

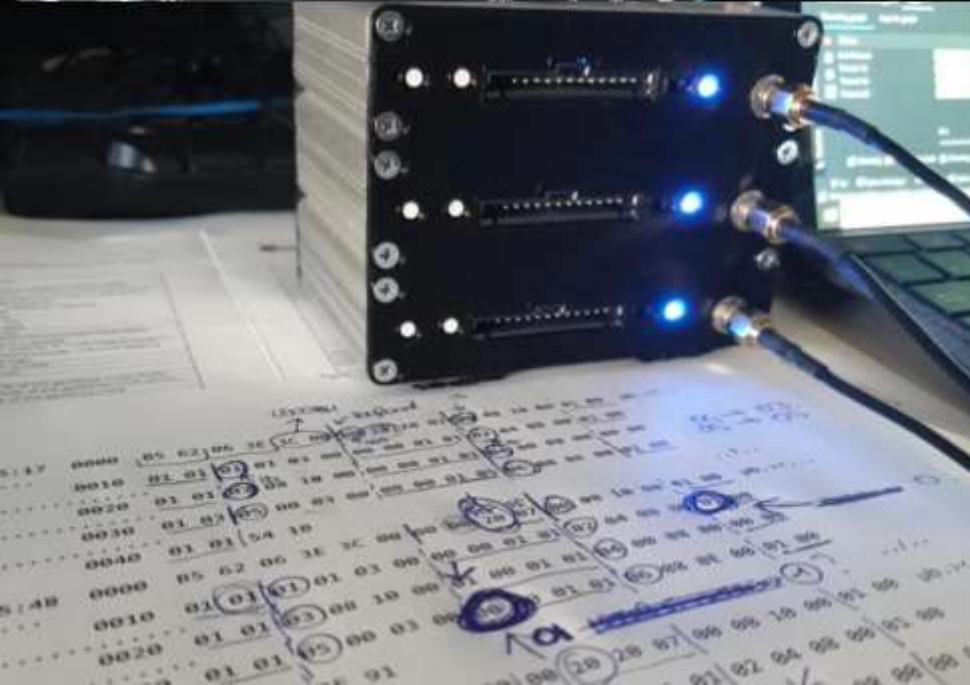
# GPS/GNSS Data Logger and Parser

Progetto di Ingegneria Informatica

Architetture e Sistemi di Elaborazione Dati

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# Introduzione

*GPS DataLogger and Parser* è un tool in grado di registrare uno stream di byte proveniente da uno (o più ricevitori) u-blox connessi al PC mediante porta COM, per poi analizzarlo e convertirlo nei formati standard RINEX (.obs e .nav) e NMEA.

In alternativa alla registrazione *realtime*, è possibile utilizzare files .ubx precedentemente acquisiti (con il tool u-center, ad esempio).

Scheda Progetto: [GPS data logger and parser | Progetto di Ingegneria Informatica \(polimi.it\)](#)

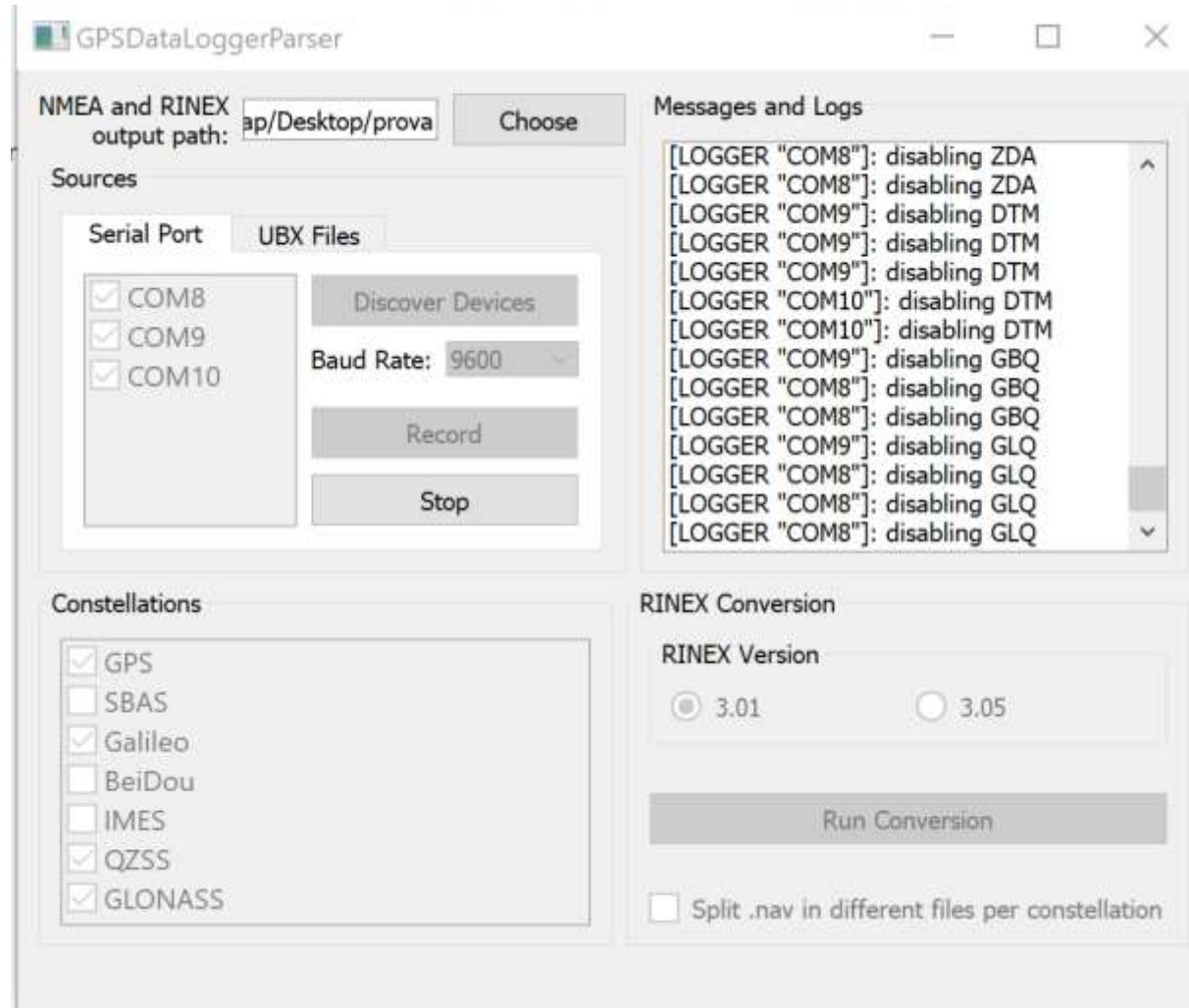
Link Repository GitHub: <https://github.com/lucapada/GPSDataLoggerParser>

# Implementazione

Il tool è stato sviluppato in Python 3.8. La scelta del linguaggio scaturisce dalla volontà di realizzare un applicativo cross-platform, espandibile, semplice e veloce.

