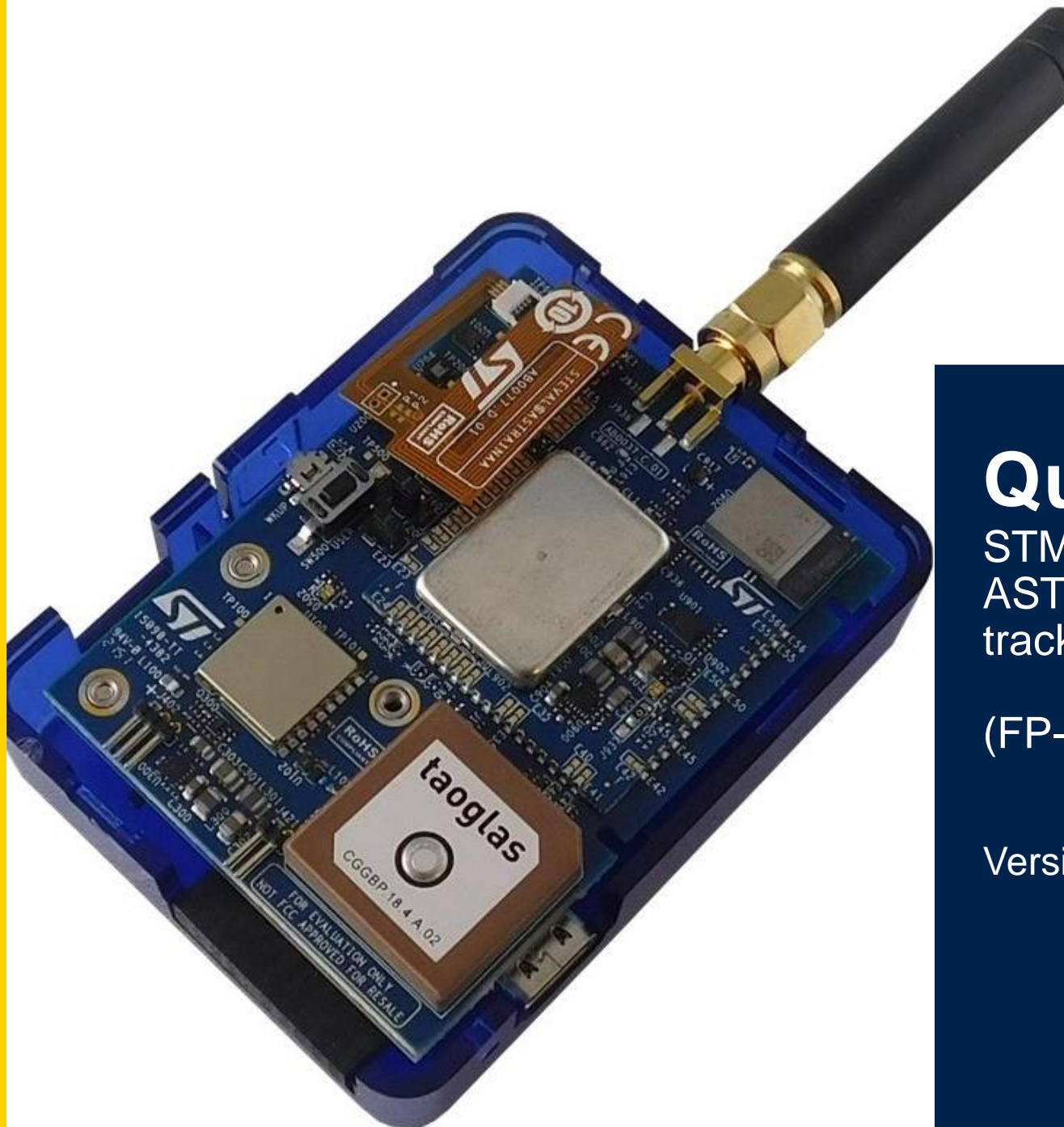




life.augmented



# Quick Start Guide

STM32Cube function pack for the STEVAL-ASTRA1B multiconnectivity asset tracking reference design

(FP-ATR-ASTRA1)

Version 1.0 (April 27, 2022)

# Agenda

- 1 STEVAL-ASTRA1B and FP-ATR-ASTRA1 overview
- 2 Setup & Demo Example
- 3 Documents & Related Resources
- 4 STM32 Open Development Environment: Overview

# **1- STEVAL-ASTRA1B and FP-ATR-ASTRA1 overview**

# STEVAL-ASTRA1B end-to-end Asset Tracking solution



**STEVAL-ASTRA1B**  
Eval board

**ST Asset Tracking app**

**DSH-ASSETTRACKING**  
Web based dashboard



<https://dsh-assettracking.st.com>

**Firmware Package**  
**FP-ATR-ASTRA1**

# STEVAL-ASTRA1B Overview

## Multi-connectivity with sensors and GNSS platform for indoor and outdoor asset tracking

The ASTRA platform (STEVAL-ASTRA1B) is a development kit and reference design that simplifies prototyping, testing and evaluating advanced asset tracking applications such as livestock monitoring, fleet management, and logistics.

Thanks to its modular and optimized design, it simplifies the development of tracking and monitoring innovative solutions.

The STEVAL-ASTRA1B is built around the STM32WB5MMG module and the STM32WL55JC SoC for short and long range connectivity (BLE, LoRa, and 2.4 GHz and sub 1-GHz proprietary protocols). ST25DV64K for NFC connectivity is also available. The on-board STSAFE-A110 enhances security features.

The kit embeds a complete set of environmental and motion sensors (LIS2DTW12, LSM6DSO32X, HTS221, STTS22H, LPS22HH). Moreover, the TESEO-LIV3F GNSS module provides outdoor positioning.

The power management, built around ST1PS02 and STBC03, is optimized for long battery life.



# FP-ATR-ASTRA1

## Software Overview

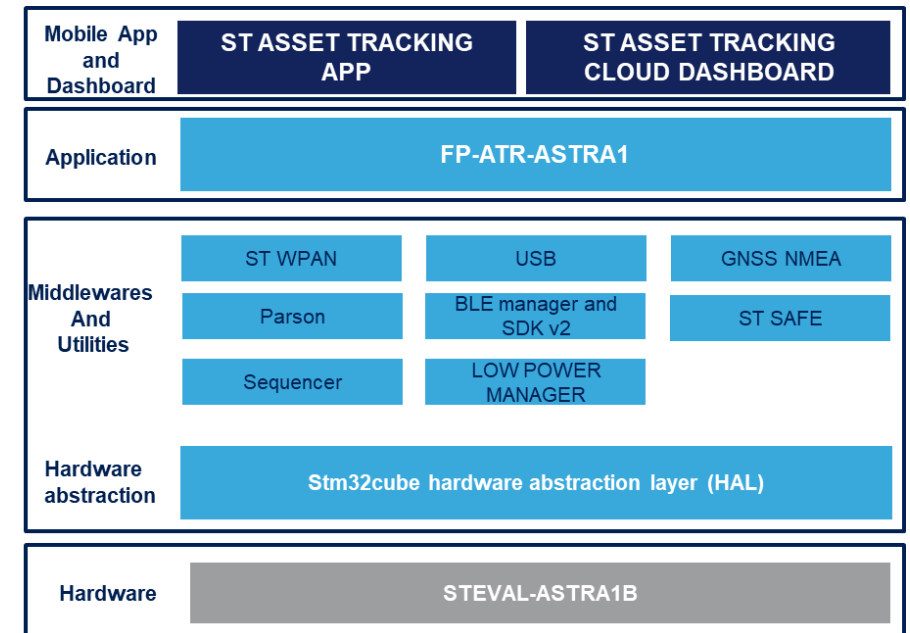
### FP-ATR-ASTRA 1 Software Description

The FP-ATR-ASTRA1 implements a complete asset tracking application that supports long range connectivity and short-range connectivity. This application reads the data from environmental and motion sensors, retrieves the geo-position from GNSS and sends them to the cloud. The FP-ATR-ASTRA1 package supports low-power profiles and the related transitions to ensure long battery autonomy. Moreover, it provides key features such as secure element management, data storing, the possibility to add custom algorithms, debugging interfaces, and expansion capability. The firmware is available as a standard source code .zip file

