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AN6149

Application note

Get decimeter level accuracy with Teseo-LIV4F - GNSS module and Skylark Dx precise positioning service

Introduction

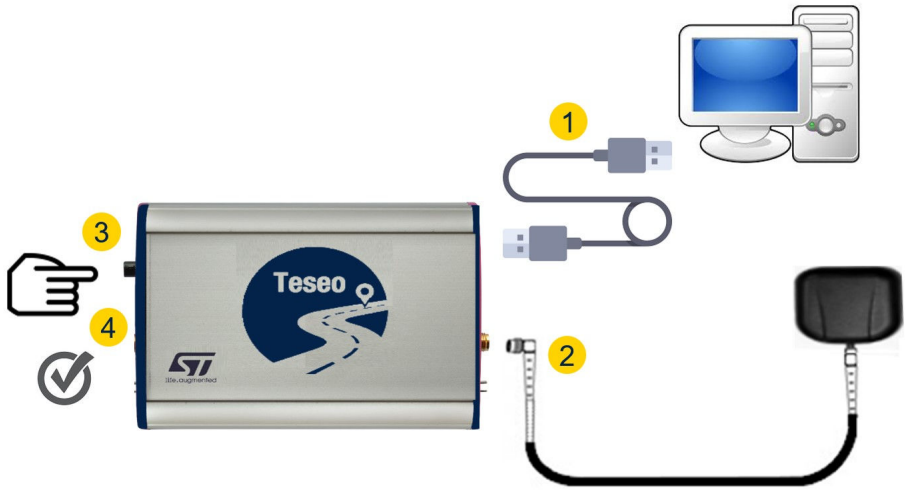
This application note drives the customer to achieve 30-centimeter GNSS accuracy using the STMicroelectronics GNSS Teseo-LIV4F dual band module and the Swift Navigation Dx correction service.

1 Prerequisite

1.1 EVB-LIV4F evaluation kit

Connect your EVB-LIV4F to the Windows PC using the USB cable provided in the kit.
Connect the antenna provided in the kit as shown in the figure below.

Figure 1. EVB-LIV4F hardware setup



Turn-on the PC and the EVB-LIV4F board.

1.2 Download the SiliconLabs Virtual-Com-Port device driver

Download and install the SiliconLabs Virtual-Com-Port (VCP) driver from the silabs web site.
This device driver is required to guarantee the EVB-LIV4F kit is seen as a UART COM port on the Windows PC.

1.3 Download TESEO-SUITE

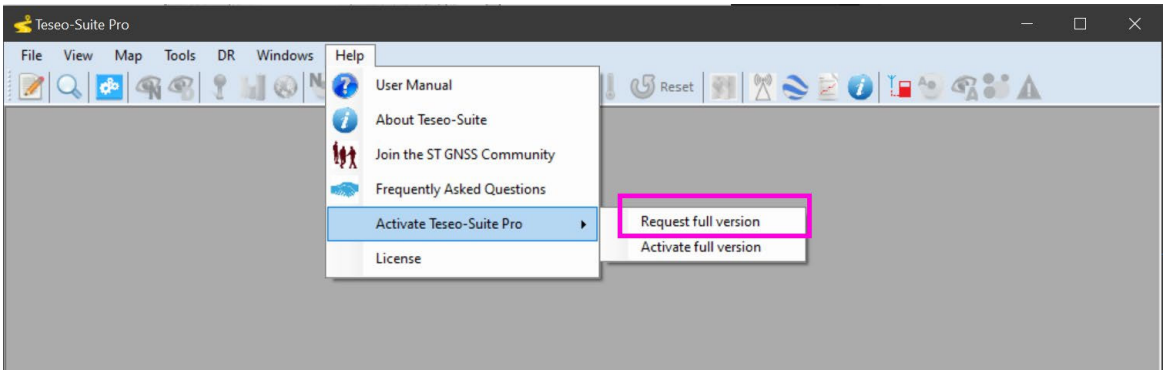
Download and install the latest version of TESEO-SUITE (minimum required version 7.2.3) our Windows PC-based GUI tool available on www.st.com.

1.4 TESEO-SUITE version from basic to pro

This step is necessary to change the TESEO-SUITE version from basic to pro which involves enabling all features (for example, assistance panel).

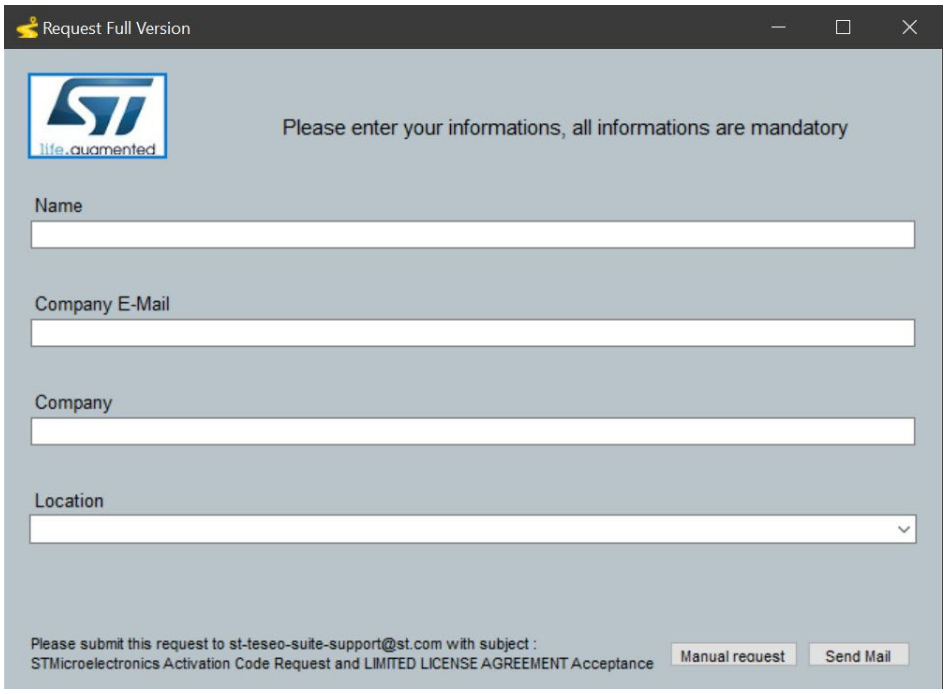
In *"Help"* menu, select *"Request full version"* as shown in the figure below.

