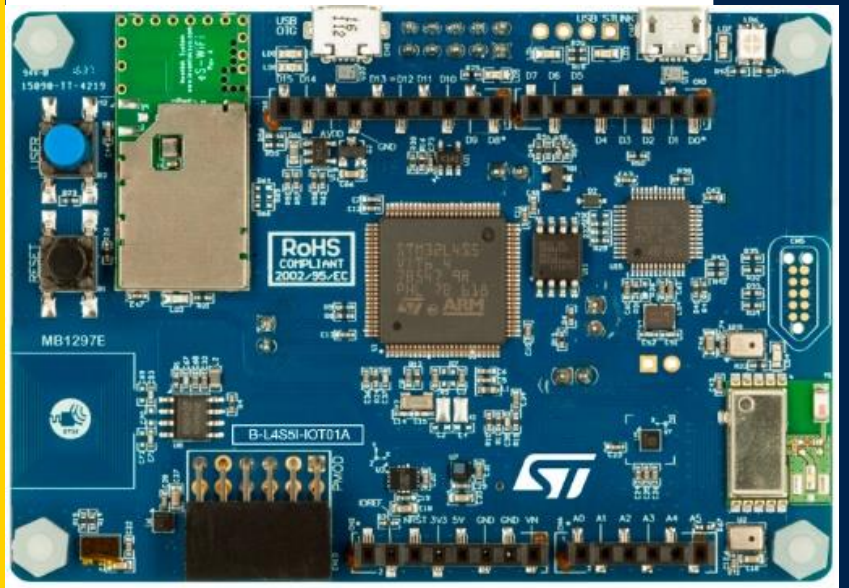

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Quick Start Guide

STM32Cube AWS Cloud function pack for STWIN and Discovery kit IoT node evaluation kits (FP-CLD-AWS1)

Version 3.0 (March 3, 2021)

Agenda

1. Hardware and Software overview
2. Setup & Demo Examples
3. Documents & Related Resources

1- Hardware and Software overview

STWIN development kit - STEVAL-STWINKT1B

STWIN - SensorTile Wireless Industrial Node

Hardware Overview

The STWIN (STEVAL-STWINKT1 or STEVAL-STWINKT1B) is a development kit and reference design that simplifies prototyping and testing of advanced industrial IoT applications such as condition monitoring and predictive maintenance. The kit supports BLE wireless connectivity through an on-board module and Wi-Fi connectivity through a special plugin expansion board (STEVAL-STWINWFV1).

Key Features

- Multi-sensing wireless platform implementing vibration monitoring and ultrasound detection
- Updated version of STEVAL-STWINKT1, now including STSAFE-A110 populated, BlueNRG-M2S module and IMP23ABSU MEMS microphone
- Built around STWIN core system board with processing, sensing, connectivity and expansion capabilities
- Ultra-low-power ARM Cortex-M4 MCU at 120 MHz with FPU, 2048 kbytes Flash memory (STM32L4R9)
- Micro SD Card slot for standalone data logging applications
- On-board Bluetooth® low energy v5.0 wireless technology and Wi-Fi (with STEVAL-STWINWFV1 expansion board), and wired RS485 and USB OTG connectivity
- Option to implement Authentication and Brand protection secure solution with STSAFE-A110
- Wide range of industrial IoT sensors:
  - ultra-wide bandwidth (up to 6 kHz), low-noise, 3-axis digital vibration sensor (IIS3DWB)
  - 3D accelerometer + 3D Gyro iNEMO inertial measurement unit (ISM330DHCX) with machine learning core
  - ultra-low-power high performance MEMS motion sensor (IIS2DH)
  - ultra-low-power 3-axis magnetometer (IIS2MDC)
  - digital absolute pressure sensor (LPS22HH)
  - relative humidity and temperature sensor (HTS221)
  - low-voltage digital local temperature sensor (STTS751)
  - industrial grade digital MEMS microphone (IMP34DT05)
  - analog MEMS microphone with frequency response up to 80 kHz (IMP23ABSU)
- Modular architecture, expandable via on-board connectors:
  - STMOD+ and 40-pin flex general purpose expansions
  - 12-pin male plug for connectivity expansions
  - 12-pin female plug for sensing expansions
- Other kit components: Li-Po battery 480 mAh, STLINK-V3MINI debugger with programming cable, Plastic box

Latest info available at
www.st.com/stwin

STM32L4 Discovery Board for IoT node (B-L4S5I-IOT01A)

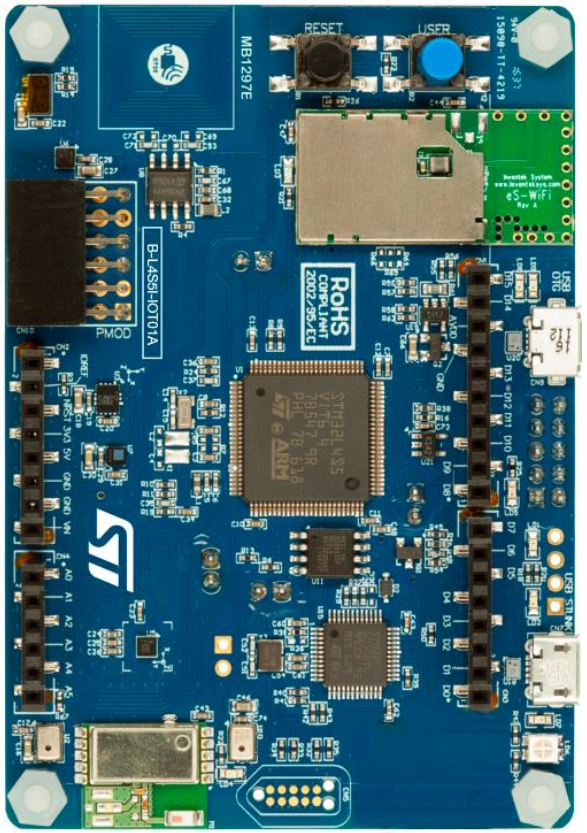
Hardware Overview

STM32L4 Discovery Board for IoT node (B-L4S5I-IOT01A)

The STM32L4+ Discovery kit for the IoT node (B-L4S5I-IOT01A) allows users to develop applications with direct connection to cloud servers. The STM32L4+ Discovery kit enables a wide diversity of applications by exploiting low-power multilink communication (BLE, Sub- GHz), multiway sensing (detection, environmental awareness) and ARM® Cortex®-M4 core-based STM32L4 Series features. Arduino™ Uno V3 and PMOD connectivity provide unlimited expansion capabilities with a large choice of specialized add-on boards.

Key Product on board

- Ultra-low-power STM32L4 Series MCUs based on ARM® Cortex® -M4+ core with 2 Mbytes of Flash memory and 640 Kbytes of SRAM, in LQFP100 package
- Bluetooth® V4.1 module (SPBTLE-RF)
- Sub-GHz (868 or 915 MHz) low-power-programmable RF module (SPSGRF-868 or SPSGRF-915)
- Wi-Fi® module Inventek ISM43362-M3G-L44 (802.11 b/g/n compliant)
- Dynamic NFC tag based on M24SR with its printed NFC antenna
- 2 digital omnidirectional microphones (MP34DT01)
- Capacitive digital sensor for relative humidity and temperature (HTS221)
- High-performance 3-axis magnetometer (LIS3MDL), 3D accelerometer and 3D gyroscope (LSM6DSL), 260-1260 hPa absolute digital output barometer (LPS22HB), Time-of-Flight and gesture-detection sensor (VL53L0X)
- USB OTG FS with Micro-AB connector
- Expansion connectors: Arduino™ Uno V3, PMOD
- Flexible power-supply options: ST LINK USB VBUS or external sources
- On-board ST-LINK/V2-1 debugger/programmer with USB re-enumeration capability: mass storage, virtual COM port and debug port



Latest info available at
www.st.com/B-L4S5I-IOT01A

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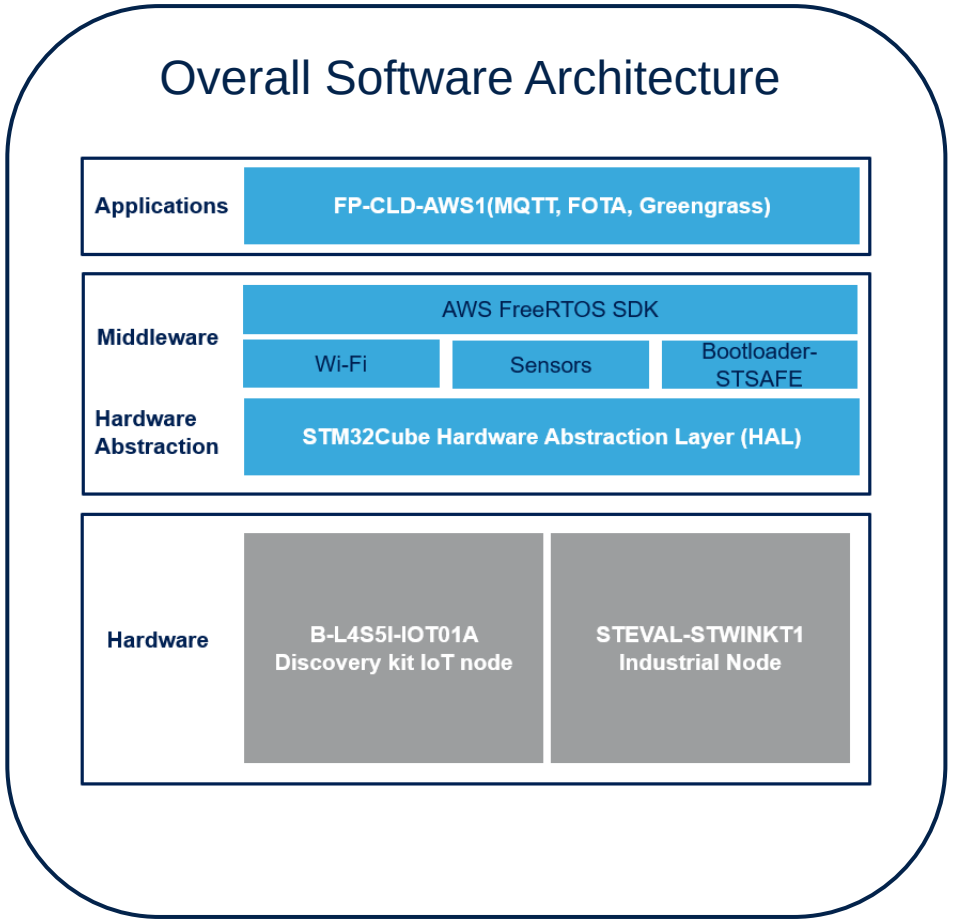
FP-CLD-AWS1
Software Overview

Software Description

The FP-CLD-AWS1 is an STM32Cube Function Pack. Thanks to this package you can directly connect your IoT sensor node to Amazon AWS IoT, transmit sensors data and receive command from Cloud applications.