### Key features

- Complete asset tracking firmware application to manage long range connectivity (LoRaWAN) and short-range connectivity (BLE and NFC)
- Environmental and motion sensor management to monitor asset status
- Outdoor localization and geo-fencing based on a GNSS NMEA string
- Secure element personalization and certificate retrieving
- Power/battery management with low-power operating modes
- Flexible state machine to support different use cases
- Predefined customizable use cases: Fleet management, Livestock monitoring, Goods monitoring, Logistics, Custom
- Fully integrated in an end-to-end, proof-of-concept ecosystem, which includes:
  - the DSH-ASSETTRACKING web cloud dashboard
  - the STAssetTracking mobile app available on Google Play and App Store

### Overall Software Architecture



Latest info available at [www.st.com](http://www.st.com)

**FP-ATR-ASTRA1**

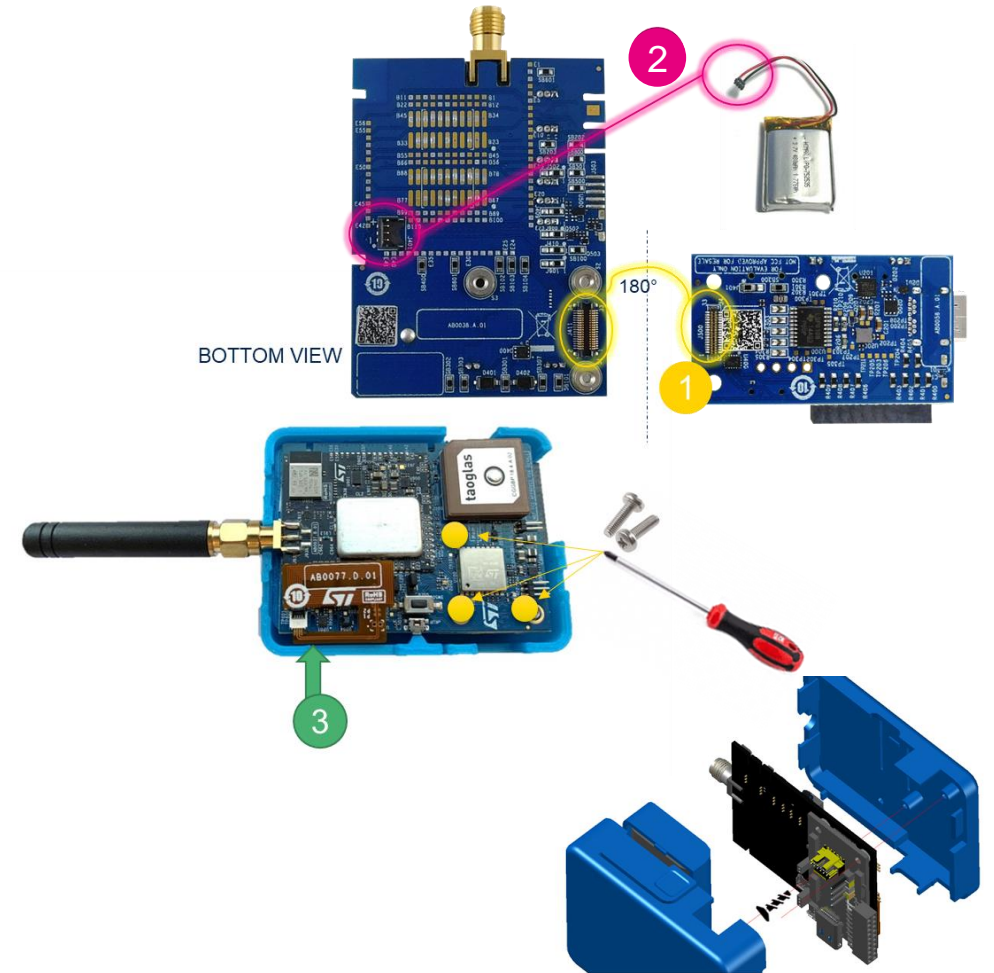
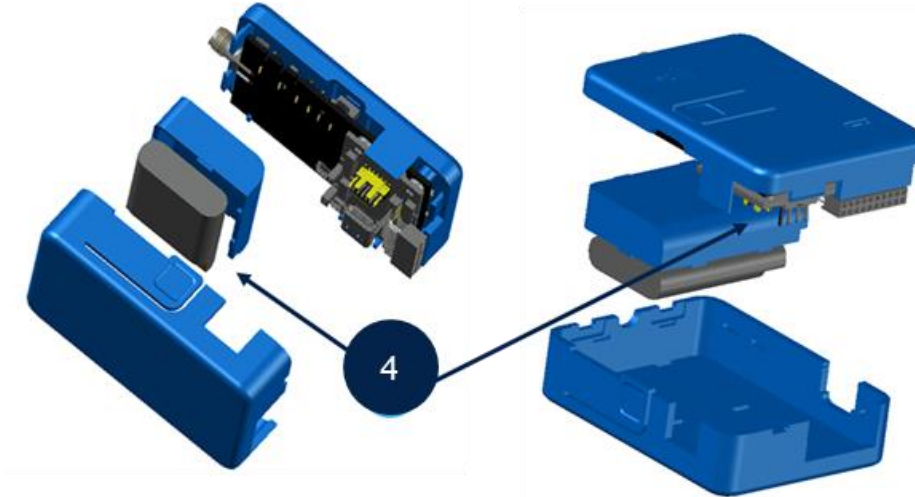
## 2- Setup & Demo Example



# FP-ATR-ASTRA1 hardware setup on STEVAL-ASTRA1B

## STEVAL-ASTRA1B assembly

1. Connect expansion board to bottom side of main and tighten the screws to fix boards and plastic case.
2. Plug the battery
3. Insert the NFC antenna
4. Close the box