Figure 2. Request full version entry



A form panel appears as shown in the figure below.

Figure 3. Request full version panel

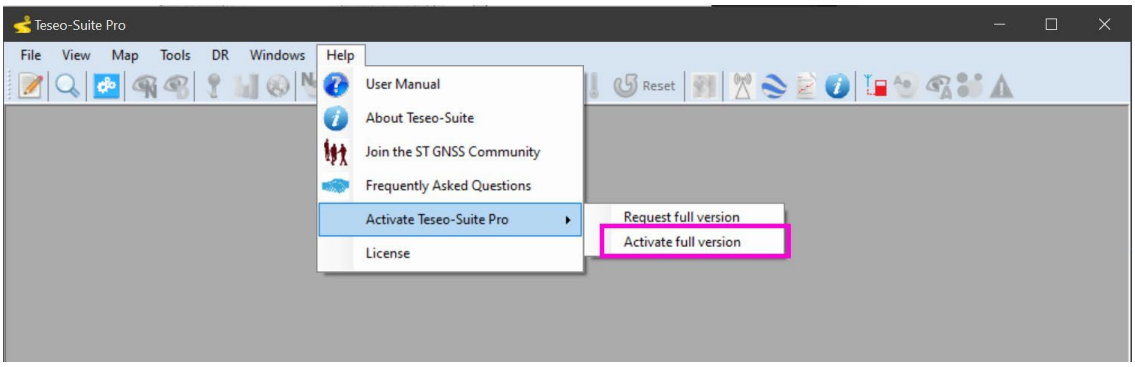


Fill out the form with all the requested information and submit it by clicking the *"Send Email"* button to receive the activation key via email.

After a while you receive the activation key by email; with the activation code you can promote your TESEO-SUITE to the pro version.

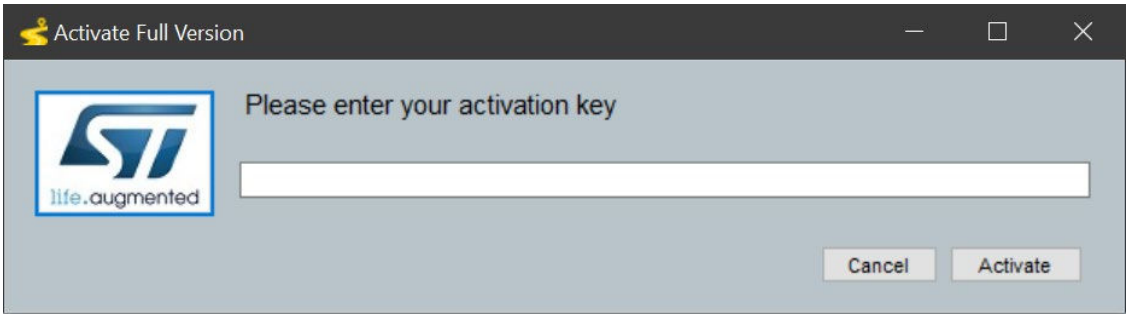
In *"Help"* menu, click on *"Activate full version"* and enter the activation key as shown in Figure 4. Activate full version entry.

Figure 4. **Activate full version entry**



The *"Activate Full Version"* panel appears as shown in the figure below.

Figure 5. **Activate full version panel**



Fill the entry with the activation key received by email and push the *"Activate button"*.
Now, your TESEO-SUITE installation has been promoted to the pro version and it is totally operative.

1.5 Download the Teseo-LIV4F firmware

Download from www.st.com the firmware Teseo-LIV4FSW.
This package contains several binaries, select the file named:
STA8041_LIV4F_PVT_MSM1_x_x_x_x_x_UPG

1.6 Create the Skylark DX account

Sign up for a Skylark DX account at swiftnav web page using the promotional code.

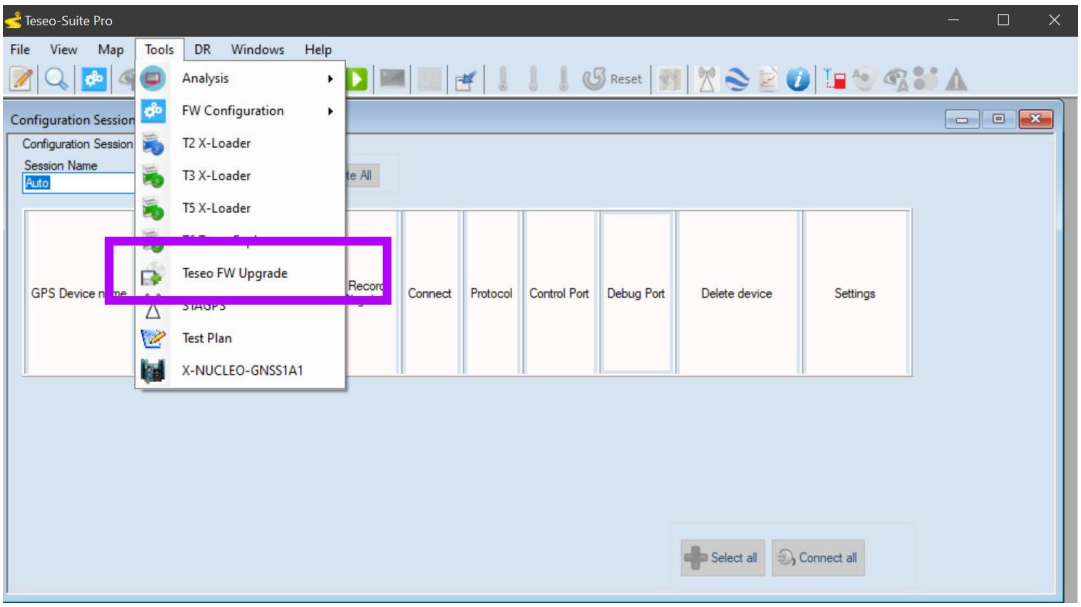
2 Preliminary setup

2.1 Install the PVT_MSM1 Teseo-LIV4F firmware

From the zip file taken in Section 1.5: Download the Teseo-LIV4F firmware extract the ***STA8041_LIV4F_PVT_MSM1*** Teseo-LIV4F firmware.