Key features

- Three Key AWS Demo Application: MQTT, OTA and Greengrass Device Discovery.
- A Web Dashboard running on Amazon AWS services for Sensor data Telemetry Application.
- Integrated X-CUBE-SBSFU and the STSAFE-A110 to implement a Secure Boot and a Secure Firmware Update solution.
- Middleware libraries featuring the Amazon AWS FreeRTOS software development kit, Wi-Fi, and transport-level security (mbedTLS)
- Complete firmware to safely connect an IoT node with sensors to Amazon AWS IoT using Wi-Fi communication technology
- Ready-to-use binaries to connect the IoT node to the web dashboard
- Sample implementations available for STM32L4+ Discovery Kit for IoT node (B-L4S5I-IOT01A), and for STEVAL-STWINKT1B Industrial node.
- Easy portability across different MCU families, thanks to STM32Cube
- Based on STM32Cube software development environment for STM32 microcontrollers
- Free, user-friendly license terms



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2- Setup & Demo Examples: STEVAL-STWINKT1B & B-L4S5I-IOT01A

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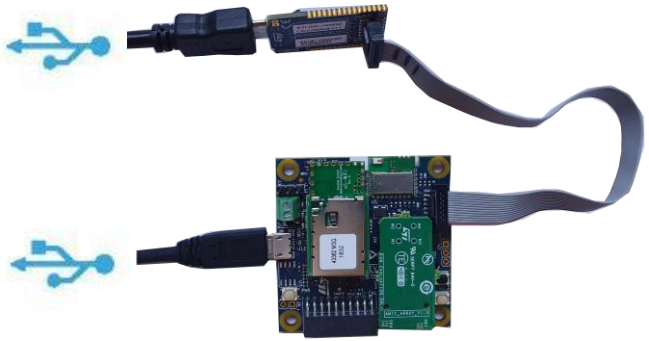
HW prerequisites for STEVAL-STWINKT1B

- 1x STEVAL-STWINKT1B development board
- Laptop/PC with Windows 7, 8 or 10
- 2x microUSB cables
- Wi-Fi Router or access to a Wi-Fi network

STEVAL-STWINKT1B

MicroUSB Cable



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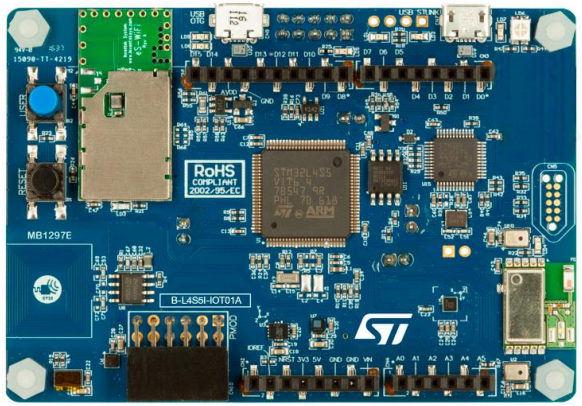
HW prerequisites for B-L4S5I-IOT01A

- 1x B-L4S5I-IOT01A development board
- Laptop/PC with Windows 7, 8 or 10
- 1x microUSB cables
- Wi-Fi Router or access to a Wi-Fi network



B-L4S5I-IOT01A

MicroUSB Cable

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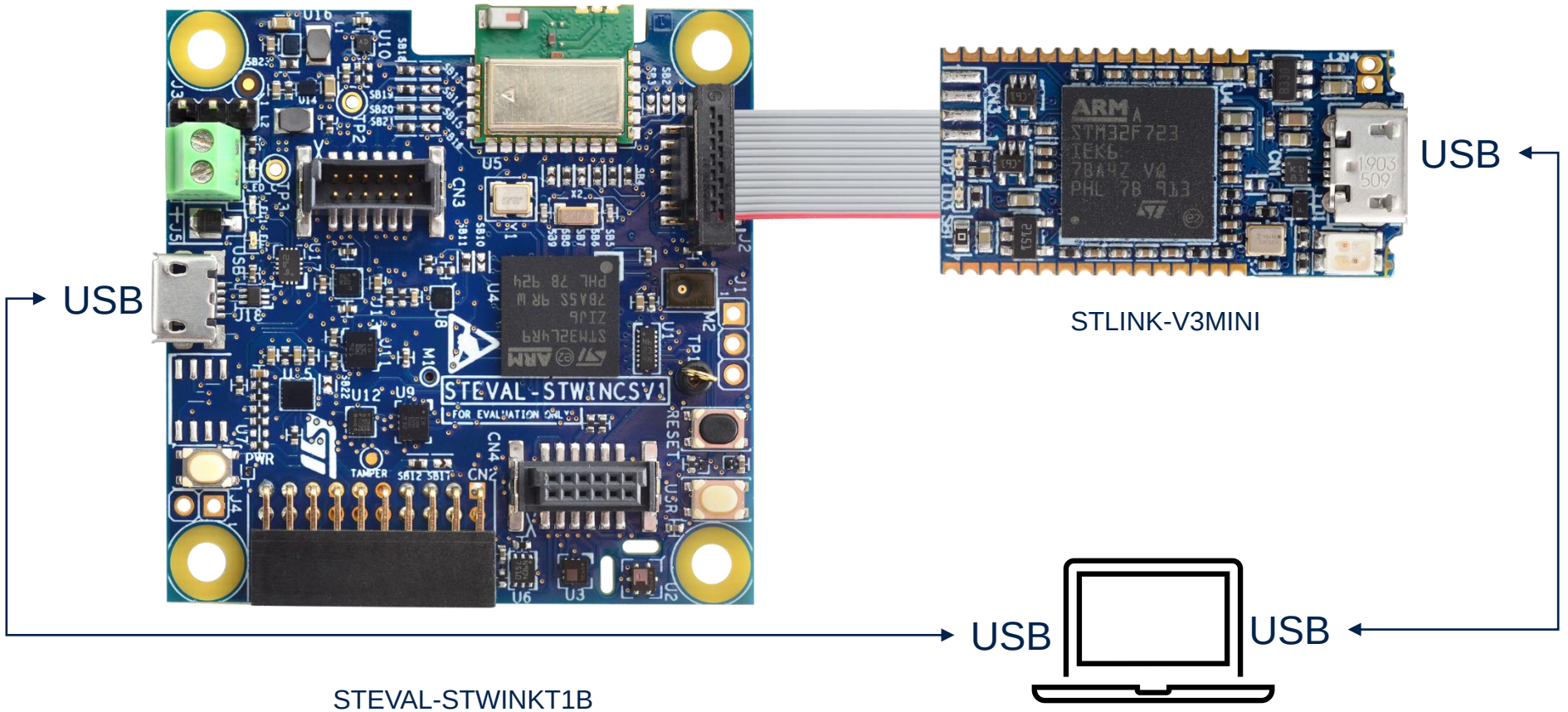
Software and other prerequisites

- **STM32CubeProgrammer Software**
  - Download and install STM32CubeProgrammer
- **FP-CLD-AWS1**
  - Download FP-CLD-AWS1 package from www.st.com, copy the .zip file content into a folder on your PC. The package contains binaries and source code with project files (IAR, STM32CubeIDE) based on B-L4S5I-IOT01A and STEVAL-STWINKT1B
- **Serial line monitor, e.g. TeraTerm (https://ttssh2.osdn.jp/)**
- **Chrome web browser (https://www.google.com/chrome/); tested with Chrome version v83.0.4103.61.**