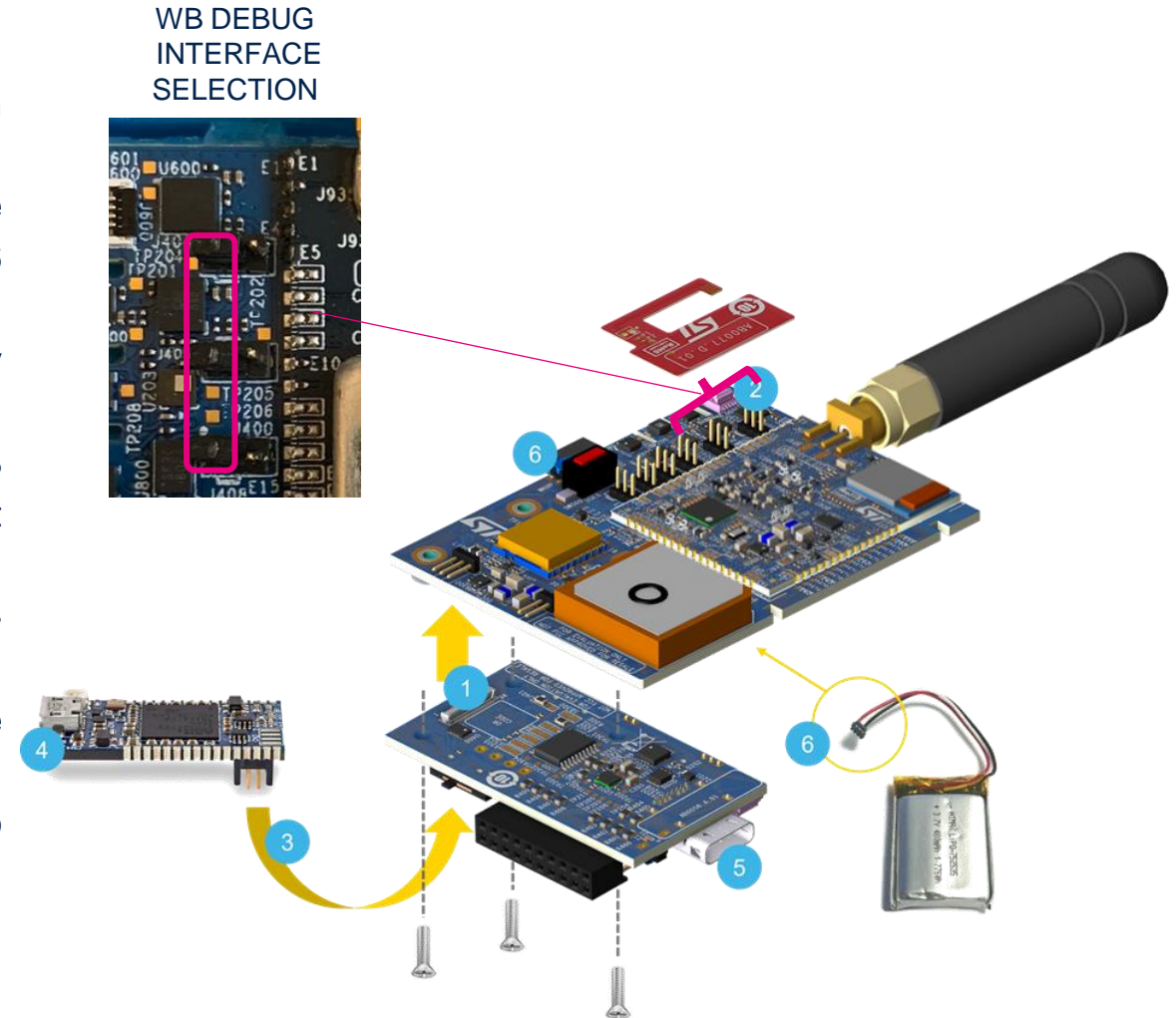


# FP-ATR-ASTRA1 hardware setup on STEVAL-ASTRA1B

## Board Programming

- 1) Connect the expansion board to bottom side of main and tighten the screws.
- 2) Check the three-pins jumper selection according to the microcontroller to be programmed, as described in UM 2966 table 5
- 3) Connect the STLINK-V3MINI to the expansion connector by means of the STDC14 flat cable.
- 4) Supply the programmer by means of a USB Type-A to Micro-B cable between the STLINK-V3MINI and the PC and check that the PWR LED is green, and the COM LED is red.
- 5) Connect a charged battery to the main board or use a USB Type-C cable connected to the expansion board to supply the boards.
- 6) If a battery is used, push the power button to power on the system.
- 7) Open the development toolchain or STM32CubeProgrammer to proceed with programming

For further details, see [UM3019](#)



# FP-ATR-ASTRA1 hardware setup on STEVAL-ASTRA1B

STEVAL-ASTRA1B is provided with 1 RGB user LED and two user buttons:

- power/side button
- frontal button

RGB LED behaviors meaning :

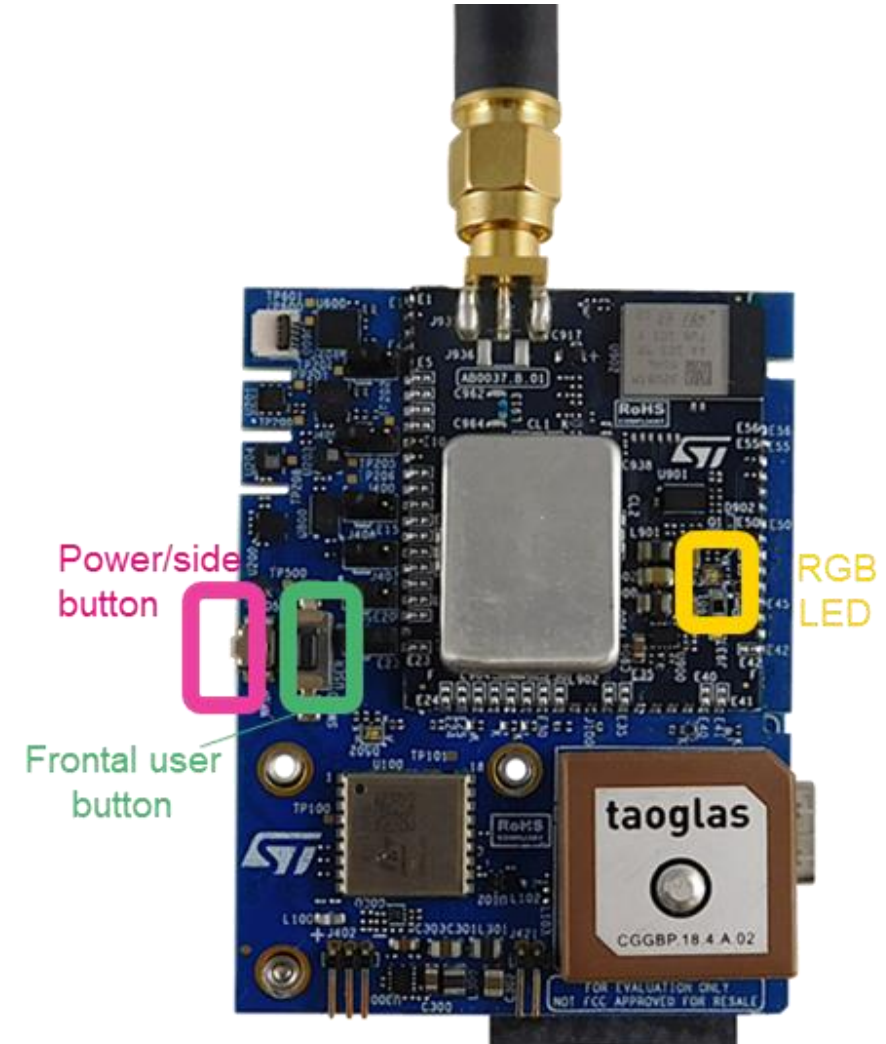
- blue if the configuration is ongoing;
- red if send is ongoing;
- green:
  - with slow blinking if the BLE is not connected;
  - with fast blinking if the BLE is connected;
- yellow if the BLE is connected and sending.