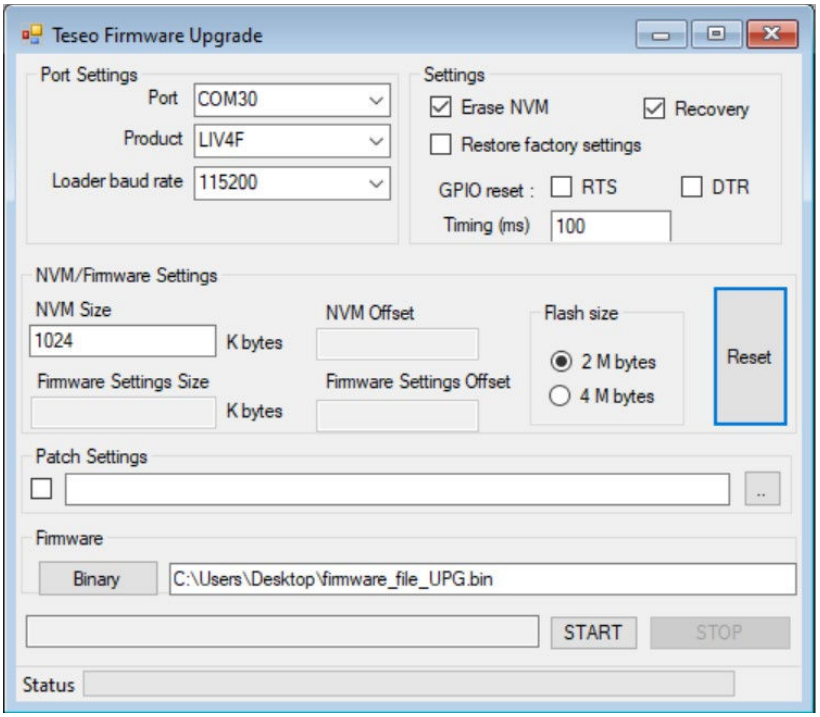
Open the TESEO-SUITE and select *"Teseo FW Upgrade"* from the menu as shown in the figure below.

Figure 6. Teseo firmware upgrade item in the menu



The *"Teseo Firmware Upgrade"* panel appears as shown in the Figure 7. Teseo firmware upgrade panel.

Figure 7. **Teseo firmware upgrade panel**



Follow the setting in the table below.

Table 1. **Firmware upgrade setting**

Port	The COM port discovered on your PC
Product	LIV4F
Loader baud rate	115200
Erave NVM	Enabled
Recovery	Enabled
Binary	Select the ***STA8041_LIV4F_PVT_MSM1*** Teseo-LIV4F firmware from Section 1.5: Download the Teseo-LIV4F firmware.

At this point:

1. Push and hold the *Reset* button in the EVB-LIV4F board.
2. Push the *Start* button in the firmware upgrade panel (on PC).
3. Release the *Reset* button in the EVB-LIV4F board.

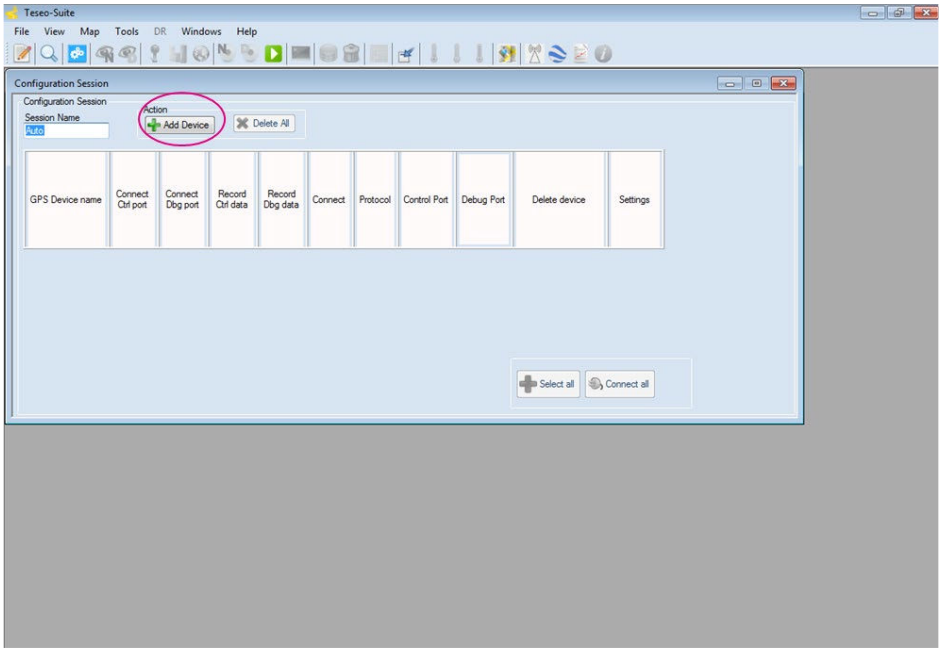
After that the firmware upgrade procedure starts.