2.1- Provision the Device STEVAL-STWINKT1B

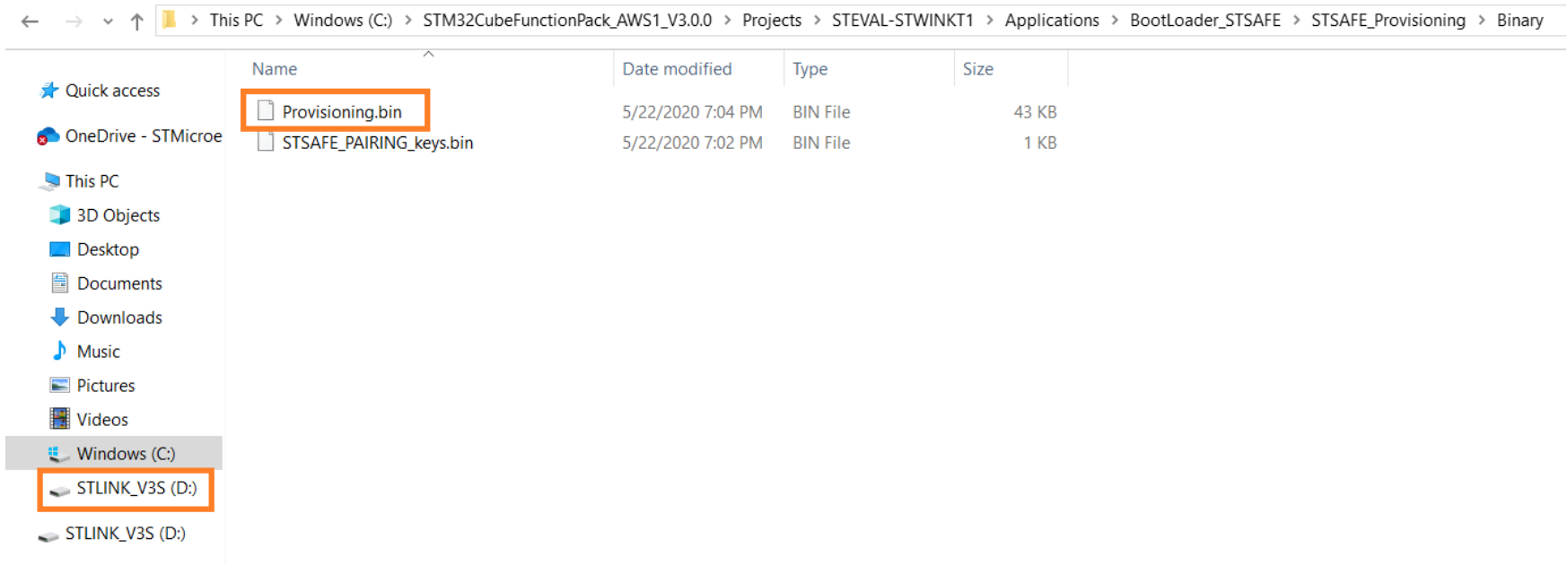
Connect STEVAL-STWINKT1B To PC

- Connect STEVAL-STWINKT1B USB micro port to PC using USB micro cable
- Connect STEVAL-STWINKT1B J2 Connector (14 pin) to STLINK-V3MINI debug port and debugger USB to laptop USB.



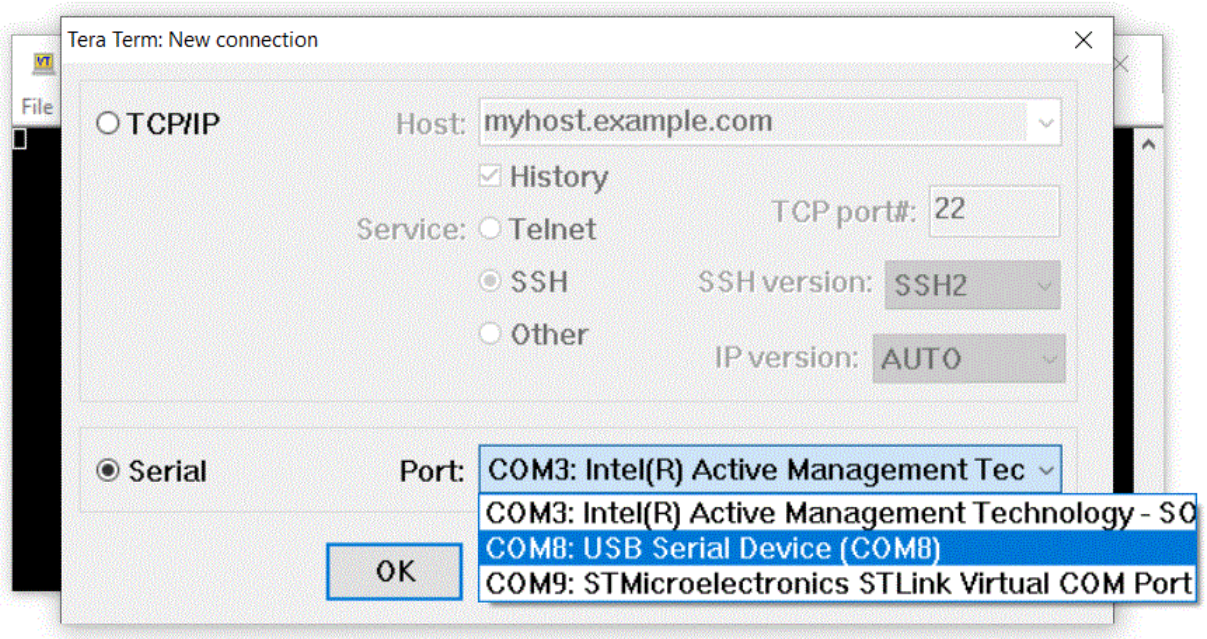
Flash the Provisioning FW

- Provisioning binary is provided in the folder:
  - Projects\STEVAL-STWINKT1\Applications\BootLoader_STSAFE\STSAFE_Provisioning\Binary\Provisioning.bin
- Program the FW to the board.
  - Use STM32CubeProgrammer to flash the Binary
  - Paste the binary to STLINK USB Drive (STLINK_V3S) visible in Windows Explorer to flash the device



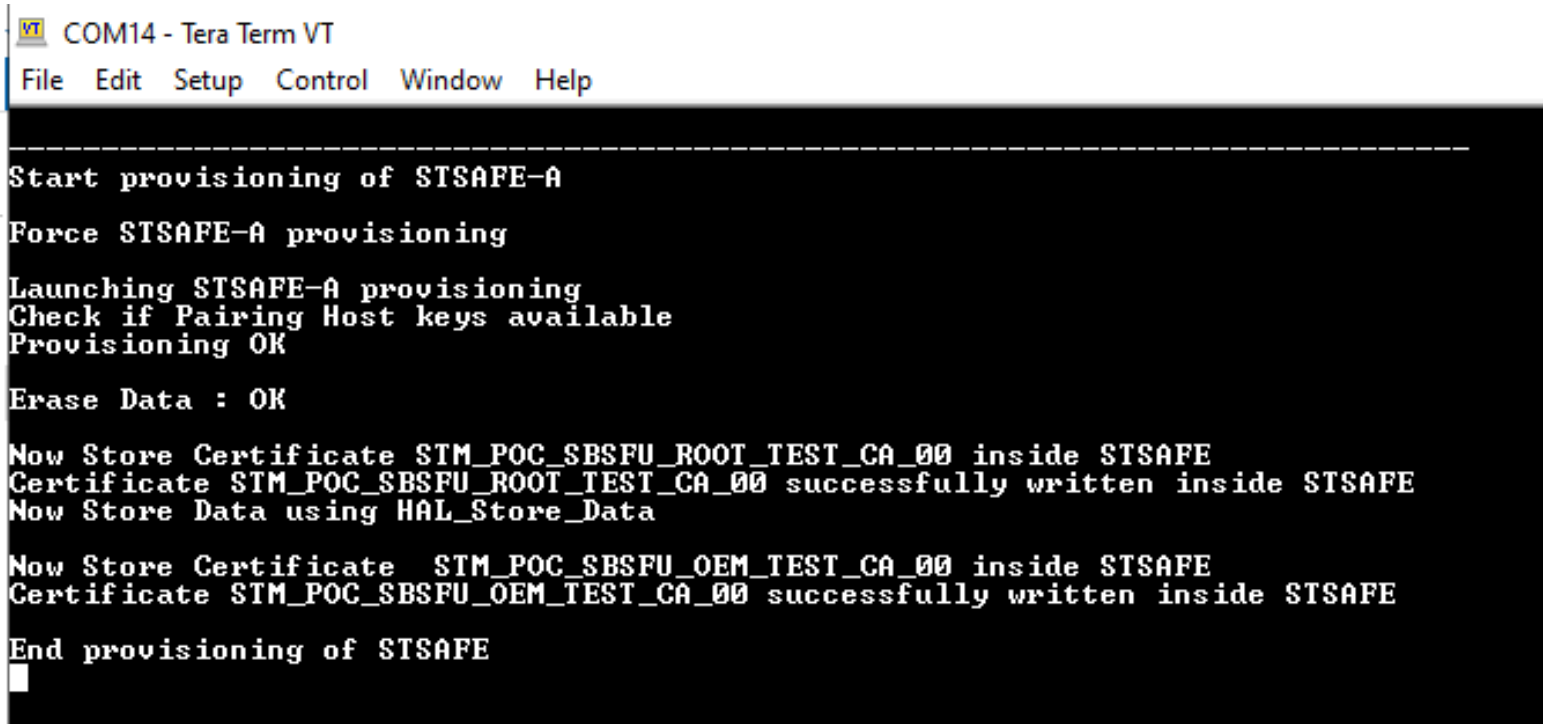
Run FW and Connect a Terminal to STWIN

- Reset the board pressing Black Button and Run the FW.
- Open *Tera Term*, select *Serial*, select the *USB Serial Device* and click *OK*.
  - *Caution: Do NOT select STMicroelectronics STLink Virtual COM Port*
- Configure New-line (Rx:AUTO/Tx:CR+LF) and enable local echo in Terminal configuration (**Setup → Terminal** in TeraTerm).