Per rendere l'esperienza utente più semplice e intuitiva possibile è stata realizzata una GUI con il framework *PyQt5*.

# GUI



# Ambiente di Sviluppo

The screenshot displays the PyCharm IDE environment. The main window shows the `GPSDataLoggerParser` application with a dark theme. The interface includes a menu bar, a toolbar, and a sidebar with a project tree and a structure view. The main editor area shows the `new_connection = self.model.item(d).text()` line of code. A dialog box titled `GPSDataLoggerParser` is open, showing the NMEA and RINEX output path, sources, serial port settings, and a messages and logs pane. The messages pane shows the following log entries:

```
ports...
u-blox receiver detected on port COM4
u-blox receiver detected on port COM6
u-blox receiver detected on port COM7
No u-blox(s) device detected...
[SERIAL] Connection Opened
[SERIAL] Connection Opened
[LOGGER "COM4"]: Saving receiver configuration...
[SERIAL] Connection Opened
[LOGGER "COM6"]: Saving receiver configuration...
[LOGGER "COM7"]: Saving receiver configuration...
```

The bottom of the IDE shows the `Concurrent Activities Diagram` with the `Threading graph` selected. The graph displays the execution of the `MainThread` and its child threads (`Thread-12`, `Thread-16`, and `Thread-20`). The `MainThread` is highlighted in green, indicating it is the active thread. The `Thread-12`, `Thread-16`, and `Thread-20` are shown in blue, indicating they are waiting. The `Waiting time (s)` for each thread is 0.00 (0%).

| Name       | Waiting time (s) |
|------------|------------------|
| MainThread | 0.00 (0%)        |
| Thread-12  | 0.00 (0%)        |
| Thread-16  | 0.00 (0%)        |
| Thread-20  | 0.00 (0%)        |



# Funzionamento

Il software consente di registrare stream di byte provenienti da uno o più ricevitori, contemporaneamente e in tempo reale, oppure il caricamento di files .ubx.

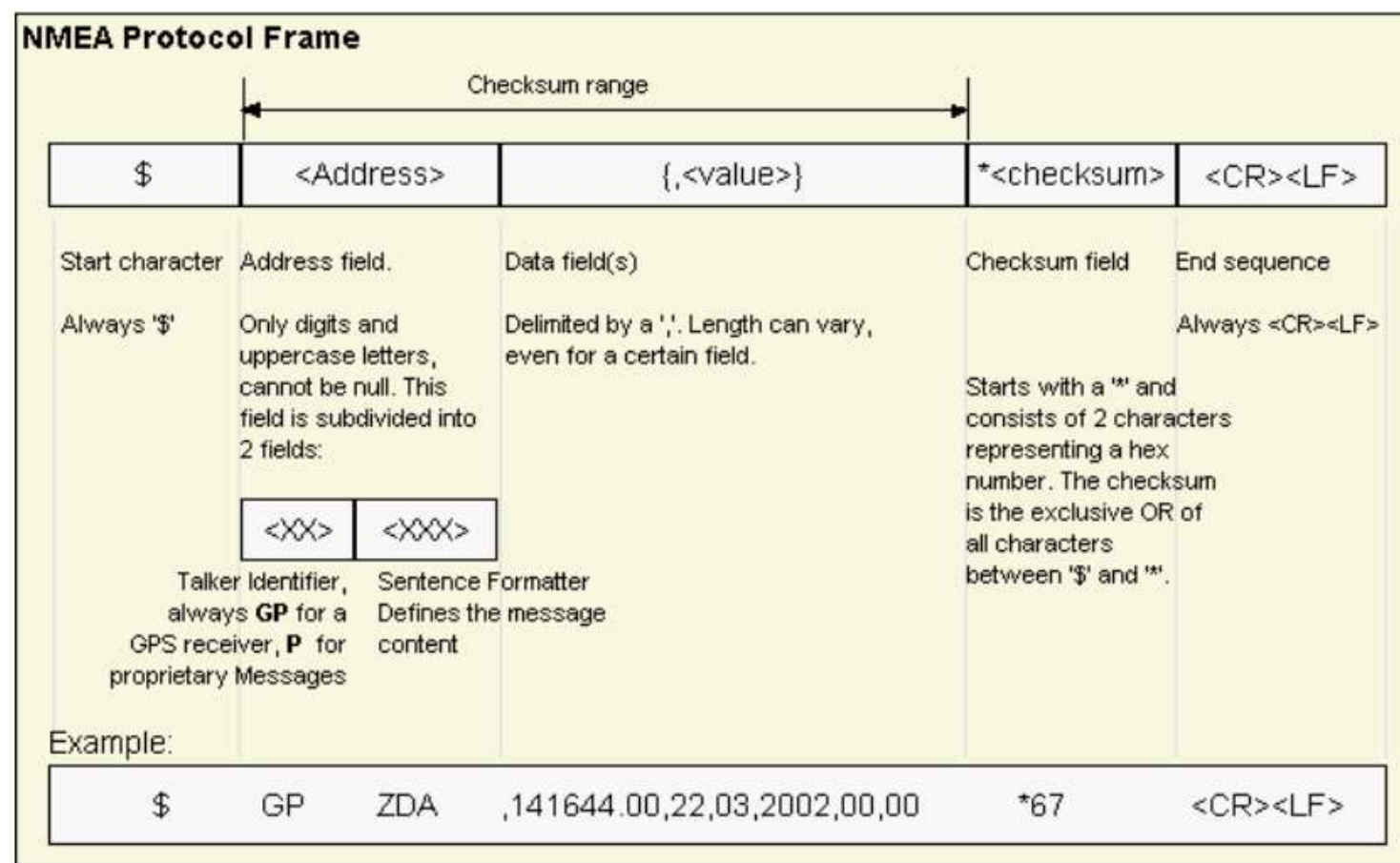
Dagli stream acquisiti vengono estratte le **stringhe (sentences) NMEA** e i **messaggi UBX-RXM-RAWX** da cui, a loro volta, vengono estratti i **time-stamp** necessari alla sincronizzazione dei tempi tra il GNSS e computer locale.

Al termine delle operazioni di acquisizione è possibile **generare i files RINEX (Receiver INdependent EXchange format)** relativi alle osservazioni e alle navigazioni a partire dagli stream .ubx precedentemente salvati, mediante l'utilizzo del tool *CONVBIN RTKLib*.