Frontal button:

- short press: trigger an asynchronous LoRa send data
- long press: system shutdown

Power/side button:

- short press: change status low power to run (or vice versa)
- long press: system reboot



# Setup & Application Examples

## Software and Other prerequisites

- **STM32CubeProgrammer Software**
  - Download and install [STM32CubeProgrammer](#)
- **FP-ATR-ASTRA1**
  - Download FP-ATR-ASTRA1 package from [www.st.com](http://www.st.com)
  - copy the .zip file content into a folder on your PC.
  - The package contains binaries and source code with project files for several IDEs ([Keil](#), [IAR](#), [STM32Cube IDE](#)) for STEVAL-ASTRA1B evaluation board
- **Serial line monitor**, e.g. TeraTerm (<https://ttssh2.osdn.jp/>)
- **ST Asset Tracking App**
  - Download and install ST Asset Tracking App from Google Play store or iOS App Store
- **ST Asset Tracking Dashboard**
  - Use/Create your myst.com account to access the [DSH-ASSETTRACKING \(st.com\)](#)

# FP-ATR-ASTRA1. Sample applications

## Start coding in just a few minutes



life.augmented

www.st.com

1 [www.st.com/stm32code-fp](http://www.st.com/stm32code-fp)

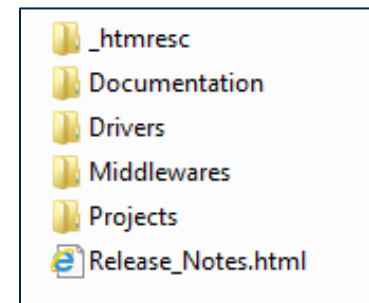
2

Select part number:  
**FP-ATR-ASTRA1**

3

Download & unpack

FP-ATR-ASTRA1 package structure

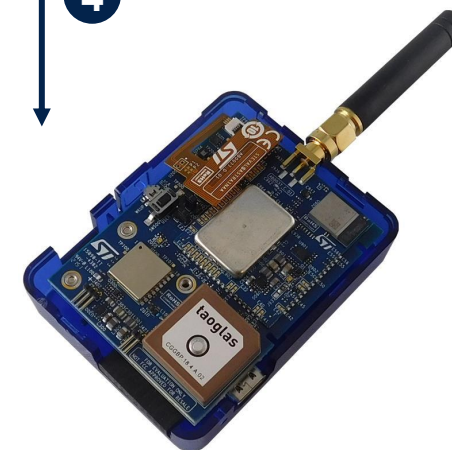


Docs

BSP, HAL and drivers

Sample Application

4



5

Use the pre-compiled binaries or re-compile the code  
customizing your device configuration

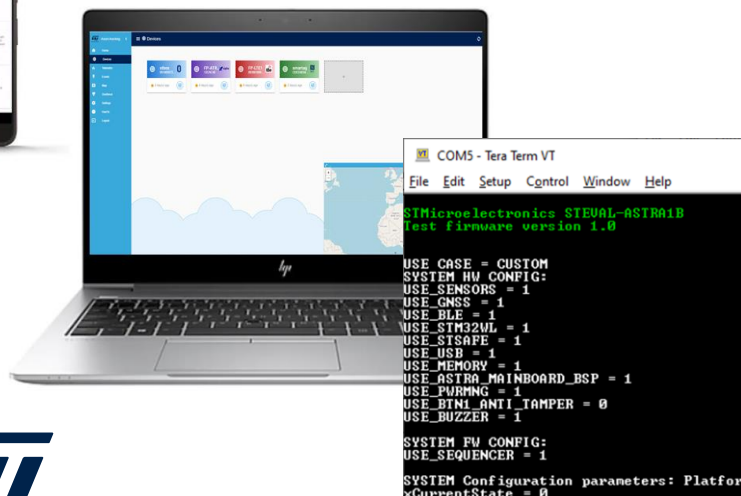


Select one of the projects in

STM32CubeFunctionPack\_ASTRA1\_V1.0.0\Projects\STEVAL-ASTRA1B\Applications\AssetTracking

6

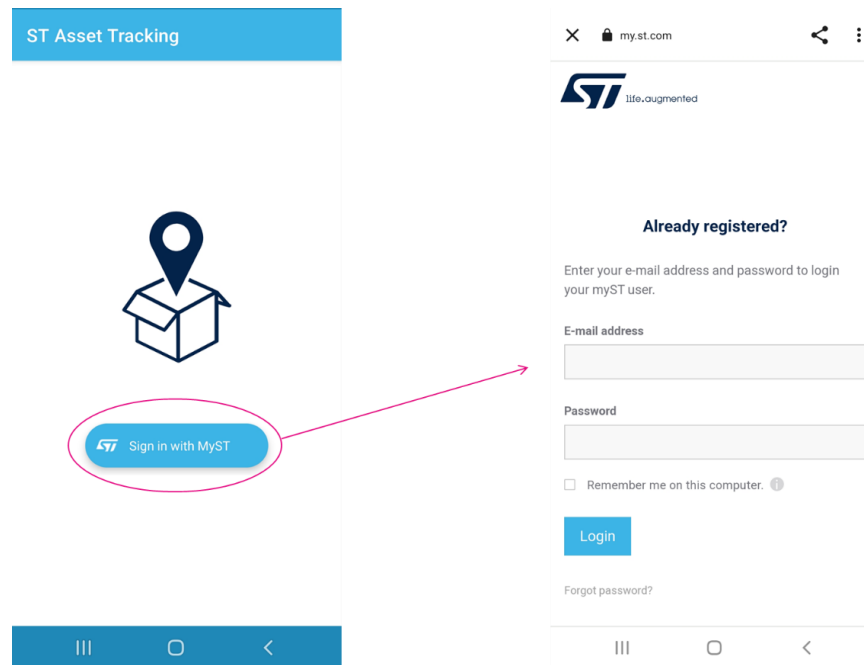
Visualize sensor, GNSS e platform status  
on mobile App, dashboard or serial  
interface



life.augmented

## Asset Tracking App and Dashboard device registration

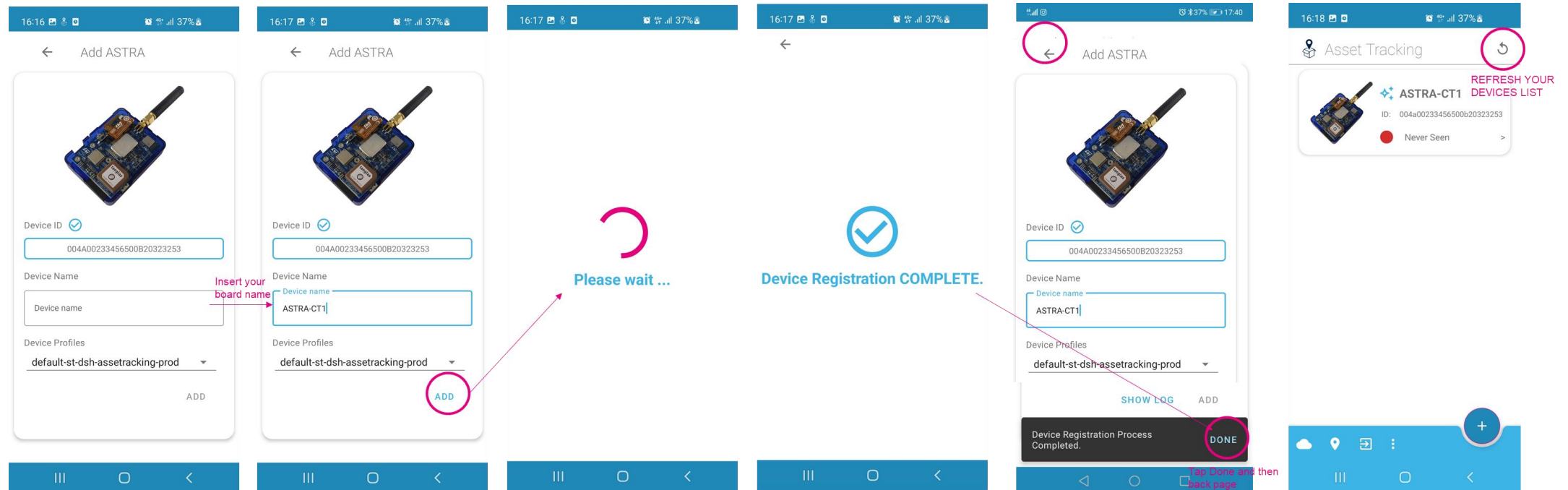
### 1. Open ST ASSET TRACKING APP and login with myst.com account