Complete the Provisioning

- Press user button (white) to start provisioning
- Get the Provisioning complete message on Screen



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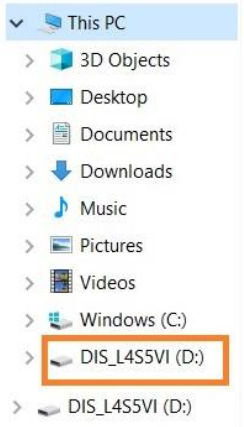
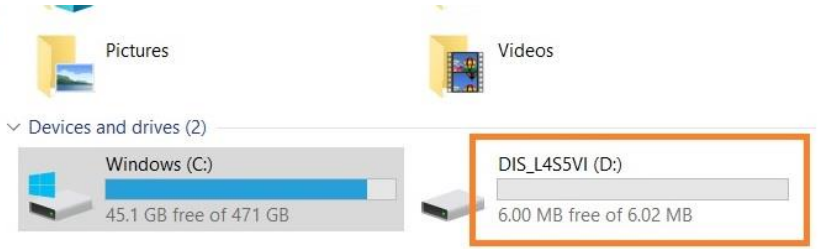
2.2- Provision the Device B-L4S5I-IOT01A

Connect B-L4S5I-IOT01A To PC

- Connect the board (B-L4S5I-IOT01A) to your laptop using USB micro cable





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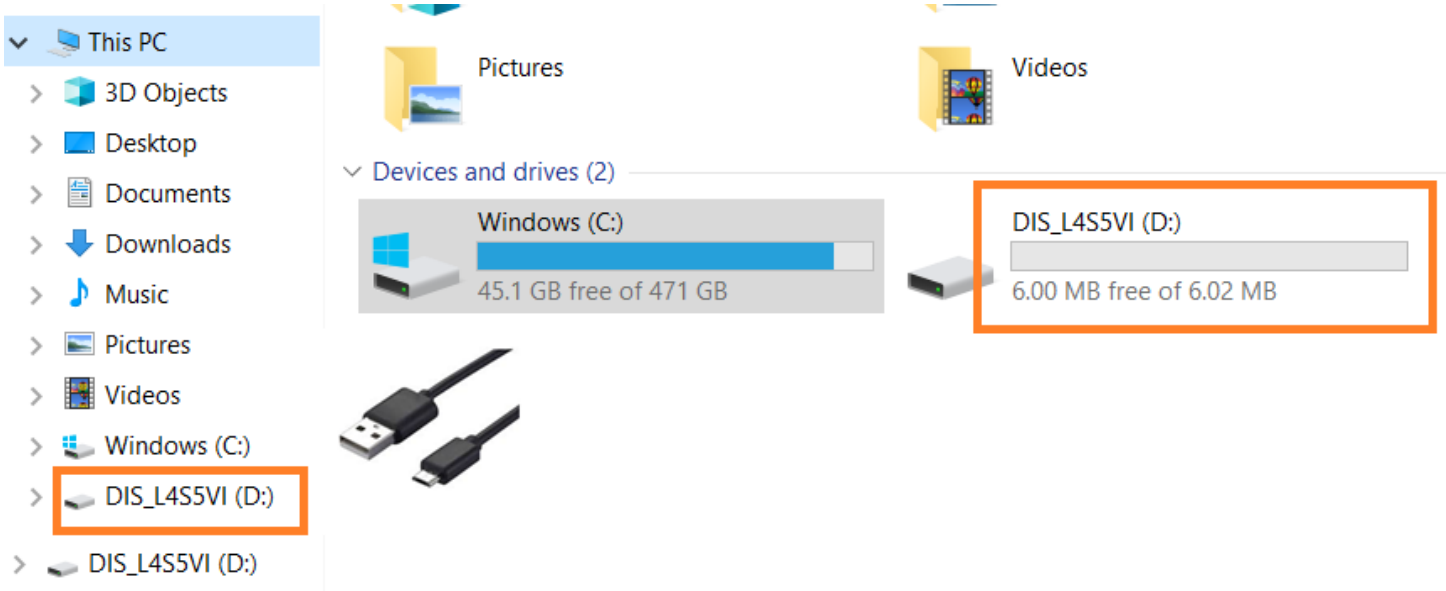
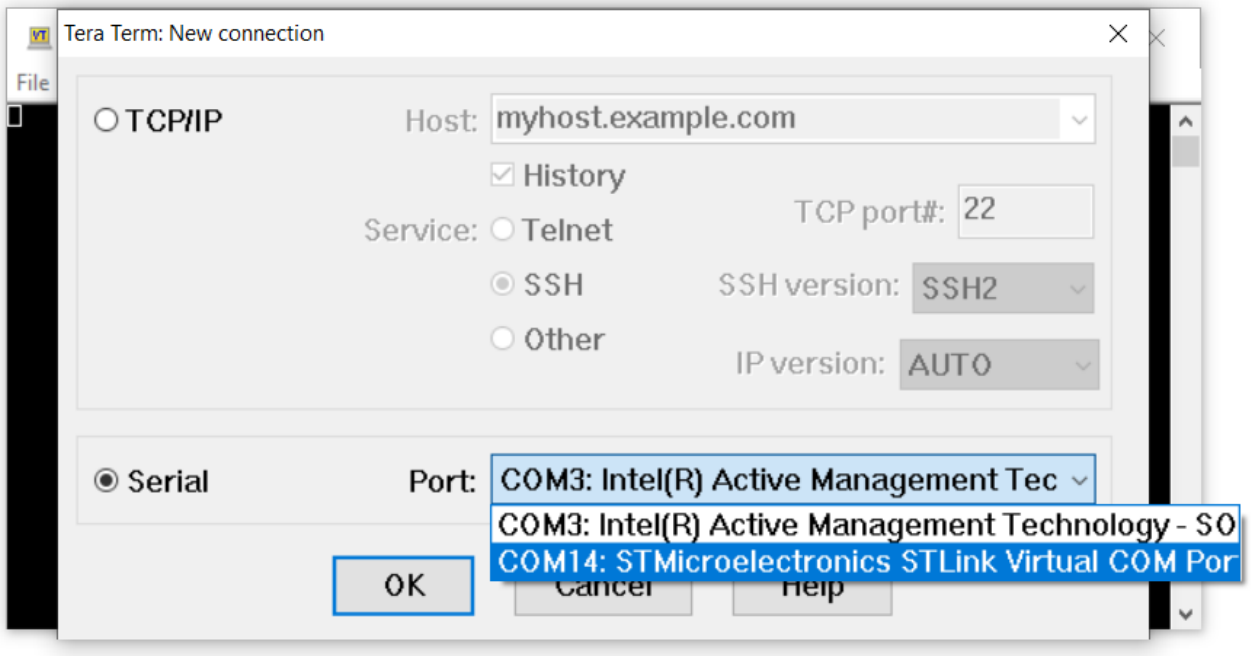
Flash the Provisioning FW

- Provisioning binary is provided in the folder:
  - Projects\B-L4S5I-IOT01A\Applications\BootLoader_STSAFE\STSAFE_Provisioning\Binary\Provisioning.bin
- Program the FW to the board.
  - Use STM32CubeProgrammer to flash the Binary
  - Paste the binary to STLINK USB Drive (DIS_L4S5VI) visible in Windows Explorer to flash the device



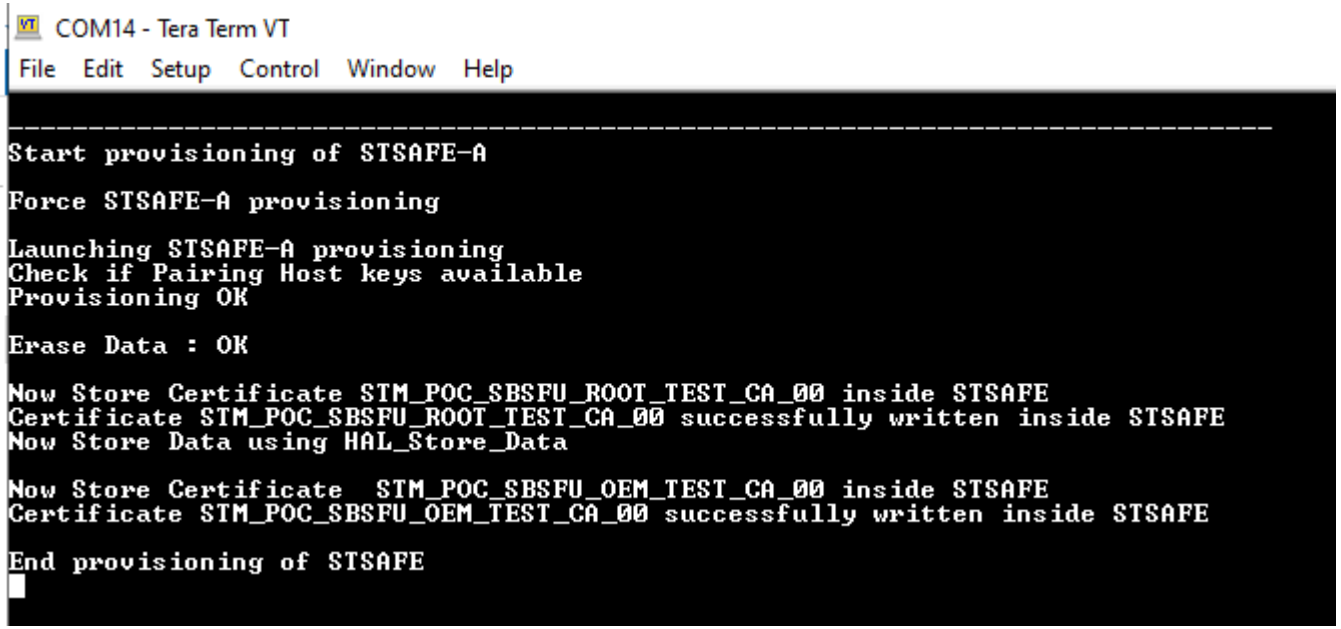
Connect a Terminal to B-L4S5I-IOT01A and Run FW

- Open *Tera Term*, select *Serial*, select STMicroelectronics STLink Virtual COM Port
- Configure New-line (Rx:AUTO/Tx:CR+LF) and enable local echo in Terminal configuration (**Setup → Terminal** in TeraTerm).
- Reset the board pressing Black Button and Run the FW.