# Funzionamento

## Struttura Messaggio NMEA

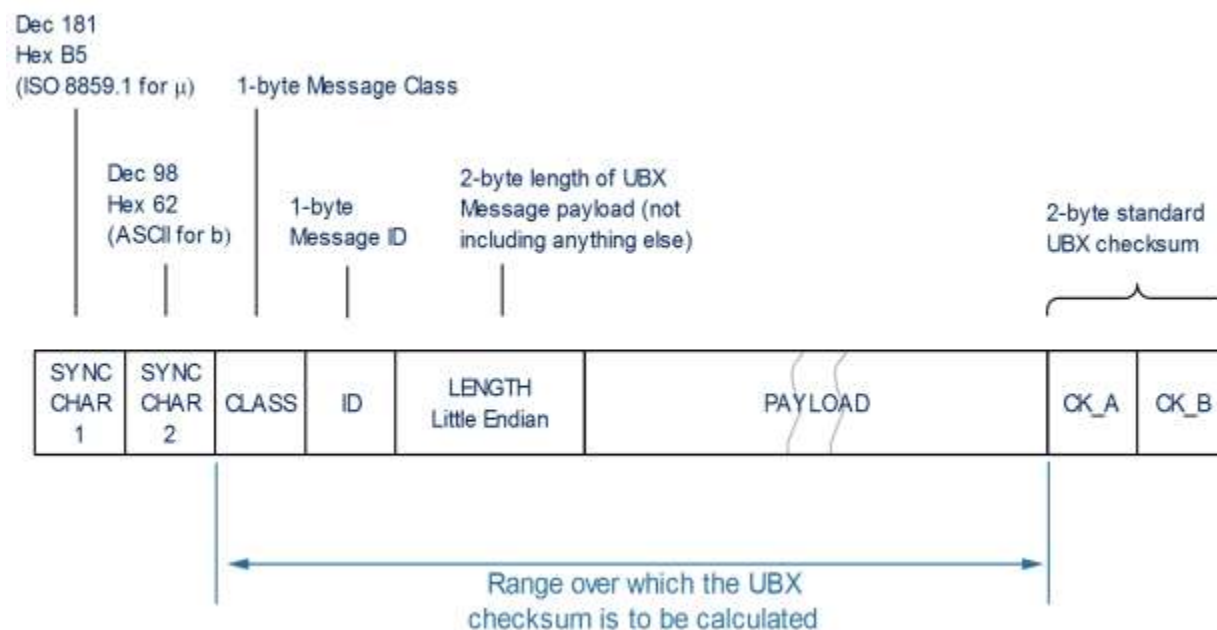
NMEA messages sent by the GNSS receiver are based on NMEA 0183 Version 4.10. The following figure shows the structure of a NMEA protocol message.