# FP-ATR-ASTRA1

## Asset Tracking App and dashboard device registration

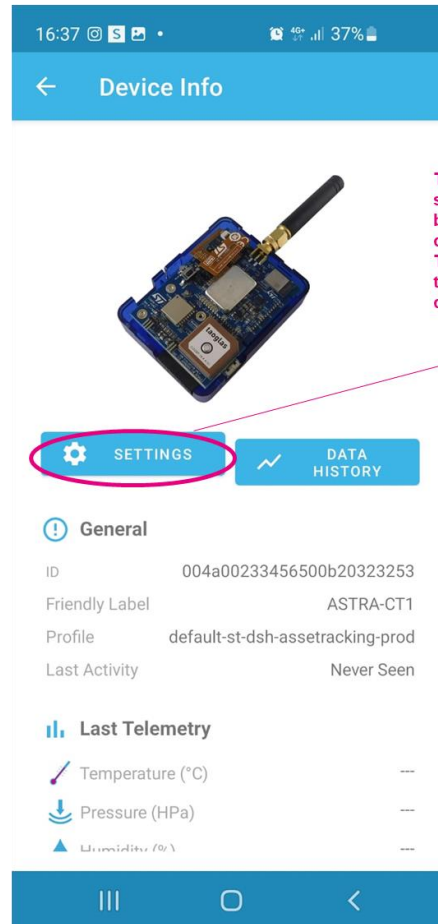
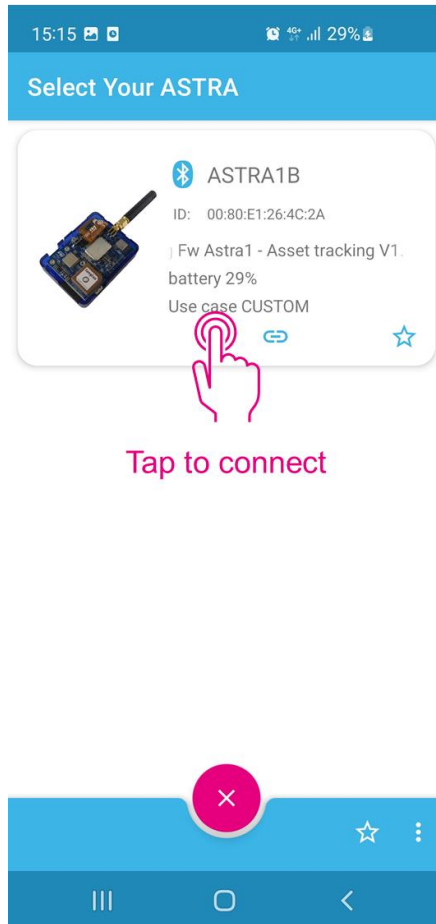
2. Add your ASTRA device: these steps automatically register LoRaWAN device on TTN V3 network server linked to ST dashboard, the board automatically starts the join process and as soon as it joins (\*) it starts sending data



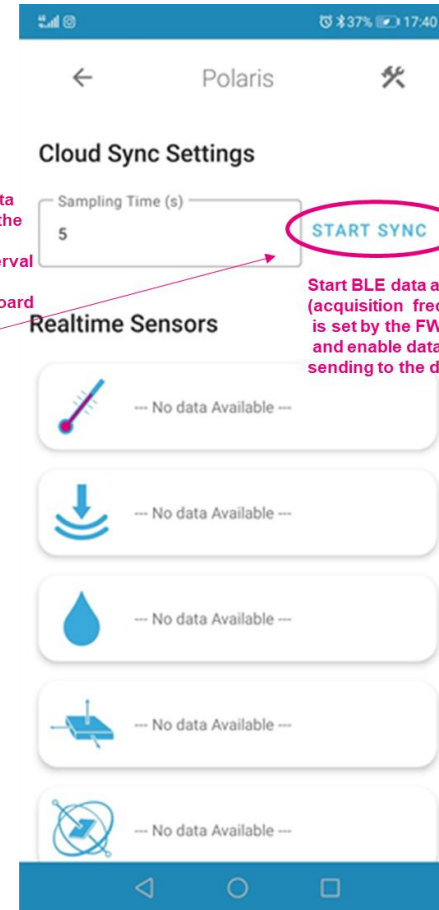


# FP-ATR-ASTRA1

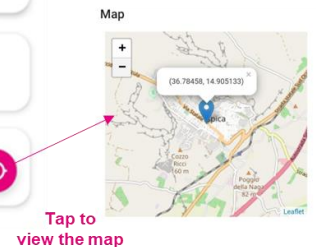
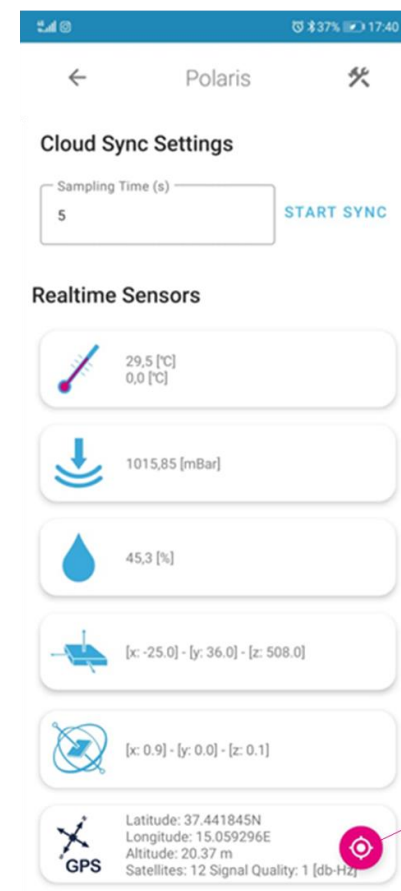
## Start BLE data sending



The smartphone stores the BLE data before to send to the dashboard  
This field sets interval to send data to the dashboard

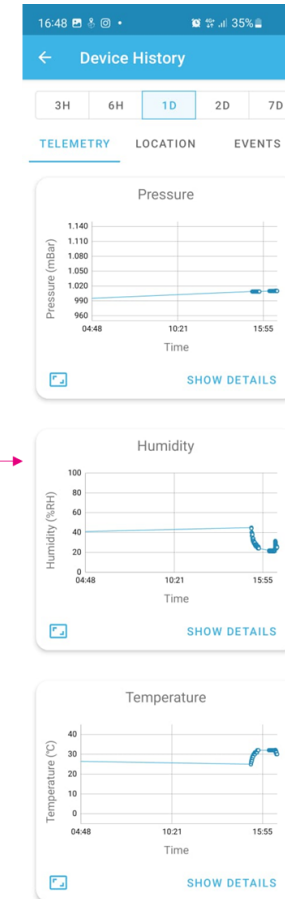
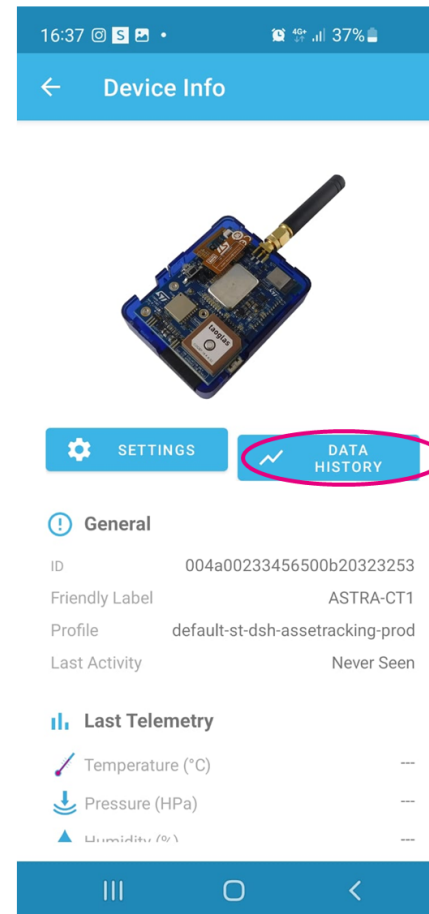
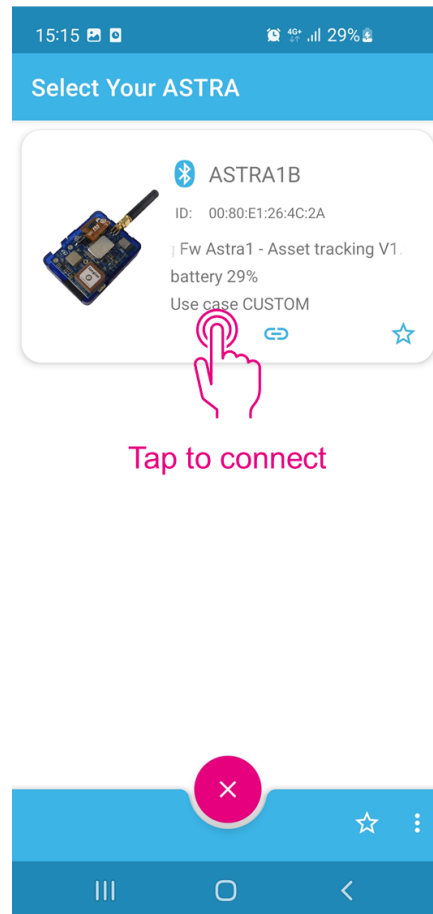