Once completed the EVB-LIV4F is fully operative.

2.2 Connect the EVB-LIV4F to TESEO-SUITE

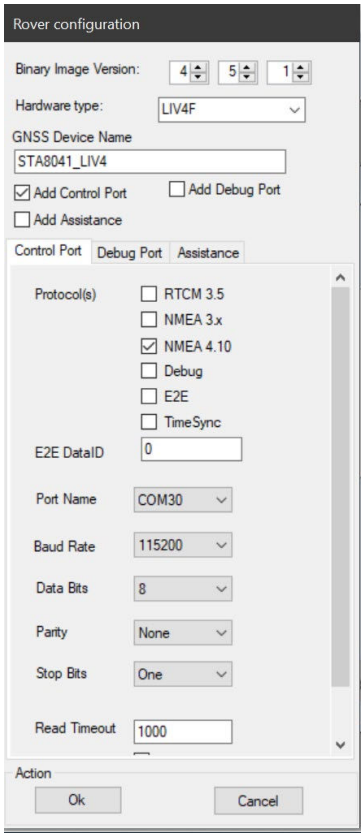
Push *"Add Device"* button in the *"Configuration Session"* as shown in the figure below.

Figure 8. **Add device**



The *"Configuration device"* panel appears as shown in the Figure 9. Configuration device panel.

Figure 9. **Configuration device panel**



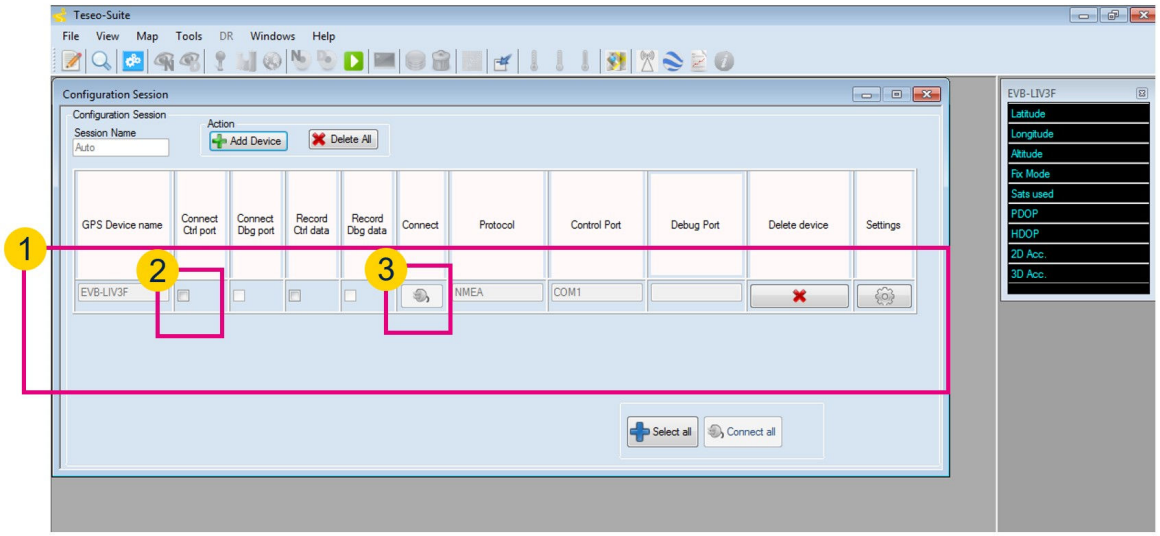
Apply the setting as in the table in the next page.

Table 2. Configuration device setting

Hardware type	GNSS device name	Add control port	Protocol	Port name	Port setting	Ok button
LIV4F	STA8041_LIV4	Enabled	NMEA 4.10	According to the discovered COM port on the PC	Baud rate 115200 Data bits 8 Stop bits 1 Parity None Handshake None	Push Ok button the start the connection

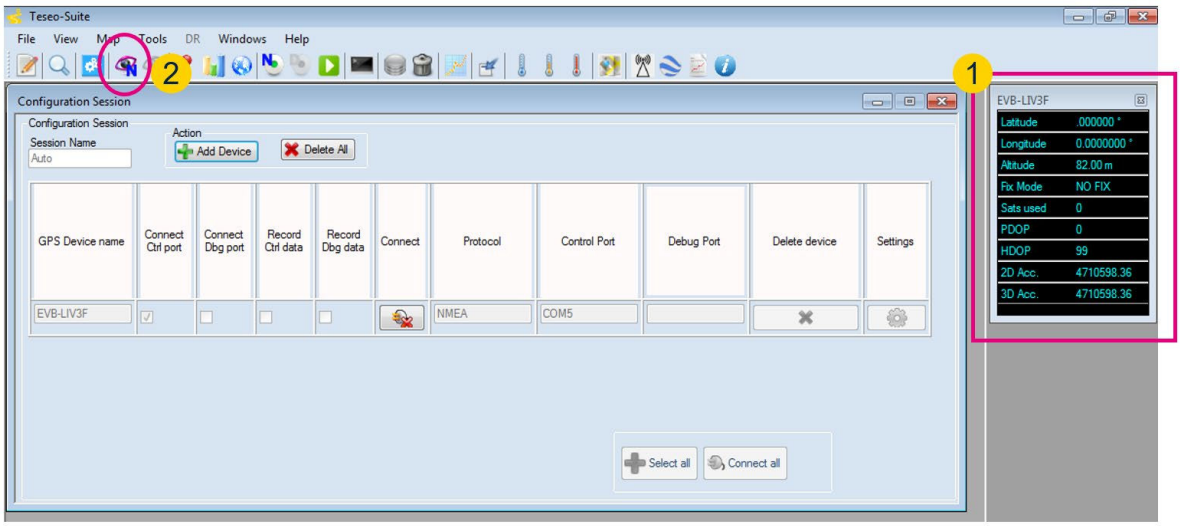
A new line (marked as 1 in Figure 10. Updated configuration session panel) in the *"Configuration Session"* panel appears; enable the control port (marked as 2 in Figure 10. Updated configuration session panel) and active the connection pushing the plug button (marked as 3 in Figure 10. Updated configuration session panel).