# Funzionamento

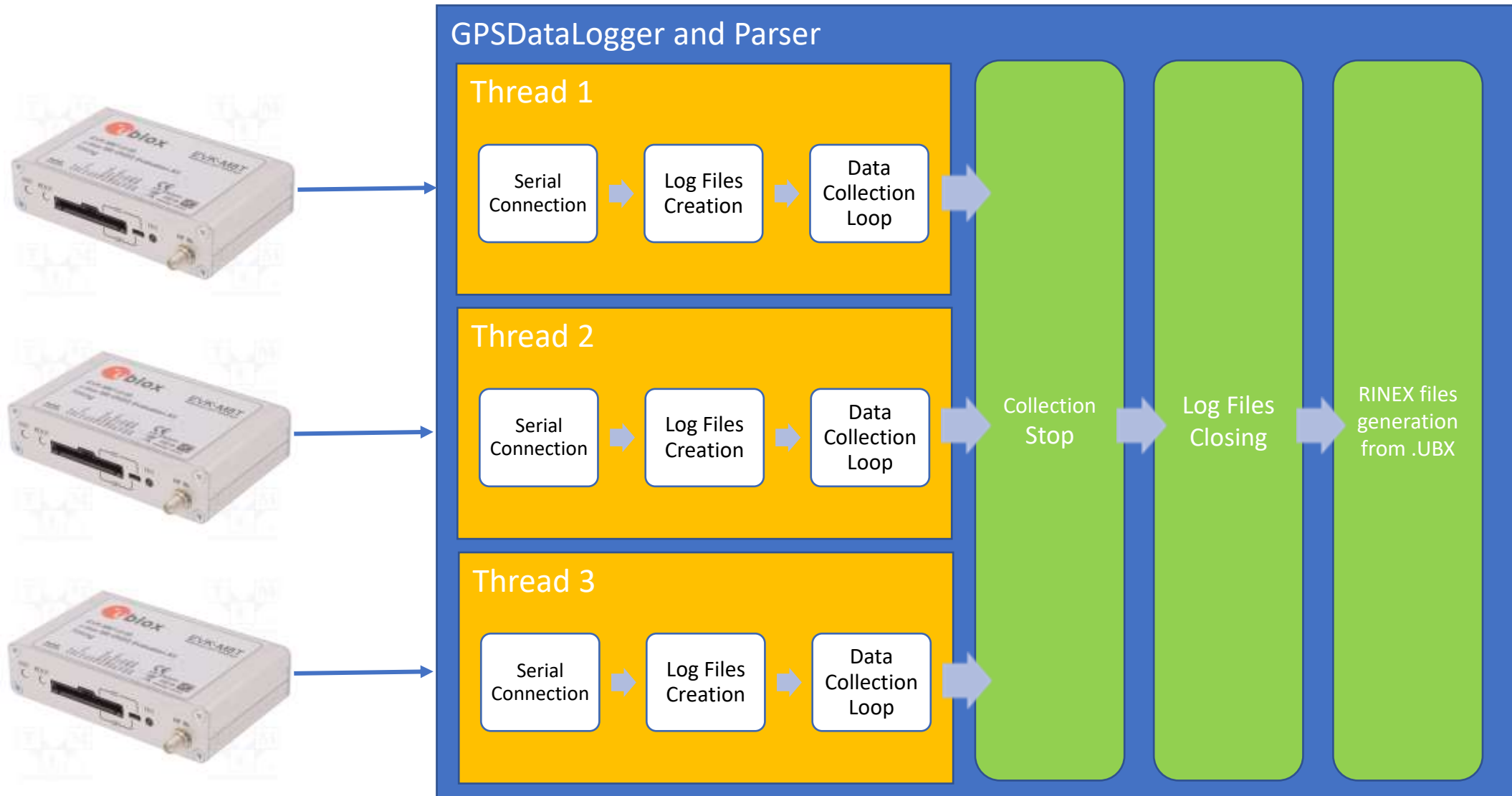
## Struttura Messaggio UBX



|                   |   |         |         |                 |   |           |
|-------------------|---|---------|---------|-----------------|---|-----------|
| Message           | UBX-RXM-RAWX  |         |         |                 |   |           |
| Description       | Multi-GNSS raw measurements   |         |         |                 |   |           |
| Firmware          | Supported on: <ul style="list-style-type: none"><li>u-blox 8 / u-blox M8 protocol versions 18, 19, 19.1, 19.2, 20, 20.01, 20.1, 20.2, 20.3, 22, 22.01, 23 and 23.01 (only with ADR or High Precision GNSS or Time Sync products)</li></ul>  |         |         |                 |   |           |
| Type              | Periodic/Polled   |         |         |                 |   |           |
| Comment           | <p>This message contains the information needed to be able to generate a RINEX 3 multi-GNSS observation file (see <a href="ftp://ftp.igs.org/pub/data/format/">ftp://ftp.igs.org/pub/data/format/</a>).</p> <p>This message contains pseudorange, Doppler, carrier phase, phase lock and signal quality information for GNSS satellites once signals have been synchronized. This message supports all active GNSS.</p> <p>The only difference between this version of the message and the previous version (<b>UBX-RXM-RAWX-DATA0</b>) is the addition of the version field.</p> |         |         |                 |   |           |
| Message Structure | Header  | Class   | ID      | Length (Bytes)  | Payload   | Checksum  |
|                   | 0xB5 0x62   | 0x02    | 0x15    | 16 + 32*numMeas | see below   | CK_A CK_B |
| Payload Contents: |   |         |         |                 |   |           |
| Byte Offset       | Number Format   | Scaling | Name    | Unit            | Description   |           |
| 0                 | R8  | -       | rcvTow  | s               | Measurement time of week in receiver local time approximately aligned to the GPS time system.<br>The receiver local time of week, week number and leap second information can be used to translate the time to other time systems. More information about the difference in time systems can be found in the RINEX 3 format documentation. For a receiver operating in GLONASS only mode, UTC time can be determined by subtracting the leapS field from GPS time regardless of whether the GPS leap seconds are valid. |           |
| 8                 | U2  | -       | week    | weeks           | GPS week number in receiver local time.   |           |
| 10                | I1  | -       | leapS   | s               | GPS leap seconds (GPS-UTC). This field represents the receiver's best knowledge of the leap seconds offset. A flag is given in the recStat bitfield to indicate if the leap seconds are known.  |           |
| 11                | U1  | -       | numMeas | -               | Number of measurements to follow  |           |

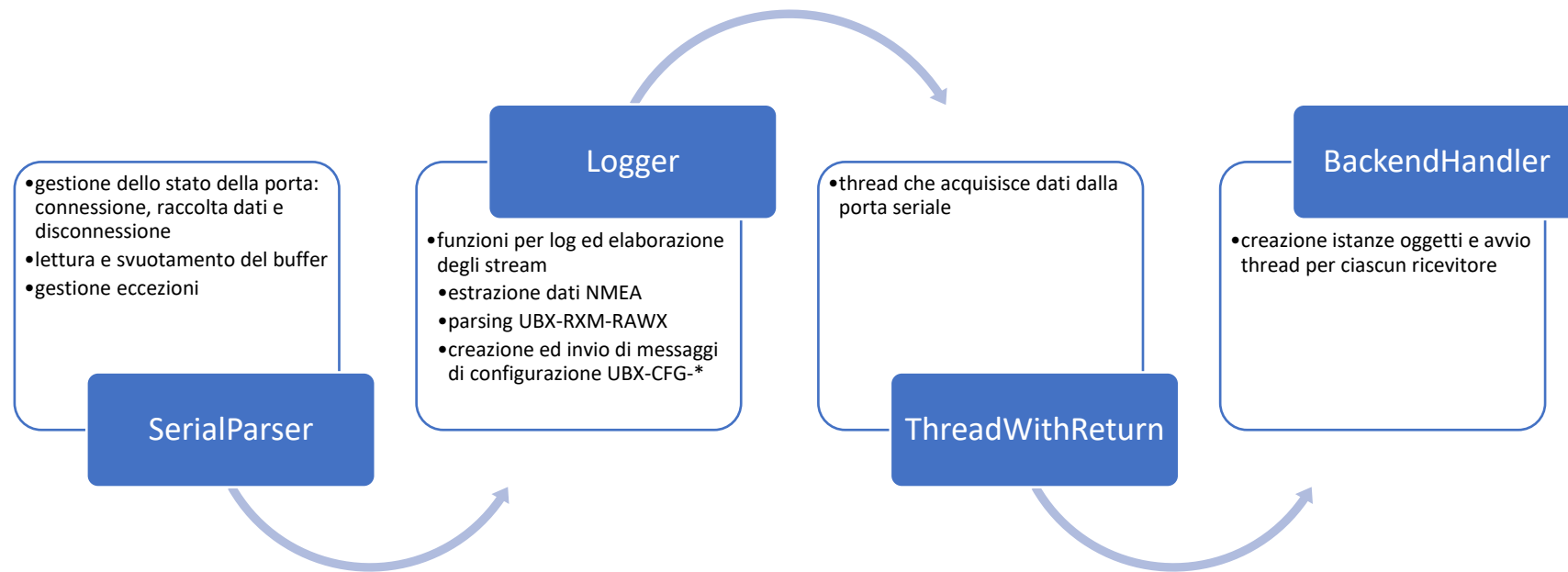


# Funzionamento



# Architettura BackEnd

Il software è costituito da moduli ed è stato sviluppato seguendo un approccio *bottom-up*.



main.py

GUI  
(PyQt5)

+

esecuzione tool  
conversione RINEX

Backend  
Handler

per ogni ricevitore selezionato, crea un istanza di Logger, SerialParser e  
ThreadWithReturn

Logger

Contiene tutte le funzioni per la  
codifica/decodifica dei messaggi  
da/per il ricevitore.  
logData è la funzione eseguita  
dal Thread per l'ascolto dei dati  
dal ricevitore

Serial Parser

gestisce la porta  
seriale ed eventuali  
eccezioni

ThreadWithReturn

avvia un thread  
eseguendo la  
funzione logData  
contenuta in Logger

# Demo

# Installazione Python

[Download Python | Python.org](#)

# Installazione delle dipendenze

```
pip install pyqt5 pyserial pynput
```

# Lancio

```
python main.py
```

# Demo



# Demo

1

NMEA and RINEX output path: d:/uni/GPSDataLoggerParser/acquisizione Choose

Sources

Serial Port UBX Files

Discover Devices

Baud Rate: 9600

Record

Stop

Constellations

- ☐ GPS
- ☐ SBAS
- ☐ Galileo
- ☐ BeiDou
- ☐ IMES
- ☐ QZSS
- ☐ GLONASS

Messages and Logs

RINEX Conversion

RINEX Version

☒ 2.12 ☐ 3.02

Run Conversion

☐ Split .nav in different files per constellation

1. Scelta della directory di lavoro



# Demo

1

NMEA and RINEX  
output path: ud/uni/GPSDataLoggerParser/acquisizione Choose

Sources

Serial Port

UBX Files

Discover Devices

Baud Rate: 9600

Record

Stop

Messages and Logs

1. Scelta della directory di lavoro
2. Scelta dei GNSS(s)

2

Constellations

- ☐ GPS
- ☐ SBAS
- ☐ Galileo
- ☐ BeiDou
- ☐ IMES
- ☐ QZSS
- ☐ GLONASS

RINEX Conversion

RINEX Version

☒ 2.12

☐ 3.02

Run Conversion

☐ Split .nav in different files per constellation

# Demo

1

2

3

The screenshot shows the 'GPSDataLoggerParser' application interface. It is divided into several sections:

- NMEA and RINEX output path:** A text field containing the path `ud/uni/GPSDataLoggerParser/acquisizione`, which is highlighted by a red box and labeled with a red '1'.
- Sources:** A section with two tabs: 'Serial Port' and 'UBX Files'. The 'Serial Port' tab is active, showing a list of serial ports: `/dev/ttyACM2`, `/dev/ttyACM1`, and `/dev/ttyACM0`, all of which are checked. To the right of the list is a 'Baud Rate' dropdown menu set to '9600'. Below the list are 'Discover Devices', 'Record', and 'Stop' buttons. This entire section is highlighted by a red box and labeled with a red '3'.
- Constellations:** A section with a list of satellite constellations: GPS, SBAS, Galileo, BeiDou, IMES, QZSS, and GLONASS. The first five are checked, while IMES is unchecked. This section is highlighted by a red box and labeled with a red '2'.
- Messages and Logs:** A text area on the right side of the window showing detection messages for u-blox receivers on COM ports.
- RINEX Conversion:** A section at the bottom right with a 'RINEX Version' dropdown menu set to '2.12', a 'Run Conversion' button, and a checkbox for 'Split .nav in different files per constellation'.

1. Scelta della directory di lavoro

2. Scelta dei GNSS(s)

3. Configurazione delle sorgenti (o caricamento dei file) e avvio dell'acquisizione.

# Demo

NMEA and RINEX output path:

Sources

Serial Port ☒ UBX Files ☐

Baud Rate:

Messages and Logs

Constellations

- ☐ GPS
- ☐ SBAS
- ☐ Galileo
- ☐ BeiDou
- ☐ IMES
- ☐ QZSS
- ☐ GLONASS

RINEX Conversion

























RINEX Version

☒ 2.12 ☐ 3.02

☐ Split .nav in different files per constellation

Timelapse acquisizione dati da 3 ricevitori contemporaneamente in un arco temporale di 5 ore

# Demo

|   |   |   |                  |                    |           |
|---|---|---|------------------|--------------------|-----------|
|    | _dev_ttyACM0_20230114_172218_NMEA       |    | 14/01/2023 22:10 | Documento di testo | 1.310 KB  |
|    | _dev_ttyACM0_20230114_172218_NMEA_times |    | 14/01/2023 22:10 | Documento di testo | 504 KB    |
|    | _dev_ttyACM0_20230114_172218_rover      |    | 14/01/2023 22:10 | u-blox Log File    | 14.142 KB |
|    | _dev_ttyACM0_20230114_172218_times      |    | 14/01/2023 22:10 | Documento di testo | 160 KB    |
|    | _dev_ttyACM1_20230114_172218_NMEA       |    | 14/01/2023 22:10 | Documento di testo | 1.311 KB  |
|    | _dev_ttyACM1_20230114_172218_NMEA_times |    | 14/01/2023 22:10 | Documento di testo | 505 KB    |
|    | _dev_ttyACM1_20230114_172218_rover      |    | 14/01/2023 22:10 | u-blox Log File    | 15.808 KB |
|    | _dev_ttyACM1_20230114_172218_times      |    | 14/01/2023 22:10 | Documento di testo | 154 KB    |
|    | _dev_ttyACM2_20230114_172218_NMEA       |    | 14/01/2023 22:10 | Documento di testo | 1.310 KB  |
|    | _dev_ttyACM2_20230114_172218_NMEA_times |    | 14/01/2023 22:10 | Documento di testo | 504 KB    |
|   | _dev_ttyACM2_20230114_172218_rover      |   | 14/01/2023 22:10 | u-blox Log File    | 15.923 KB |
|  | _dev_ttyACM2_20230114_172218_times      |  | 14/01/2023 22:10 | Documento di testo | 159 KB    |

dev\_ttyACM2\_20230114\_172218\_times - Blocco note di Windows

File Modifica Formato Visualizza ?

|                     |            |
|---------------------|------------|
| 2023-01-14 17:23:44 | 577442.004 |
| 2023-01-14 17:23:45 | 577443.004 |
| 2023-01-14 17:23:46 | 577444.004 |
| 2023-01-14 17:23:49 | 577447.004 |
| 2023-01-14 17:23:50 | 577448.004 |
| 2023-01-14 17:23:52 | 577450.004 |
| 2023-01-14 17:23:55 | 577453.004 |
| 2023-01-14 17:24:01 | 577459.004 |
| 2023-01-14 17:24:02 | 577460.004 |
| 2023-01-14 17:24:04 | 577462.004 |
| 2023-01-14 17:24:05 | 577463.004 |
| 2023-01-14 17:24:06 | 577464.004 |
| 2023-01-14 17:24:08 | 577466.004 |
| 2023-01-14 17:24:09 | 577467.004 |
| 2023-01-14 17:24:11 | 577469.004 |
| 2023-01-14 17:24:13 | 577471.004 |
| 2023-01-14 17:24:17 | 577475.004 |
| 2023-01-14 17:24:18 | 577476.004 |
| 2023-01-14 17:24:19 | 577477.004 |
| 2023-01-14 17:24:23 | 577481.004 |
| 2023-01-14 17:24:24 | 577482.004 |
| 2023-01-14 17:24:26 | 577484.004 |
| 2023-01-14 17:24:30 | 577488.004 |
| 2023-01-14 17:24:32 | 577490.004 |
| 2023-01-14 17:24:35 | 577493.004 |
| 2023-01-14 17:24:37 | 577495.004 |
| 2023-01-14 17:24:39 | 577497.004 |
| 2023-01-14 17:24:40 | 577498.004 |
| 2023-01-14 17:24:42 | 577500.004 |
| 2023-01-14 17:24:50 | 577508.004 |
| 2023-01-14 17:24:53 | 577511.004 |
| 2023-01-14 17:24:55 | 577513.004 |
| 2023-01-14 17:24:57 | 577515.004 |
| 2023-01-14 17:24:59 | 577517.004 |
| 2023-01-14 17:25:00 | 577518.004 |
| 2023-01-14 17:25:01 | 577519.004 |
| 2023-01-14 17:25:05 | 577523.004 |
| 2023-01-14 17:25:11 | 577530.004 |