Start BLE data acquisition (acquisition frequency is set by the FW) and enable data packets sending to the dashboard



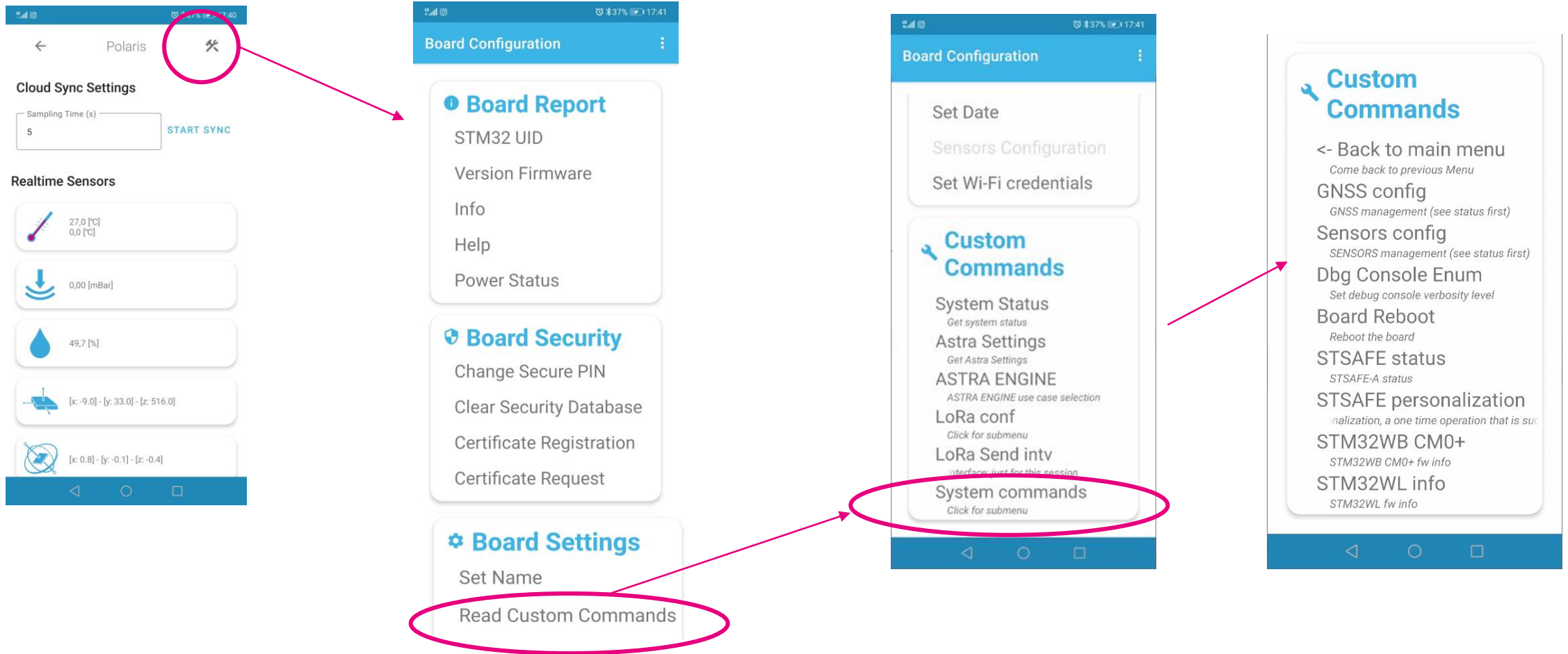
# FP-ATR-ASTRA1

## Show data history



# FP-ATR-ASTRA1:

## Board configuration command using BLE

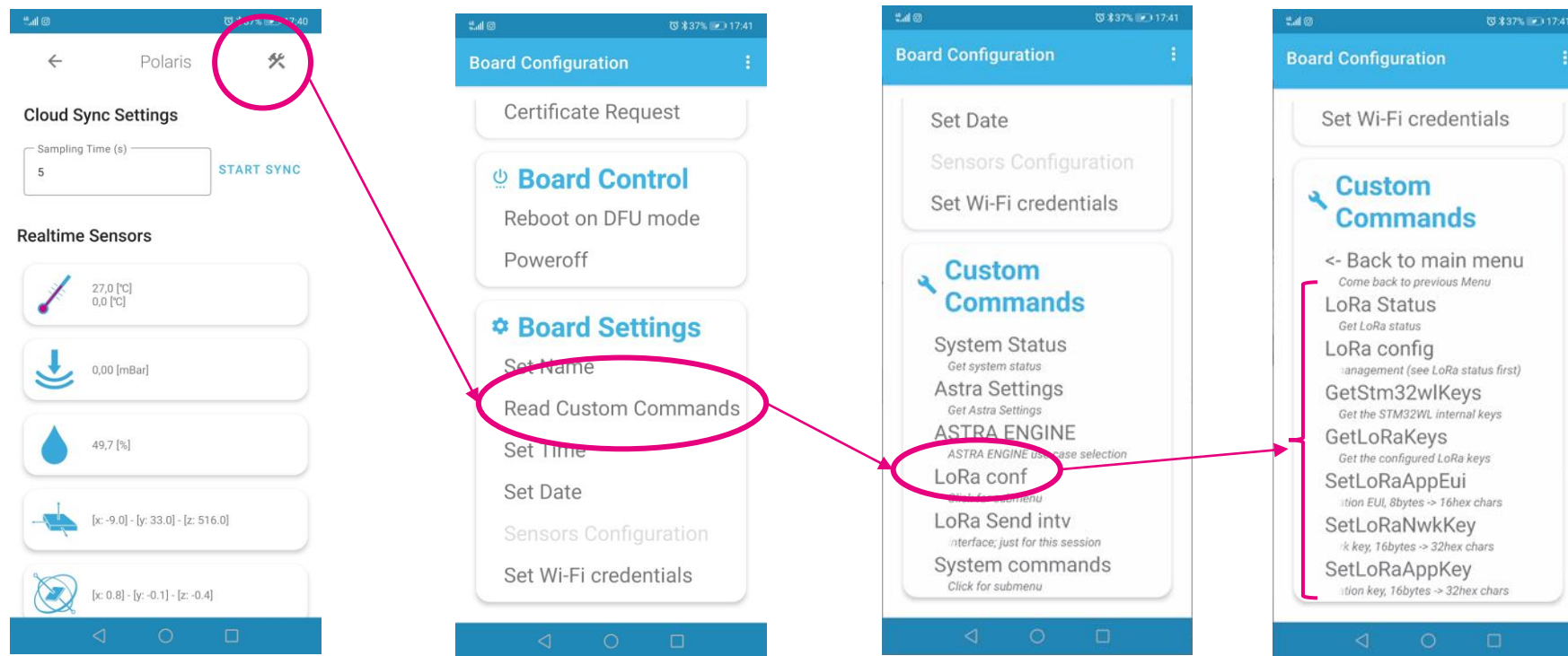


For further details on custom and system command, see UM3019

# CUSTOM COMMANDS

## Check LoRaWAN Status and Info(1/2)

- Once the STEVAL-ASTRA1B has been registered, it tries to join the available TTN LoRaWAN network and sends data
- User can check LoRaWAN configuration and status using mobile app



# FP-ATR-ASTRA1

## Dashboard data view

Open web browser and got to [DSH-ASSETTRACKING \(st.com\)](https://st.com)

The first screenshot shows the 'ASSET-TRACKING PLATFORM Dashboard and Device Management' interface. It features a 'Home' button in the top left corner, which is circled in pink. Below the header, there are five numbered steps: 1. Register and configure your devices, 2. Look at your devices telemetry, 3. Analyze the events detected by your devices, 4. Monitor your device on their geo localization, and 5. Set and detect geofencing events. A pink arrow points from the 'Home' button to the second screenshot.

The second screenshot shows a login page with two options: 'Sign in with your social account' and 'Sign in with your email and password'. The 'Continue with Google' button under the social account option is circled in pink. A pink arrow points from this button to the third screenshot.

The third screenshot shows the 'Devices (1)' page. It includes a navigation bar with 'HOME', 'DEVICES', 'TELEMETRY', 'MAP', 'SETTINGS', 'HOWTO', and 'LOGOUT'. Below the navigation bar, there is a 'Devices (1)' section with a '+ NEW' button and a 'REFRESH' button. A device card for 'MyPolaris' is displayed, showing its ID '00200009070201002' and a map of Europe. A pink arrow points from the 'Continue with Google' button in the second screenshot to the 'MyPolaris' device card in the third screenshot.

