port settings at UBX→CFG→PRT and change the settings for UART1, UART2 and USB to the options shown in figure 4, figure 5 and figure 6.

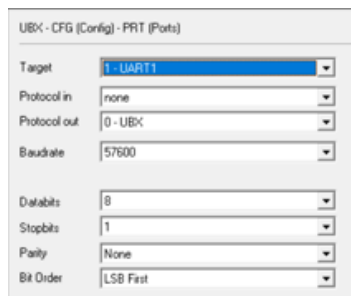


Figure 4: Settings for UART1.

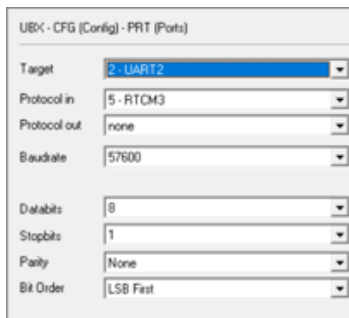


Figure 5: Settings for UART2.

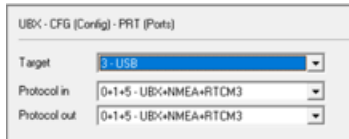


Figure 6: Settings for USB.

4. Click **Send** to make sure the changes have been written to the board.
5. Measurement frequency may also be set. Go to UBX→CFG→RATE and set the measurement period to 100ms to set the measurement frequency to 10Hz as shown in figure 7.

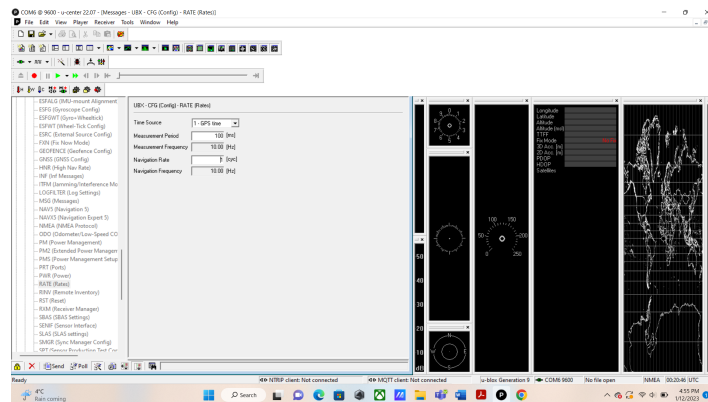


Figure 7: Values for measurement period

6. Click **Send** to make sure the changes have been written to the board.
7. These settings can be saved under UBX→CFG→CFG and clicking the send button to make sure the board will keep these settings after reboot.

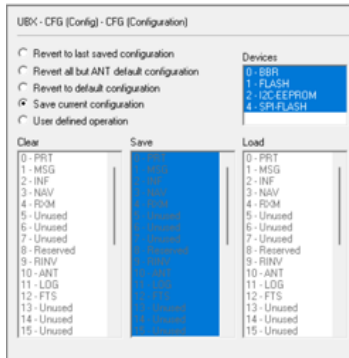


Figure 8: Save configuration.

8. The rover is now setup!

2 NTRIP

2.1 U-Center [Windows]

To achieve highly accurate RTK localization, we can input RTCM (correction) messages from a GNSS base station into the receiver. Nowadays many GNSS stations distribute their RTCM streams via the NTRIP protocol. We utilized corrections from the free NTRIP provider, rtk2go.com.

1. To configure rover to receive corrections via NTRIP protocol, select Receiver→NTRIP client from the menu bar.
2. Provide your email address as username and keep the password as *none*.
3. Select an NTRIP mount point suitable near your location. We used MACKLBG since it was close to our location[Boston]. The list of mount points can be found [here](#).
4. Click Ok.

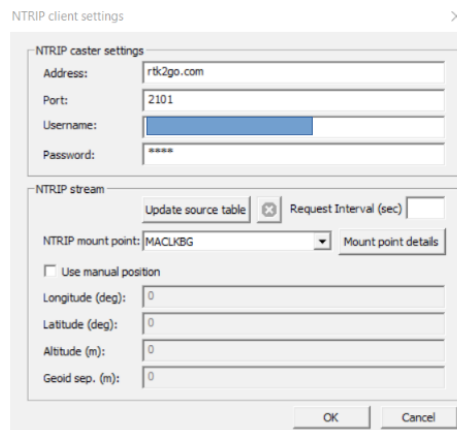


Figure 9: NTRIP client settings.

5. Upon successful connection, the NTRIP connection status at the bottom of the window will be changed to the picture as shown in figure 10.

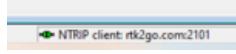


Figure 10: Successful connection

6. It is recommended to go to an open place and wait for a few minutes. We would be able to see a fix/float status in 'Fix Mode' on the u-centre window as shown in figure 11.

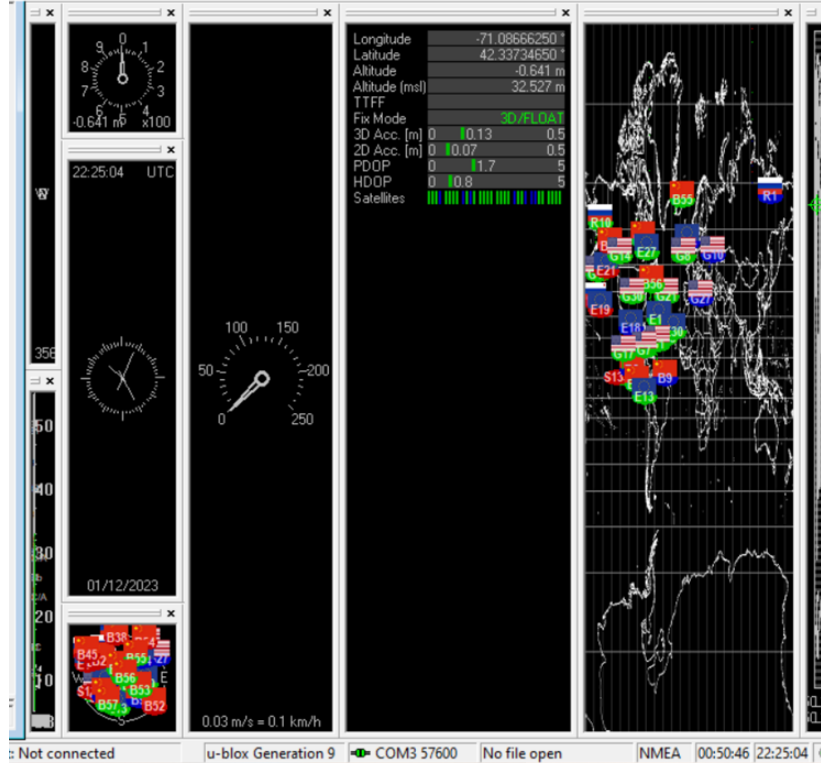


Figure 11: U centre window with fix/float status.

2.2 ROS [Ubuntu]

1. We will be using the ublox_driver package to receive messages via ROS.
2. Open the ublox_driver package and install the prerequisite packages and software.
3. Follow sections 2 and 3 [Including the 'optional' part in section 3]
4. For this command: `./str2str -in ntrip://$NTRIP_SITE:$NTRIP_PORT/$MOUNT_POINT -out tcpsvr://:3503`

Use this:

`./str2str -in 'ntrip://xyz@gmail.com:none@rtk2go.com:2101/MACKLBG' -out tcpsvr://:3503`

Select an NTRIP mount point suitable near your location. We used MACKLBG since it was close to our location[Boston]. The list of mount points can be found [here](#).