Complete the Provisioning

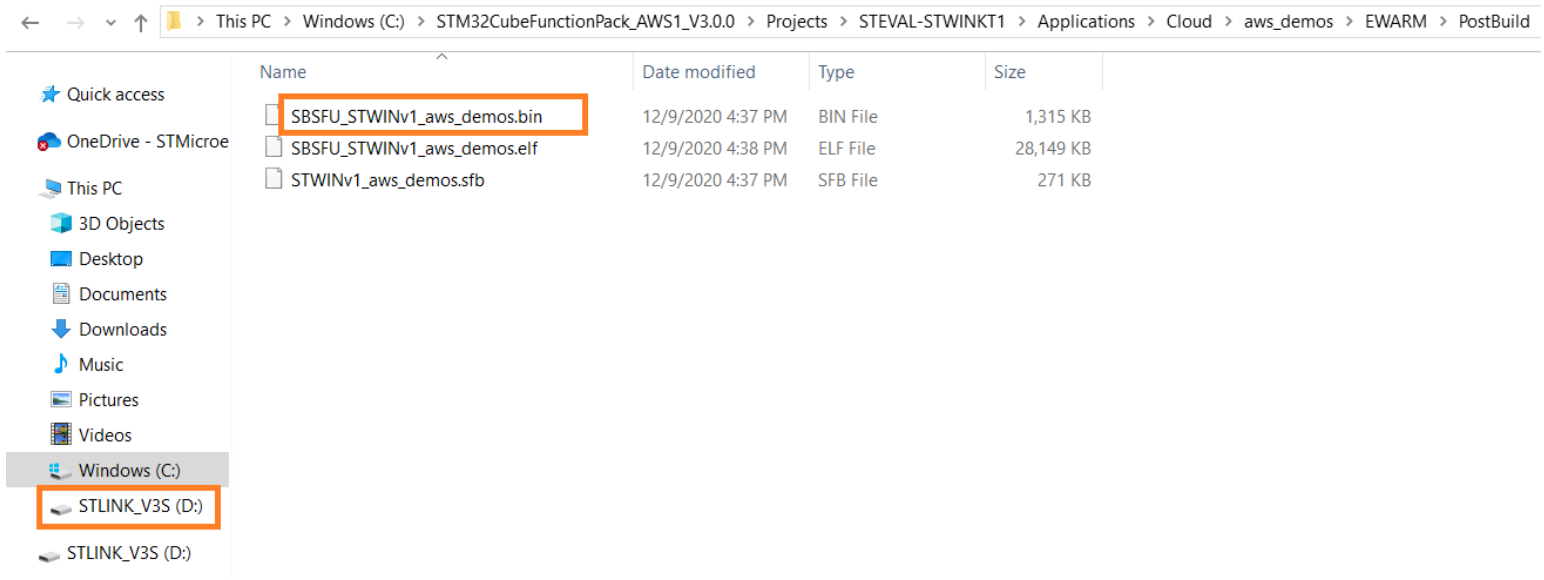
- Get the Provisioning complete message on Screen



2.3- Register the Device to ST Dashboard

Run AWS application on Device: STEVAL-STWINKT1B

- Keep the board (USB and Debug) connected to your PC and Tera Term open
- AWS Application Binary is provided in the folder:
  - Projects\STEVAL-STWINKT1\Applications\Cloud\aws_demos\EWARM\PostBuild\SBSFU_STWINv1_aws_demos.bin
- Program the FW to the board.
  - Use STM32CubeProgrammer to flash the Binary
  - Paste the binary to STLINK USB Drive (STLINK_V3S) visible in Windows Explorer to flash the device



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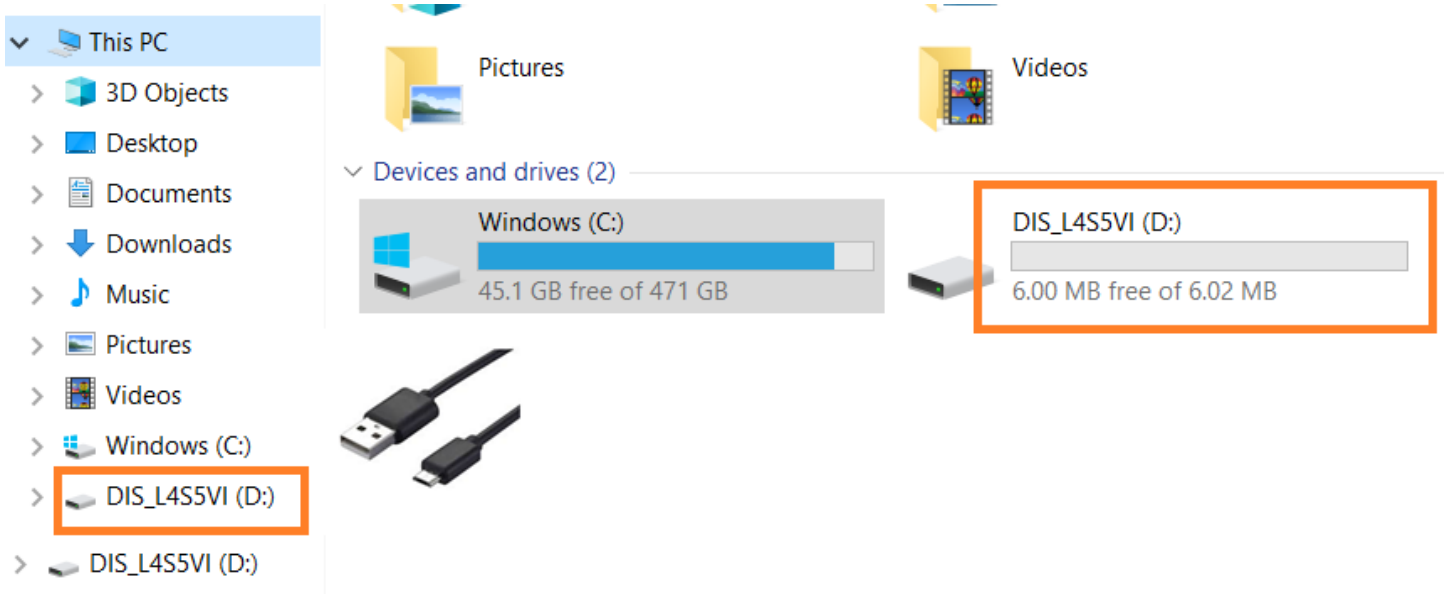
Run AWS application on Device: B-L4S5I-IOT01A

- Keep the board (USB) connected to your PC and Tera Term open
- AWS Application Binary is provided in the folder:
  - Projects\B-L4S5I-IOT01A\Applications\Cloud\aws_demos\EWARM\PostBuild\SBSFU_B-L4S5I-IOT01_aws_demos.bin
- Program the FW to the board.
  - Use STM32CubeProgrammer to flash the Binary
  - Paste the binary to STLINK USB Drive (DIS_L4S5VI) visible in Windows Explorer to flash the device