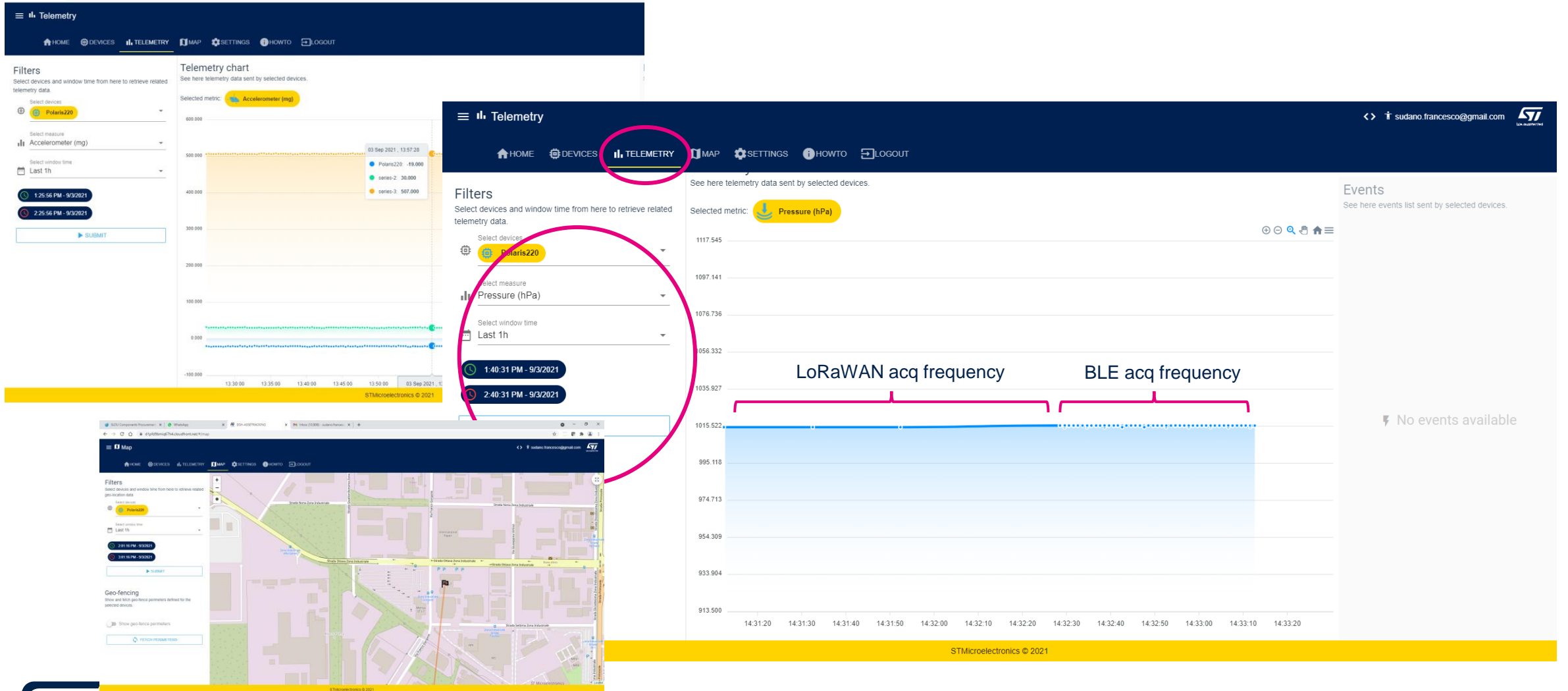


GATEWAYS

Turn On TTN V3 GATEWAY

# FP-ATR-ASTRA1

## Dashboard data view

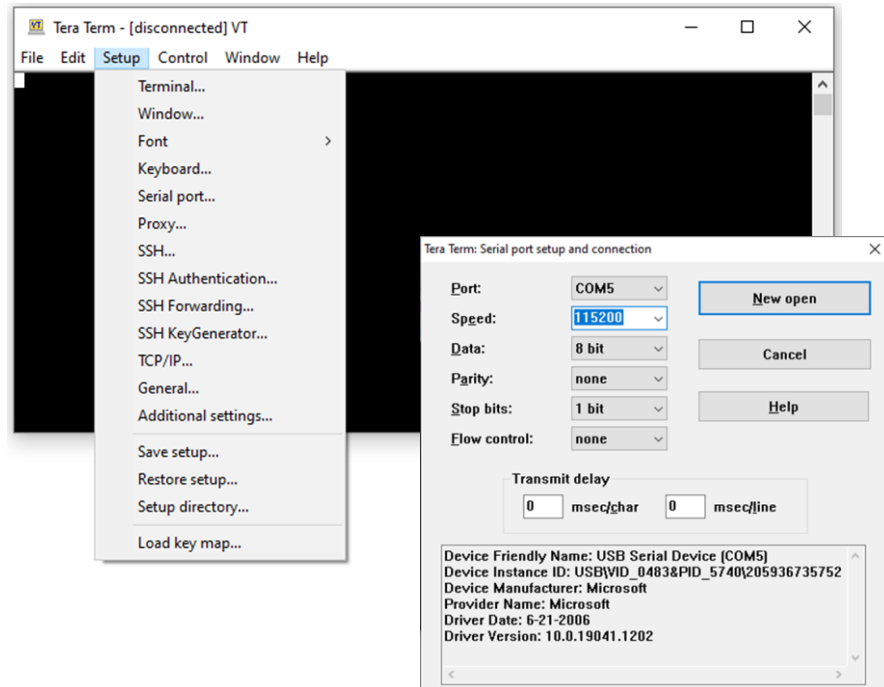




# FP-ATR-ASTRA1

## Debug console

- The FP-ATR-ASTRA1 FW package implements a textual human interface via USB or BLE



```
COM5 - Tera Term VT
File Edit Setup Control Window Help

STMicroelectronics STEVAL-ASTRA1B
Test firmware version 1.0

USE CASE = CUSTOM
SYSTEM HW CONFIG:
USE_SENSORS = 1
USE_GNSS = 1
USE_BLE = 1
USE_STM32WL = 1
USE_SISAFE = 1
USE_USB = 1
USE_MEMORY = 1
USE_ASTRA_MAINBOARD_BSP = 1
USE_PWRMNG = 1
USE_BTN1_ANTI_TAMPER = 0
USE_BUZZER = 1

SYSTEM FW CONFIG:
USE_SEQUENCER = 1

SYSTEM Configuration parameters: PlatformStatus.s
xCurrentState = 0
```

TYPE "?" to know command list

```
COM217 - Tera Term VT
File Edit Setup Control Window Help

Terminal HELP:
?fwversion - View fw info
?hwversion - View hw info
?blemacaddr - View BLE mac addr
?loraparams - View LoRa params
?verbosity - View verbosity level
!verbosity - Set verbosity level
!sysreset - System reset
!sysdfu - System DFU mode
!syswlp - Prog STM32WL
!fwdw1CRLF - Send cmd CR+LF to STM32WL
!fwdw1 - Send cmd to STM32WL
!wldgetresp - Get STM32WL response
!wldtransp - STM32WL uart transparent
!gnssreport - GNSS enable detailed report
!gnssnmea - GNSS set NMEA printout
!stop - STOP fw execution
!loraconf - Set LoRa fw configuration
?loraconf - Get LoRa fw configuration
!debug - Set the debug mode
?debug - Get the debug mode
!sysrun - Set system state to run
!syslp - Set system state to low power
!usecase - Set ATR use case
? - View help
Command complete
```

For further details, see UM3019



life.augmented

note: The debug console is also available over BLE using ST BLE Sensor app (ST Asset tracking app doesn't support this features)

## **3- Documents & Related Resources**

# Documents & Related Resources

All documents are available in the **DESIGN** tab of the related products webpage