Figure 10. Updated configuration session panel



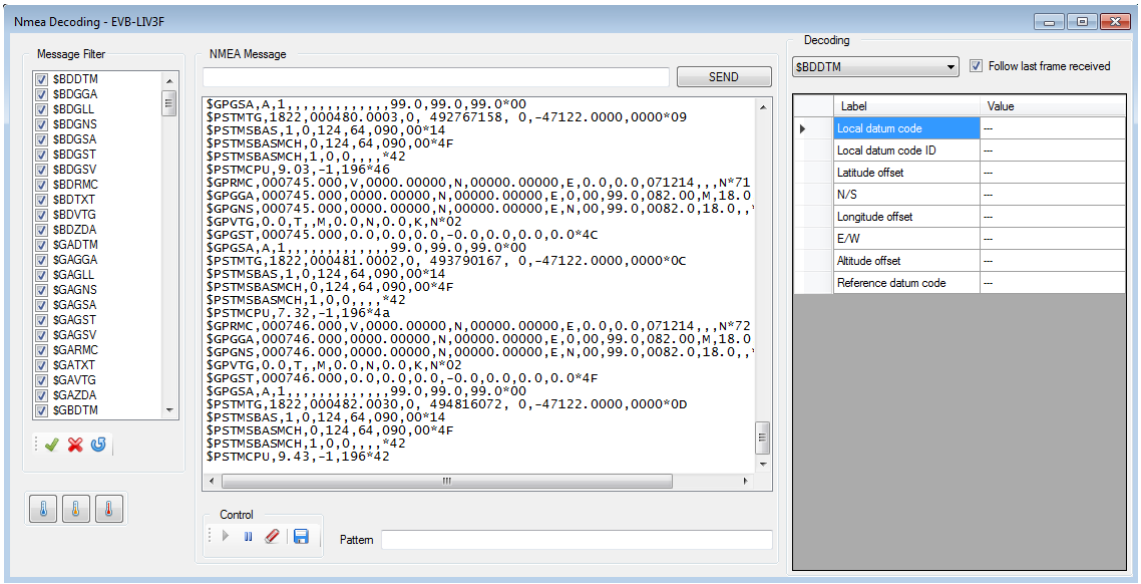
As this point the communication between the PC-Windows and the EVB-LIV4F board is established and fully working customer can inspect data in the *"Inspection Panel"* (marked as 1 in Figure 11. TESEO-SUITE view with established connection) or he could inspect the NMEA stream pushing the *"NMEA"* button (marked as 2 in Figure 11. TESEO-SUITE view with established connection).

Figure 11. **TESEO-SUITE view with established connection**



When the NMEA decoding button is pushed the *"NMEA Decoding"* panel will appear as shown in the Figure 12. NMEA decoding panel.

Figure 12. **NMEA decoding panel**

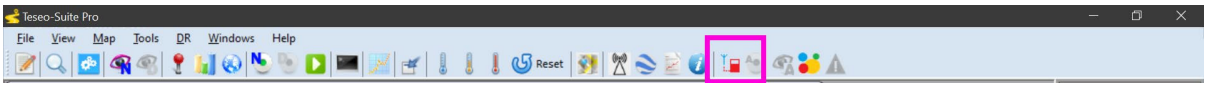


3 Skylark DX assistance configuration

In this chapter the user will configure the TESEO-SUITE assistance panel to acquire the Swift Navigation Skylark Dx assistance service.

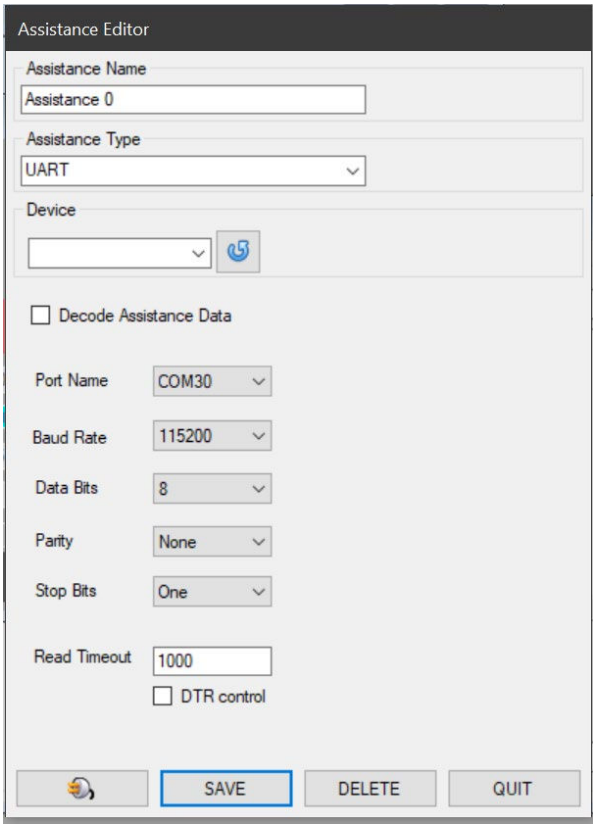
Open the *"Assistance Panel"* pushing the *"Assistance button"* in the TESEO-SUITE's toolbar as show in the figure below.