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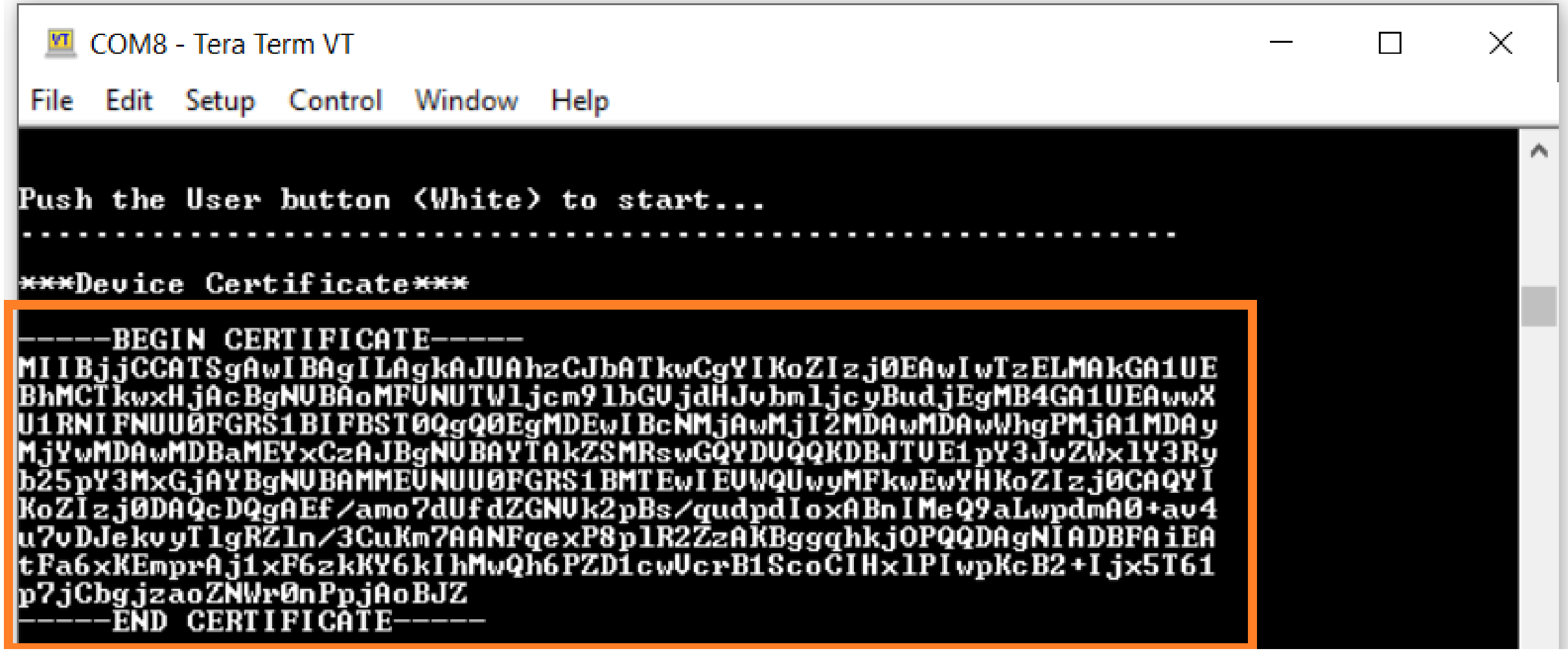
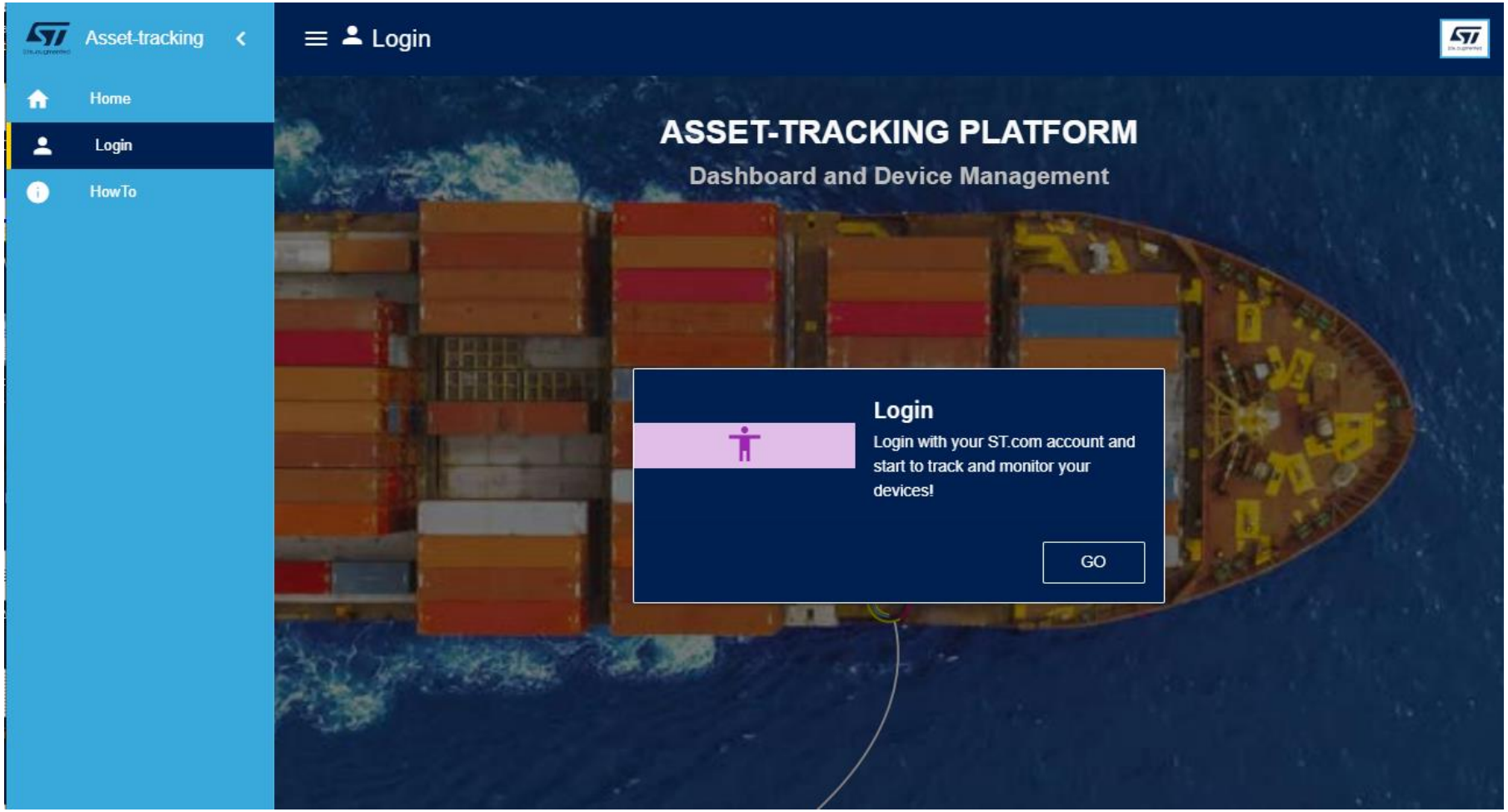
Copy Device Cert from the terminal

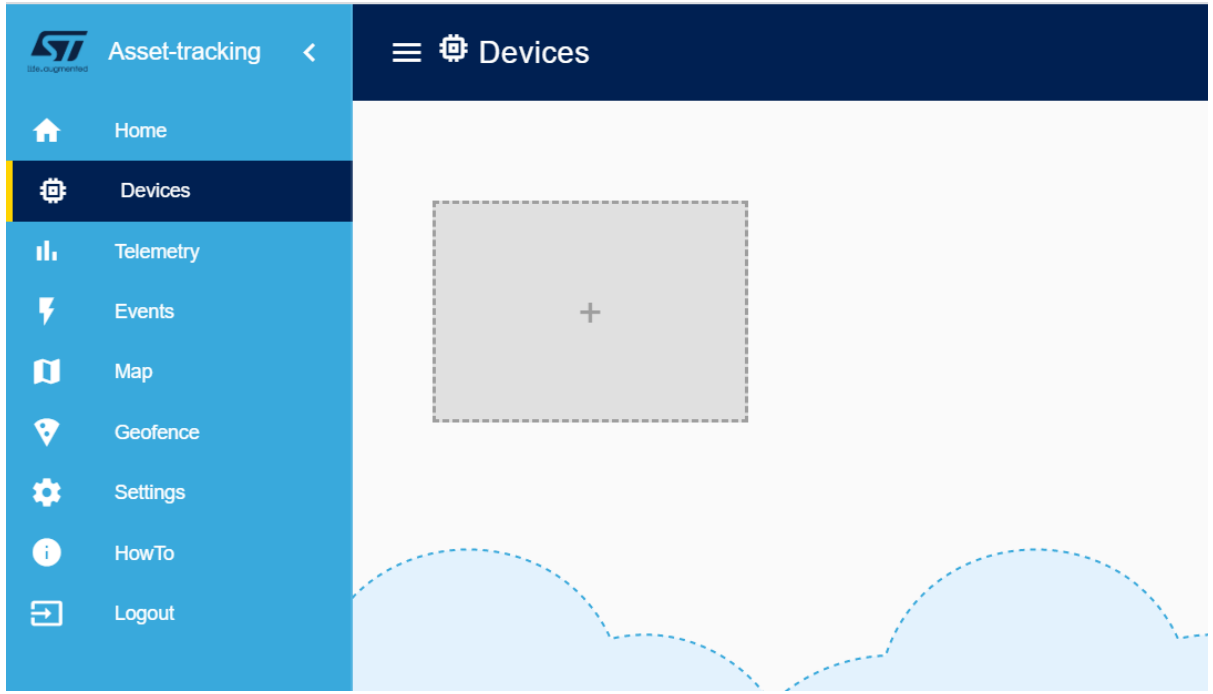


Signup and Signin to https://dsh-assetracking.st.com



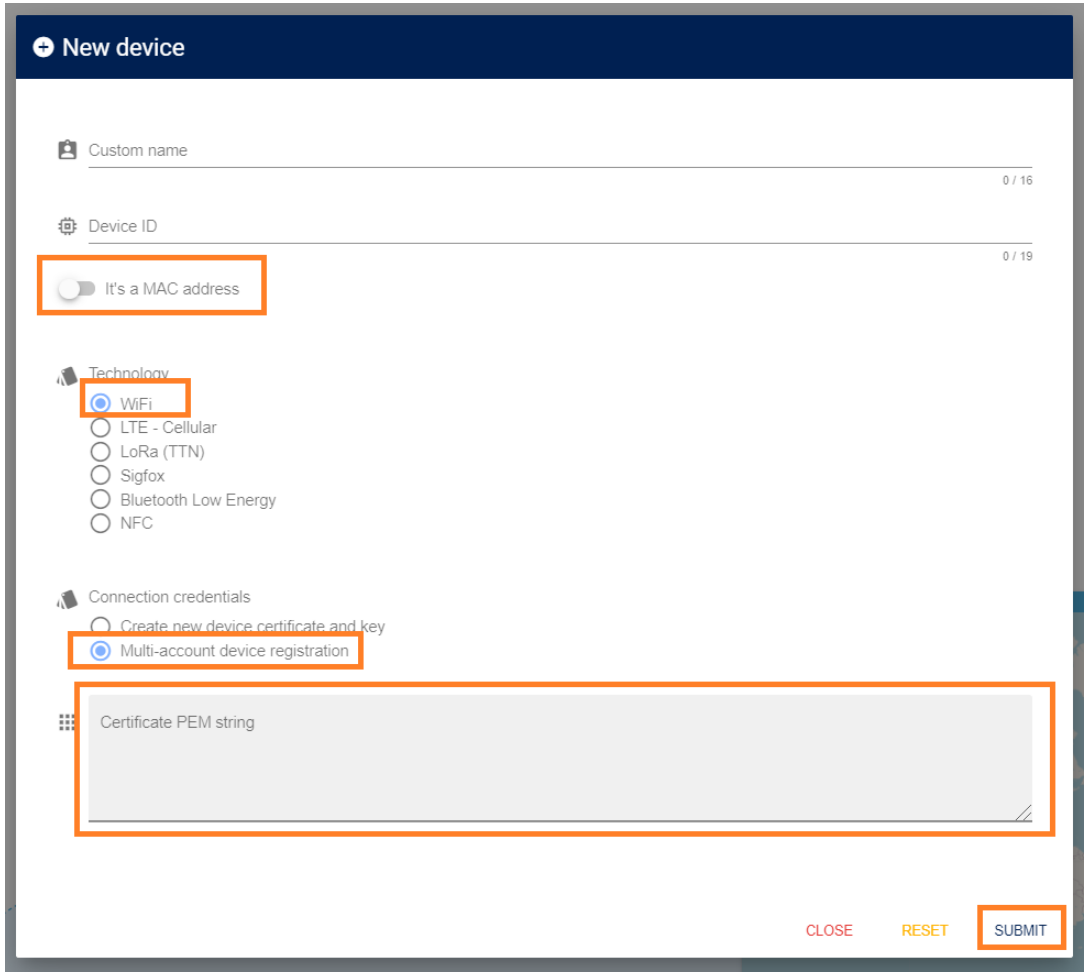
Enroll new device in Dashboard by clicking + sign

- Go to Devices in Left Panel, then on Right Panel click on “+” sign to enter data for new device.