## FP-ATR-ASTRA1:

- **DB4631:** STM32Cube function pack for the STEVAL-ASTRA1B multi-connectivity asset tracking reference design – **data brief**
- **UM3019:** Getting started with the STM32Cube function pack for IoT tracker node with Bluetooth® Low Energy, LoRa, NFC connectivity, GNSS and sensors – **user manual**

## STEVAL-ASTRA1B

- **Gerber files, BOM, Schematic**
- **DB4621:** Multi-connectivity asset tracking reference design based on STM32WB5MMG and STM32WL55JC – **data brief**
- **UM2966:** Getting started with the STEVAL-ASTRA1B multi-connectivity asset tracking reference design based on STM32WB5MMG and STM32WL55JC – **user manual**

## DSH-ASSETTRACKING:

- **DB4207:** Cloud Amazon-based web application for asset tracking – **data brief**

## ST ASSET TRACKING MOBILE APP

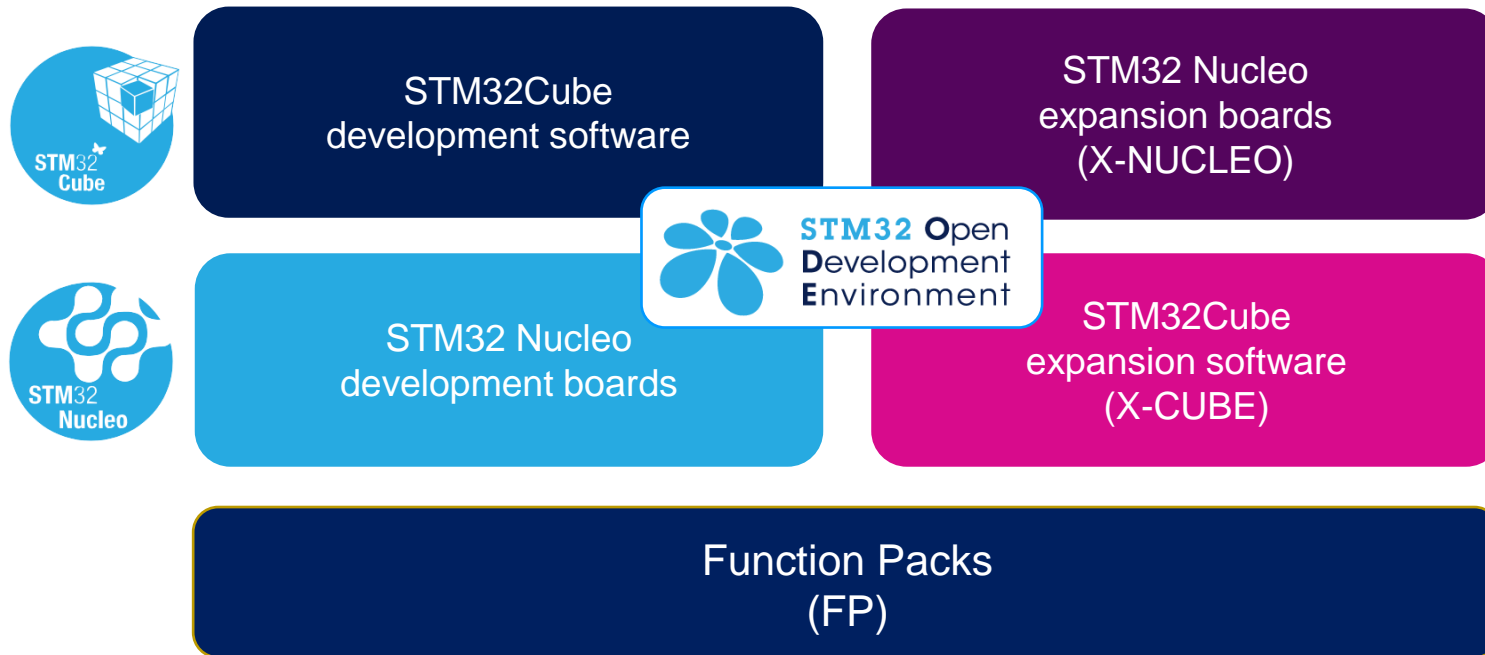
- **DB3951:** Cloud Amazon-based web application for asset tracking – **data brief**

# 4- STM32 Open Development Environment: Overview

# STM32 Open Development Environment

## Fast, affordable Prototyping and Development

- The STM32 Open Development Environment (STM32 ODE) is an open, flexible, easy, and affordable way to develop innovative devices and applications based on the STM32 32-bit microcontroller family combined with other state-of-the-art ST components connected via expansion boards. It enables fast prototyping with leading-edge components that can quickly be transformed into final designs



For further information, please visit [www.st.com/stm32ode](http://www.st.com/stm32ode)

# Our technology starts with You



Find out more at [www.st.com](http://www.st.com)

© STMicroelectronics - All rights reserved.

ST logo is a trademark or a registered trademark of STMicroelectronics International NV or its affiliates in the EU and/or other countries.

For additional information about ST trademarks, please refer to [www.st.com/trademarks](http://www.st.com/trademarks).

All other product or service names are the property of their respective owners.



life.augmented