Figure 13. Assistance button



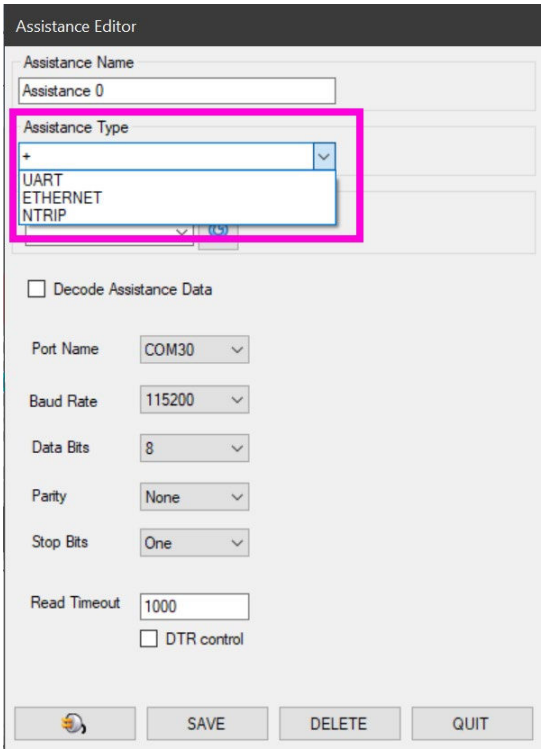
The assistance panel appears as shown in the figure below.

Figure 14. Assistance panel



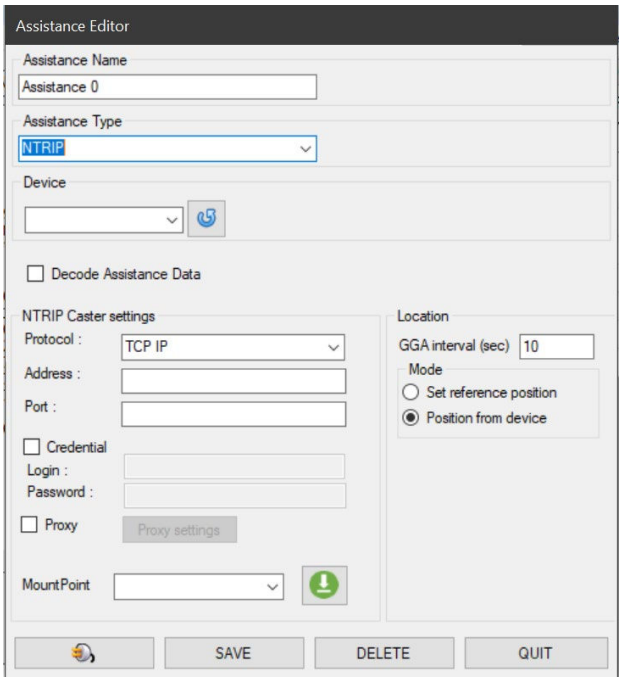
In the *"Assistance Type"* box select *"NTRIP"* as shown in the figure above.

Figure 15. **Assistance type**



When Assistance type *"NTRIP"* is selected the assistance panel is redesigned as shown in the figure above.

Figure 16. **Assistance panel in NTRIP mode**

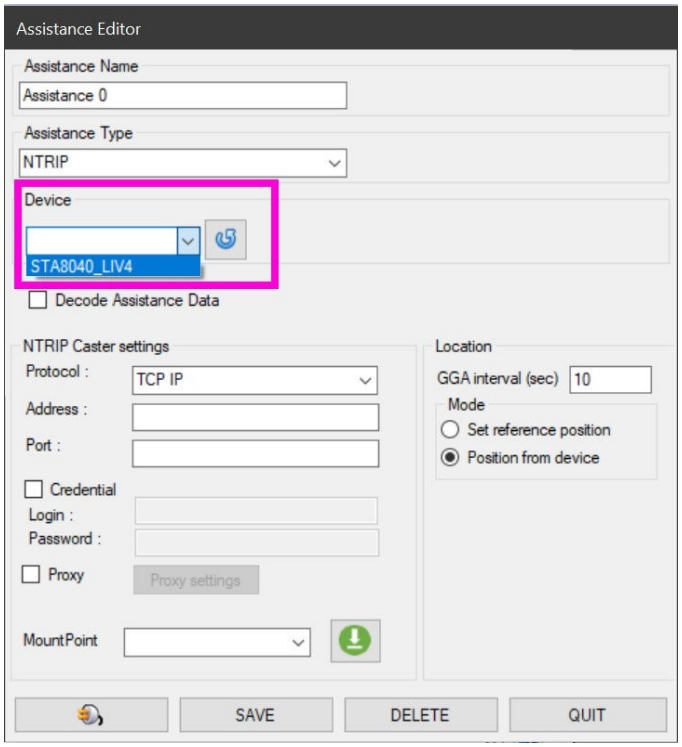


In the *"Device"* entry select the *"STA8041_LIV4"* as shown in Figure 17. Assistance device.

Take care that:

- This entry specifies which device receives the correction data.
- The entry name is the one defined in Table 2. Configuration device setting second line.

Figure 17. Assistance device



Set the *"NTRIP Caster setting"* parameters as show in Figure 18. NTRIP parameter setting with the values in Table 3. NTRIP parameter setting.

Figure 18. **NTRIP parameter setting**

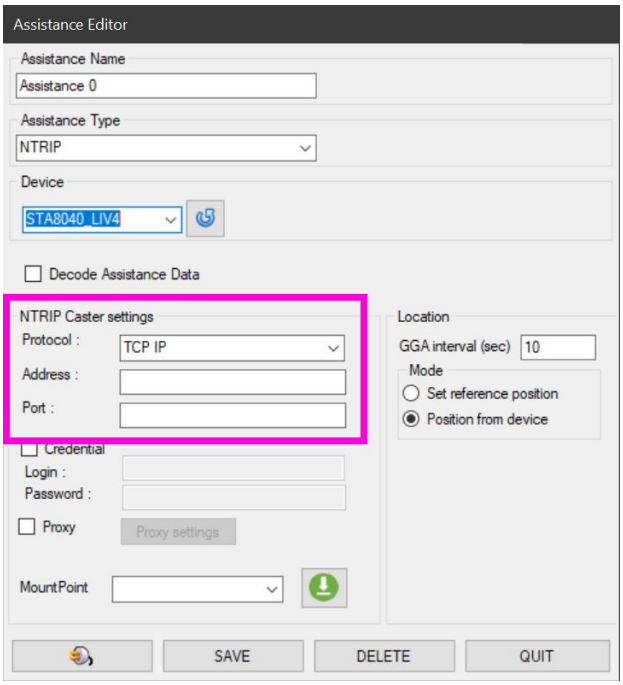


Table 3. **NTRIP parameter setting**

Protocol	Address	Port
TCPIP	Select the address based on major locations: • ap.l1l5.skylark.swiftnav.com (Asia/Pacific) • eu.l1l5.skylark.swiftnav.com (Europe) • na.l1l5.skylark.swiftnav.com (North America)	2101