Enter New Device Parameters

- Enroll the new device in Dashboard with
  - a descriptive name to your device as Custom name
  - A string as Device ID
  - Select Technology: Wi-Fi.
  - Select Multi-Account device registration and Paste the Device Certificate copied from Terminal into Certificate PEM string edit box.
  - Finally Click submit to create the thing in Dashboard



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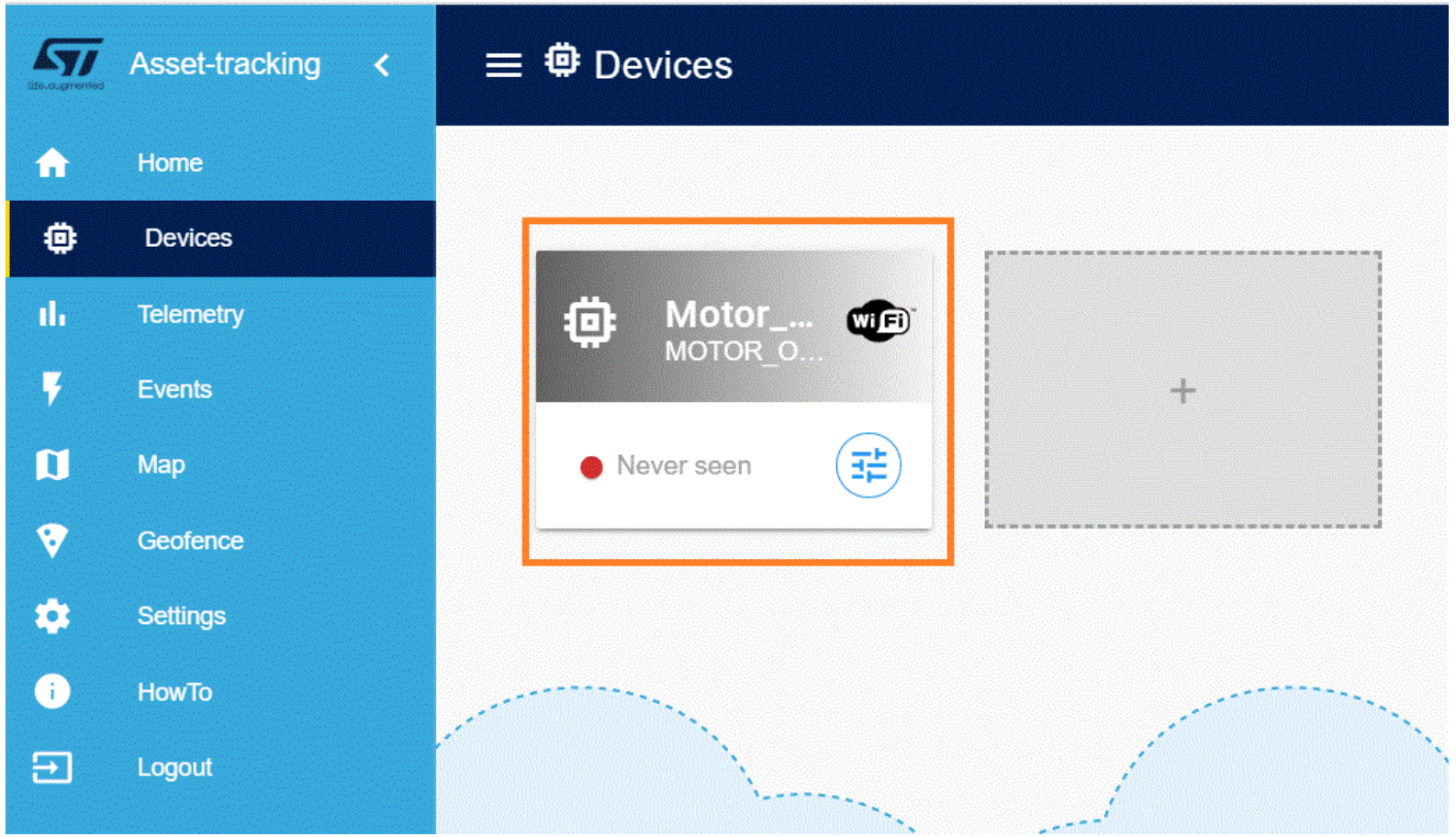
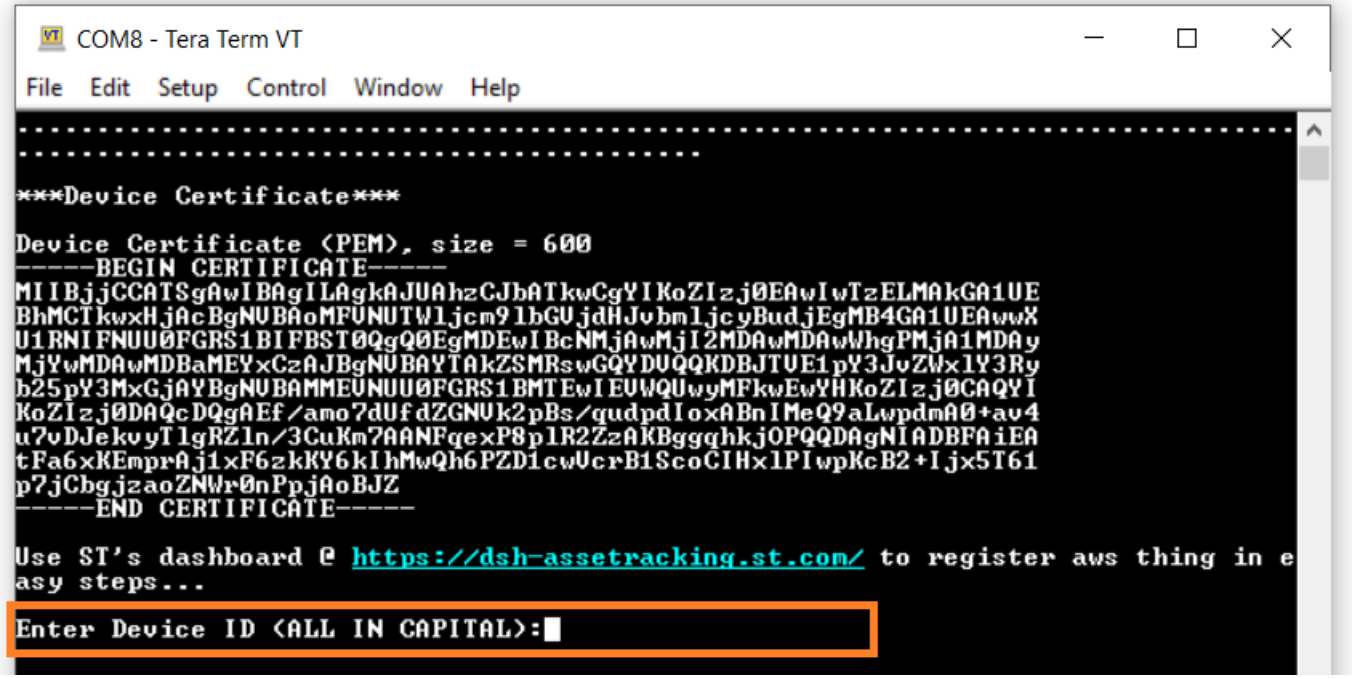
Device Enroll Success