File Sincronizzazione  
Tempo PC/Tempo UBX-RXM-RAWX

dev\_ttyACM2\_20230114\_172218\_NMEA - Blocco note di Windows

File Modifica Formato Visualizza ?

|          |           |  |
|----------|-----------|--|
| \$GNNGGA | 162343.00 | 4529.82808,N,00911.08358,E,1.07,3.06,132.6,M,47.1,M,,*4A |
| \$GNNGGA | 162344.00 | 4529.82807,N,00911.08354,E,1.07,3.06,132.7,M,47.1,M,,*4F |
| \$GNNGGA | 162345.00 | 4529.82810,N,00911.08348,E,1.07,3.06,132.7,M,47.1,M,,*45 |
| \$GNNGGA | 162346.00 | 4529.82809,N,00911.08342,E,1.07,3.07,132.8,M,47.1,M,,*4A |
| \$GNNGGA | 162347.00 | 4529.82812,N,00911.08332,E,1.07,3.07,132.8,M,47.1,M,,*46 |
| \$GNNGGA | 162348.00 | 4529.82815,N,00911.08324,E,1.07,3.07,132.8,M,47.1,M,,*49 |
| \$GNNGGA | 162349.00 | 4529.82816,N,00911.08317,E,1.07,3.07,132.8,M,47.1,M,,*4B |
| \$GNNGGA | 162350.00 | 4529.82816,N,00911.08311,E,1.07,3.07,132.8,M,47.1,M,,*45 |
| \$GNNGGA | 162351.00 | 4529.82815,N,00911.08306,E,1.07,3.07,132.9,M,47.1,M,,*40 |
| \$GNNGGA | 162352.00 | 4529.82819,N,00911.08295,E,1.07,3.07,132.9,M,47.1,M,,*44 |
| \$GNNGGA | 162353.00 | 4529.82824,N,00911.08283,E,1.07,3.07,132.9,M,47.1,M,,*4C |
| \$GNNGGA | 162354.00 | 4529.82829,N,00911.08271,E,1.07,3.07,132.9,M,47.1,M,,*48 |
| \$GNNGGA | 162355.00 | 4529.82835,N,00911.08261,E,1.07,3.07,132.8,M,47.1,M,,*47 |
| \$GNNGGA | 162356.00 | 4529.82839,N,00911.08249,E,1.07,3.07,132.8,M,47.1,M,,*42 |
| \$GNNGGA | 162357.00 | 4529.82842,N,00911.08239,E,1.07,3.07,132.8,M,47.1,M,,*48 |
| \$GNNGGA | 162358.00 | 4529.82845,N,00911.08230,E,1.07,3.07,132.8,M,47.1,M,,*49 |
| \$GNNGGA | 162359.00 | 4529.82851,N,00911.08218,E,1.07,3.07,132.8,M,47.1,M,,*47 |
| \$GNNGGA | 162400.00 | 4529.82853,N,00911.08209,E,1.07,3.07,132.9,M,47.1,M,,*4F |
| \$GNNGGA | 162401.00 | 4529.82856,N,00911.08197,E,1.07,3.07,132.9,M,47.1,M,,*4C |
| \$GNNGGA | 162402.00 | 4529.82862,N,00911.08184,E,1.07,3.07,132.9,M,47.1,M,,*49 |
| \$GNNGGA | 162403.00 | 4529.82865,N,00911.08173,E,1.07,3.07,132.9,M,47.1,M,,*47 |
| \$GNNGGA | 162404.00 | 4529.82869,N,00911.08161,E,1.07,3.07,132.9,M,47.1,M,,*4F |
| \$GNNGGA | 162405.00 | 4529.82876,N,00911.08148,E,1.07,3.07,132.9,M,47.1,M,,*4B |
| \$GNNGGA | 162406.00 | 4529.82877,N,00911.08138,E,1.07,3.07,133.0,M,47.1,M,,*46 |
| \$GNNGGA | 162407.00 | 4529.82879,N,00911.08129,E,1.07,3.07,133.1,M,47.1,M,,*48 |
| \$GNNGGA | 162408.00 | 4529.82880,N,00911.08122,E,1.07,3.07,133.1,M,47.1,M,,*4A |
| \$GNNGGA | 162409.00 | 4529.82882,N,00911.08114,E,1.07,3.07,133.1,M,47.1,M,,*4C |
| \$GNNGGA | 162410.00 | 4529.82883,N,00911.08107,E,1.07,3.07,133.1,M,47.1,M,,*47 |
| \$GNNGGA | 162411.00 | 4529.82881,N,00911.08102,E,1.07,3.07,133.2,M,47.1,M,,*42 |
| \$GNNGGA | 162412.00 | 4529.82883,N,00911.08094,E,1.07,3.08,133.2,M,47.1,M,,*42 |
| \$GNNGGA | 162413.00 | 4529.82886,N,00911.08087,E,1.07,3.08,133.3,M,47.1,M,,*45 |
| \$GNNGGA | 162414.00 | 4529.82884,N,00911.08084,E,1.07,3.08,133.3,M,47.1,M,,*43 |
| \$GNNGGA | 162415.00 | 4529.82878,N,00911.08084,E,1.07,3.08,133.5,M,47.1,M,,*47 |
| \$GNNGGA | 162416.00 | 4529.82877,N,00911.08081,E,1.07,3.08,133.5,M,47.1,M,,*4E |
| \$GNNGGA | 162417.00 | 4529.82874,N,00911.08081,E,1.07,3.08,133.6,M,47.1,M,,*4F |
| \$GNNGGA | 162418.00 | 4529.82872,N,00911.08079,E,1.07,3.04,133.7,M,47.1,M,,*4C |
| \$GNNGGA | 162419.00 | 4529.82868,N,00911.08079,E,1.07,3.04,133.8,M,47.1,M,,*49 |
| \$GNNGGA | 162420.00 | 4529.82867,N,00911.08081,E,1.07,3.04,133.8,M,47.1,M,,*4E |

Linea 1, colonna 1 100% U

File NMEA

dev\_ttyACM2\_20230114\_172218\_NMEA\_times - Blocco note di Windows

File Modifica Formato Visualizza ?