Configure the location setting as shown in Figure 19. Location setting following setting in Table 4. Location setting parameter.

Figure 19. **Location setting**

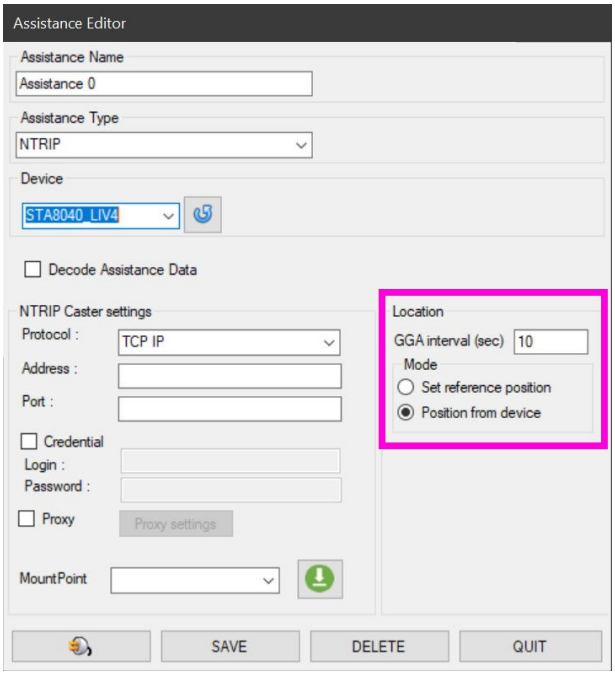
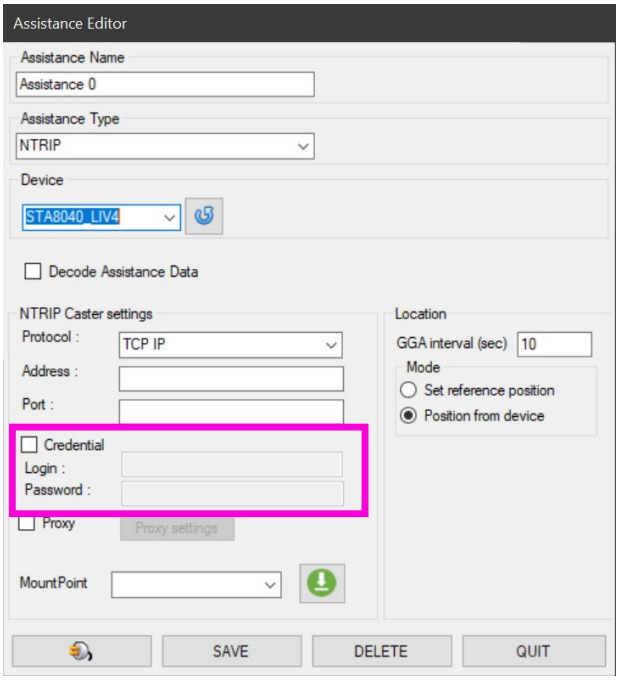


Table 4. **Location setting parameter**

GGA interval	Mode
10 seconds	Position from device

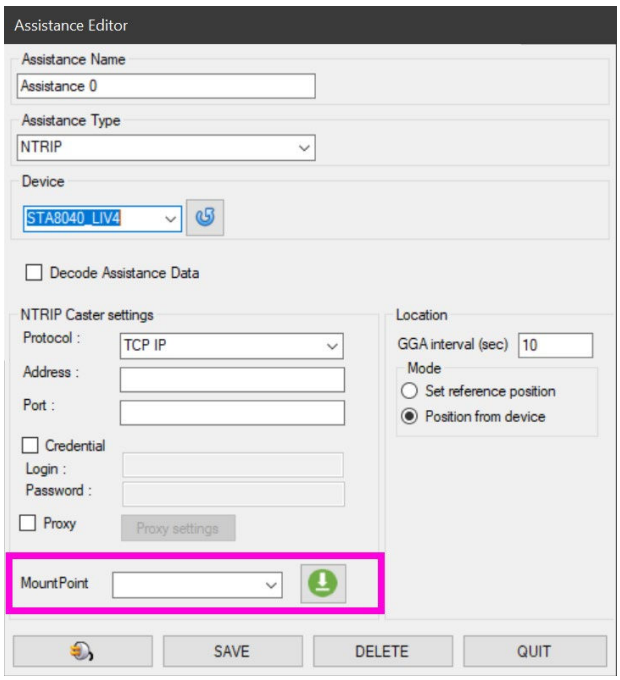
Enable and configure the credential as shown in Figure 20. Assistance credential with the Swift Navigation credential acquired in Section 1.6: Create the Skylark DX account.

Figure 20. **Assistance credential**



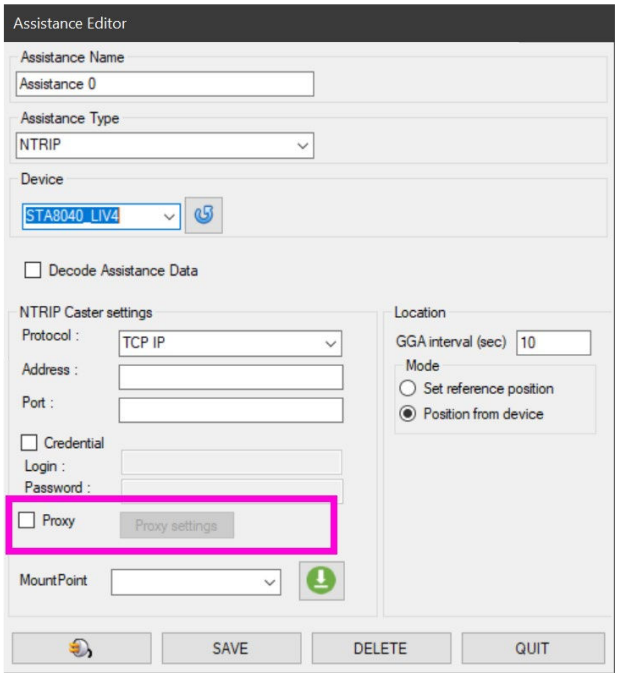
Configure the assistance *"MountPoint"* as shown in Figure 21. Assistance MountPoint with *DGNSS-MSM1* value.

Figure 21. Assistance MountPoint



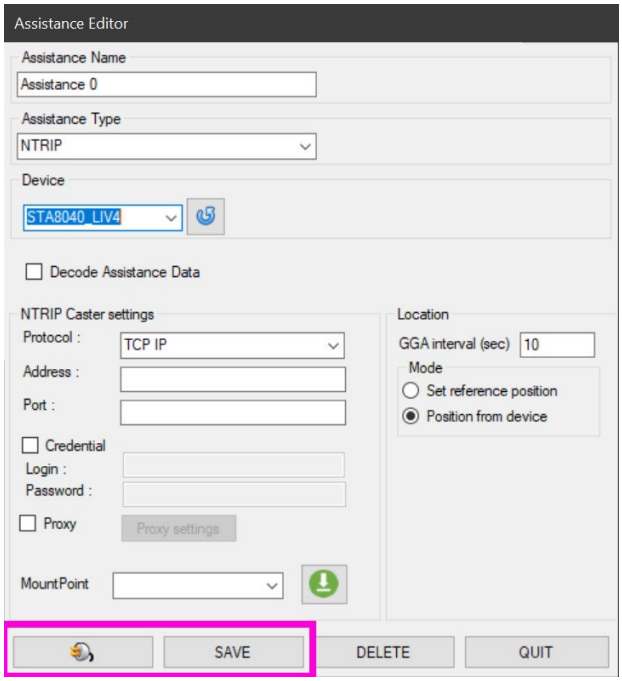
Enable the HTTP Proxy with the correct credential if needed as shown in Figure 22. Assistance proxy configuration.

Figure 22. Assistance proxy configuration



Save the configuration and open the connection pushing the button as shown in Figure 23. Complete the assistance configuration.

Figure 23. Complete the assistance configuration

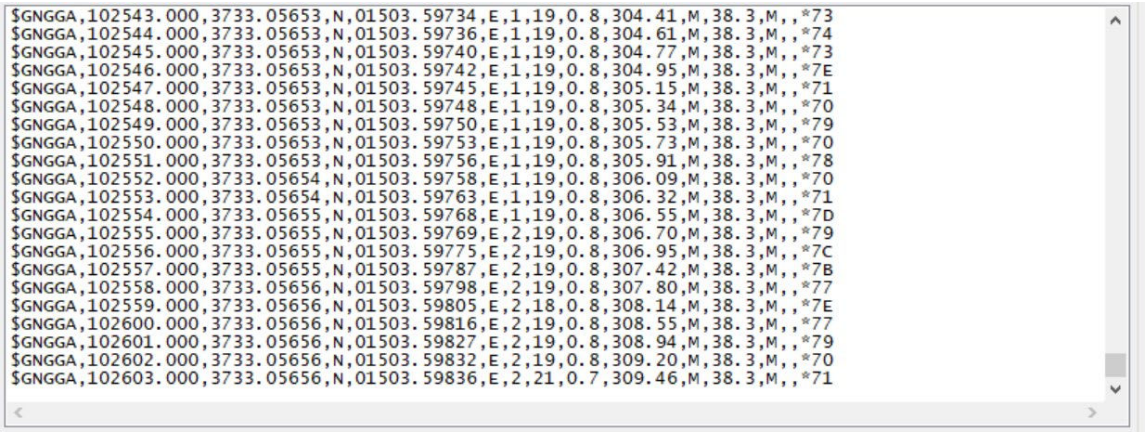


At this point the Assistance is up and running and TESEO-SUITE is acquiring data from the Swift Navigation assistance server and injecting correction data into the EVB-LIV4F.

4 Results

While the module is running and the assistance is connected to the NTRIP service, in the TESEO-SUITE - NMEA decoding panel user can check the NMEA message $GNGGA will notify the Quality-FIX field as differential (from 1 to 2 value) as shown in the figure below.

Figure 24. GPS quality field in GNGGA message



Below is the performance of Teseo-LIV4F with Swift Navigation Skylark Dx error correction service.
System configuration: dynamic (navigation) for 24 hours in 1Hz continuous mode.

Table 5. Teseo-LIV4F with Slylark Dx correction service performance results

	Count (%)	Min.	Max.	|P50|	|P68|	|P95|	|P99|
All 2D error [m]	86401 (100.00)	0.006	1.227	0.302	0.403	0.690	0.907
All alt error [m]	86401 (100.00)	-3.064	1.877	0.387	0.576	1.266	1.766
All 3D error [m]	86401 (100.00)	0.019	3.112	0.568	0.727	1.330	1.882

Revision history

Table 6. **Document revision history**

Date	Revision	Changes
20-Jun-2024	1	First release.

Contents

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