|                     |           |
|---------------------|-----------|
| 2023-01-14 17:23:43 | 162343.00 |
| 2023-01-14 17:23:44 | 162344.00 |
| 2023-01-14 17:23:45 | 162345.00 |
| 2023-01-14 17:23:46 | 162346.00 |
| 2023-01-14 17:23:47 | 162347.00 |
| 2023-01-14 17:23:48 | 162348.00 |
| 2023-01-14 17:23:49 | 162349.00 |
| 2023-01-14 17:23:50 | 162350.00 |
| 2023-01-14 17:23:51 | 162351.00 |
| 2023-01-14 17:23:52 | 162352.00 |
| 2023-01-14 17:23:53 | 162353.00 |
| 2023-01-14 17:23:54 | 162354.00 |
| 2023-01-14 17:23:55 | 162355.00 |
| 2023-01-14 17:23:56 | 162356.00 |
| 2023-01-14 17:23:57 | 162357.00 |
| 2023-01-14 17:23:58 | 162358.00 |
| 2023-01-14 17:23:59 | 162359.00 |
| 2023-01-14 17:24:00 | 162400.00 |
| 2023-01-14 17:24:01 | 162401.00 |
| 2023-01-14 17:24:02 | 162402.00 |
| 2023-01-14 17:24:03 | 162403.00 |
| 2023-01-14 17:24:04 | 162404.00 |
| 2023-01-14 17:24:05 | 162405.00 |
| 2023-01-14 17:24:06 | 162406.00 |
| 2023-01-14 17:24:07 | 162407.00 |
| 2023-01-14 17:24:08 | 162408.00 |
| 2023-01-14 17:24:09 | 162409.00 |
| 2023-01-14 17:24:10 | 162410.00 |
| 2023-01-14 17:24:11 | 162411.00 |
| 2023-01-14 17:24:12 | 162412.00 |
| 2023-01-14 17:24:13 | 162413.00 |
| 2023-01-14 17:24:14 | 162414.00 |
| 2023-01-14 17:24:15 | 162415.00 |
| 2023-01-14 17:24:16 | 162416.00 |
| 2023-01-14 17:24:17 | 162417.00 |
| 2023-01-14 17:24:18 | 162418.00 |
| 2023-01-14 17:24:19 | 162419.00 |
| 2023-01-14 17:24:20 | 162420.00 |

File Sincronizzazione  
Tempo PC/Tempo NMEA

# Demo

The screenshot shows the GPSDataLoggerParser application window. The interface is divided into several sections:

- Top Left:** "NMEA and RINEX output path:" with a text field containing "ud/uni/GPSDataLoggerParser/acquisizione" and a "Choose" button. This area is annotated with a red "1".
- Top Right:** "Messages and Logs" section showing detection messages for u-blox receivers. This area is annotated with a red "2".
- Middle Left:** "Sources" section with "Serial Port" and "UBX Files" tabs. Under "Serial Port", three ports are listed with checked boxes: "/dev/ttyACM2", "/dev/ttyACM1", and "/dev/ttyACM0". To the right is a "Baud Rate" dropdown set to "9600". Below these are "Discover Devices", "Record", and "Stop" buttons. This entire section is enclosed in a red box and annotated with a red "3/4".
- Bottom Left:** "Constellations" section with a list of satellite systems: GPS, SBAS, Galileo, BeiDou, IMES, QZSS, and GLONASS. The first six are checked. This section is annotated with a red "2".
- Bottom Right:** "RINEX Conversion" section with "RINEX Version" radio buttons for "2.12" (selected) and "3.02". Below is a "Run Conversion" button and a checkbox for "Split .nav in different files per constellation". This section is annotated with a red "5".

Annotations 1 through 5 are placed to the left of the corresponding interface sections. A red box highlights the "Sources" section, which is associated with annotation 3/4.

1. Scelta della directory di lavoro
2. Scelta dei GNSS(s)
3. Configurazione delle sorgenti (o caricamento dei file) e avvio dell'acquisizione
4. Interruzione acquisizione
5. Avvio conversione RINEX



# Demo

```
$ ./RTKLIB-master/app/convbin/gcc/convbin  
    /.../acquisizione/_dev_ttyACM2_20230114_172218_rover.ubx  
    -od -os -oi -ot -ol -v 3.02  
input file :  
    /.../acquisizione/_dev_ttyACM2_20230114_172218_rover.ubx (u-  
blox)  
->rinex obs :  
    /.../acquisizione/_dev_ttyACM2_20230114_172218_rover.obs  
->rinex nav :  
    /.../acquisizione/_dev_ttyACM2_20230114_172218_rover.nav  
->rinex lnav: ?w  
->sbas log :  
    /.../acquisizione/_dev_ttyACM2_20230114_172218_rover.sbs  
2023/01/14 16:24:02-01/14 21:10:30: O=17189 N=452 S=51570 E=28
```

# Demo

 \_dev\_ttyACM2\_20230114\_172218\_rover  
 \_dev\_ttyACM2\_20230114\_172218\_rover  
 \_dev\_ttyACM2\_20230114\_172218\_rover.sbs

|   |                  |          |           |
|---|------------------|----------|-----------|
|  | 16/01/2023 12:07 | File NAV | 174 KB    |
|  | 16/01/2023 12:07 | File OBS | 19.946 KB |
|  | 16/01/2023 12:07 | File SBS | 4.029 KB  |

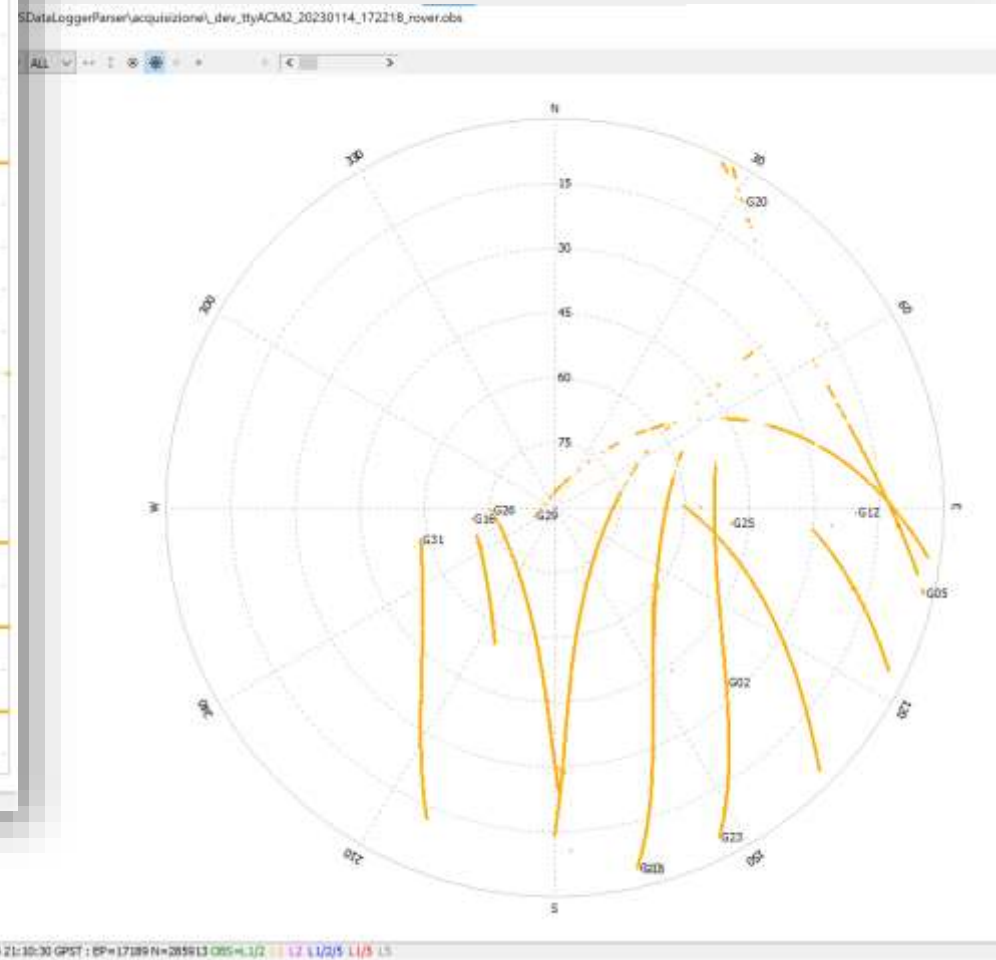
```
_dev_ttyACM2_20230114_172218_rover - Blocco note di Windows
File Modifica Formato Visualizza ?
3.02      N: GNSS NAV DATA      M: Mixed      RINEX VERSION / TYPE
CONVBIN 2.4.2      20230116 110710 UTC PGM / RUN BY / DATE
log: /home/luca/Nextcloud/uni/GPSDataLoggerParser/acquisizioCOMMENT
format: u-blox      COMMENT
GPSA  2.7940E-08  2.2352E-08  -1.1921E-07  5.9605E-08  IONOSPHERIC CORR
GPSB  1.5155E+05  -1.6384E+05  0.0000E+00  1.3107E+05  IONOSPHERIC CORR
GAL   0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  IONOSPHERIC CORR
QZSA  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  IONOSPHERIC CORR
QZSB  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00  IONOSPHERIC CORR
GPUT  1.8626451492E-09  4.440892099E-15  147456 2245  TIME SYSTEM CORR
GAUT  0.000000000E+00  0.000000000E+00  0 0  TIME SYSTEM CORR
QZUT  0.000000000E+00  0.000000000E+00  0 0  TIME SYSTEM CORR
BDUT  0.000000000E+00  0.000000000E+00  0 0  TIME SYSTEM CORR
18      LEAP SECONDS
      END OF HEADER
G25 2023 1 14 18 0 0 .411274377257E-03 .341060513165E-11 .00000000000E+00
      .61000000000E+02 .58937500000E+02 .480662878681E-08 .199526457345E+01
      .284239649773E-05 .111140634399E-01 .668875873089E-05 .515356175995E+04
      .58320000000E+06 -.180676579475E-06 .264909940674E+01 -.229105353355E-06
      .954365204479E+00 .24556250000E+03 .101495003299E+01 -.819105547605E-08
      .382158775590E-10 .10000000000E+01 .22440000000E+04 .00000000000E+00
      .24000000000E+01 .00000000000E+00 .558793544769E-08 .61000000000E+02
      .57744600000E+06 .40000000000E+01
G 2 2023 1 14 18 0 0 -.627320259809E-03 .227373675443E-11 .00000000000E+00
      .38000000000E+02 -.20187500000E+02 .409909931537E-08 .248770603739E+01
      -.992789864540E-06 .201005858835E-01 .793486833572E-05 .515369124222E+04
      .58320000000E+06 .225380063057E-06 -.160982667394E+01 .111758708954E-07
      .966835306903E+00 .226468750000E+03 -.134030254130E+01 -.758745890526E-08
      -.746459664470E-10 .10000000000E+01 .22440000000E+04 .00000000000E+00
      .24000000000E+01 .00000000000E+00 -.176951289177E-07 .38000000000E+02
      .57744600000E+06 .40000000000E+01
G12 2023 1 14 18 0 0 -.328070484102E-03 -.454747350886E-11 .00000000000E+00
      .71000000000E+02 .53968750000E+02 .451554523344E-08 .207604933092E+01
      .256486237049E-05 .883725425228E-02 .637024641037E-05 .515367742729E+04
      .58320000000E+06 -.558793544769E-08 .272983685783E+01 -.163912773132E-06
      .966808231215E+00 .25556250000E+03 .132473105401E+01 -.803176312660E-08
      -.153577825704E-10 .10000000000E+01 .22440000000E+04 .00000000000E+00
      .71000000000E+02 .00000000000E+00 -.175728517572E-07 .71000000000E+02
Linea 1, colonna 1      100%      Unix (LF)      UTF-8
```

File .nav

```
_dev_ttyACM2_20230114_172218_rover - Blocco note di Windows
File Modifica Formato Visualizza ?
3.02      OBSERVATION DATA      M: Mixed      RINEX VERSION / TYPE
CONVBIN 2.4.2      20230116 110710 UTC PGM / RUN BY / DATE
log: /home/luca/Nextcloud/uni/GPSDataLoggerParser/acquisizioCOMMENT
format: u-blox      COMMENT
MARKER NAME
MARKER NUMBER
MARKER TYPE
OBSERVER / AGENCY
REC # / TYPE / VERS
ANT # / TYPE
APPROX POSITION XYZ
ANTENNA: DELTA H/E/N
SYS / # / OBS TYPES
SYS / # / OBS TYPES
SYS / # / OBS TYPES
SYS / # / OBS TYPES
SYS / # / OBS TYPES
SYS / # / OBS TYPES
SYS / # / OBS TYPES
2023 1 14 16 24 2.0040000 GPS
2023 1 14 21 10 30.0000000 GPS
TIME OF FIRST OBS
TIME OF LAST OBS
SYS / PHASE SHIFT
SYS / PHASE SHIFT
SYS / PHASE SHIFT
SYS / PHASE SHIFT
SYS / PHASE SHIFT
SYS / PHASE SHIFT
SYS / PHASE SHIFT
GLONASS SLOT / FRQ #
GLONASS COD/PHS/BIS
END OF HEADER
> 2023 1 14 16 24 2.0040000 0 12
G 2 22775391.833 119685485.835 2221.714 47.000
G12 23835417.420 125255949.977 -2458.292 40.000
G25 21655703.079 113801483.424 -1280.321 41.000
R17 20453979.988 109453346.387 2232.876 44.000
S36 39030254.231 205105371.632 365.209 43.000
R18 23828307.717 127197032.311 4722.595 40.000
G 5 26629830.863 3169.224 22.000
END OF HEADER
Linea 1, colonna 1      100%      Unix (LF)      UTF-8
```

File .obs

# RTKPLOT (.obs)



# RTKPOST