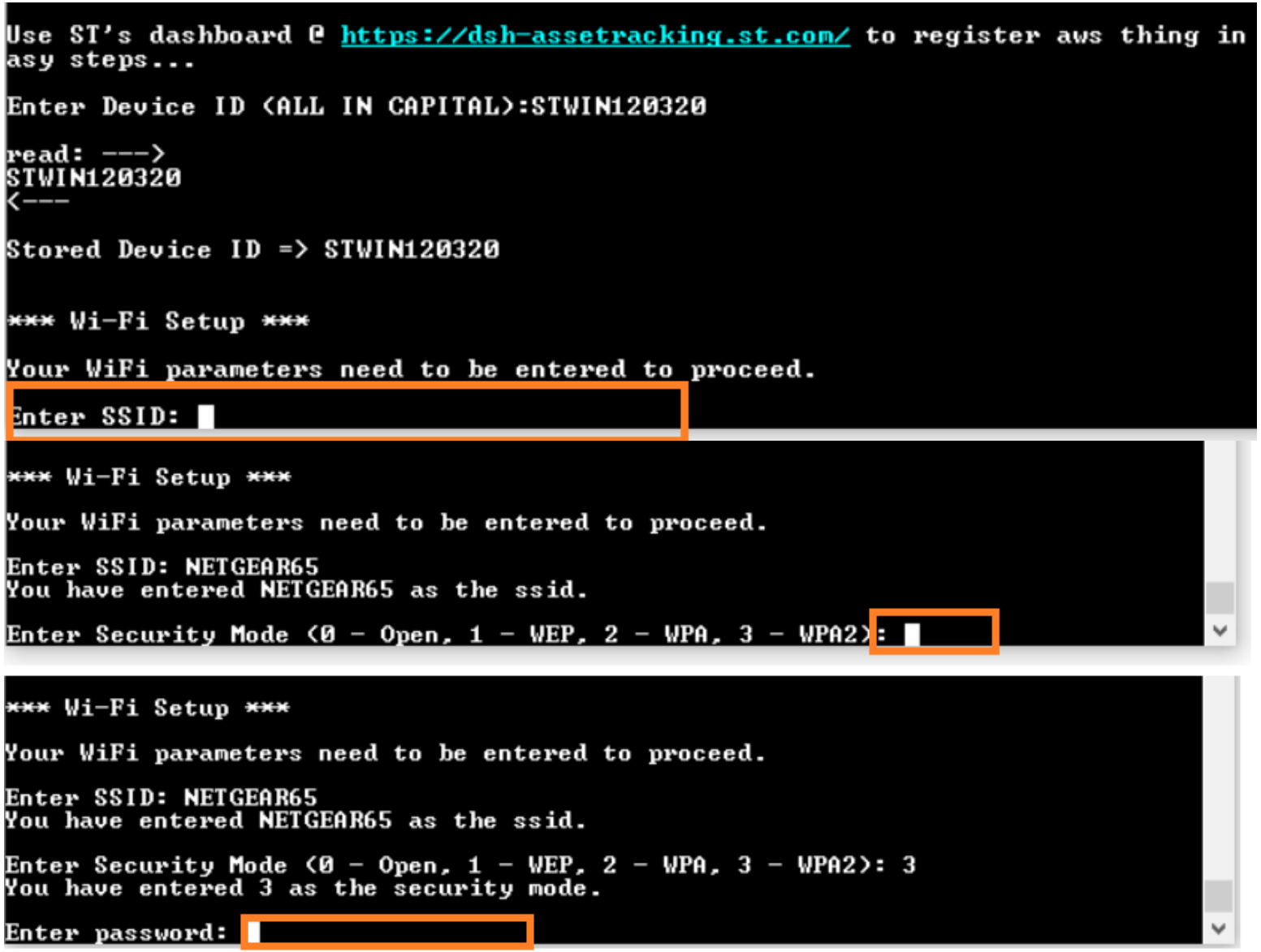
After the board is registered, a new icon appears in device list



Enter newly generated Device ID into terminal

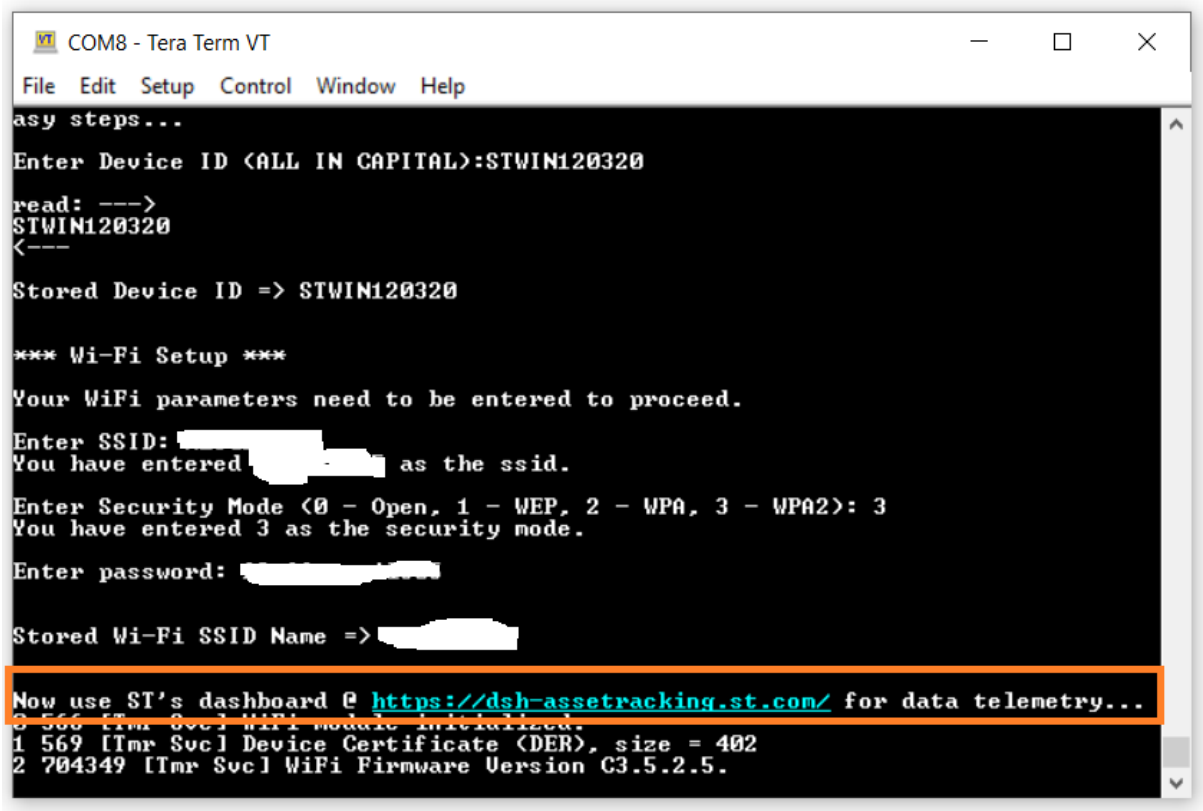


Configure Wi-Fi parameters



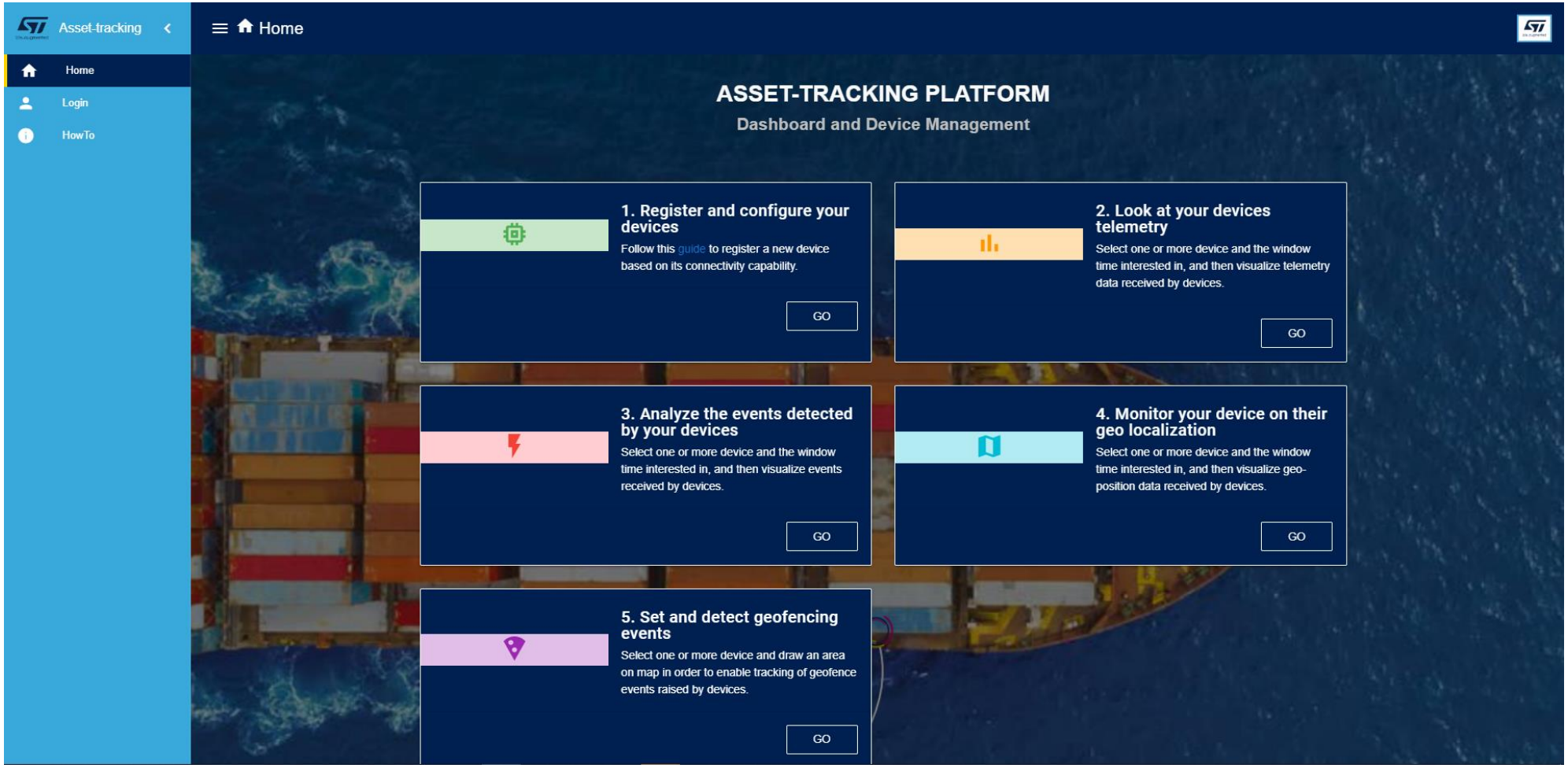
Demonstration Application Starts

- Device Configuration is complete.
- Device will connect to network and publish data.
- Go to ST's Dashboard to see the published data



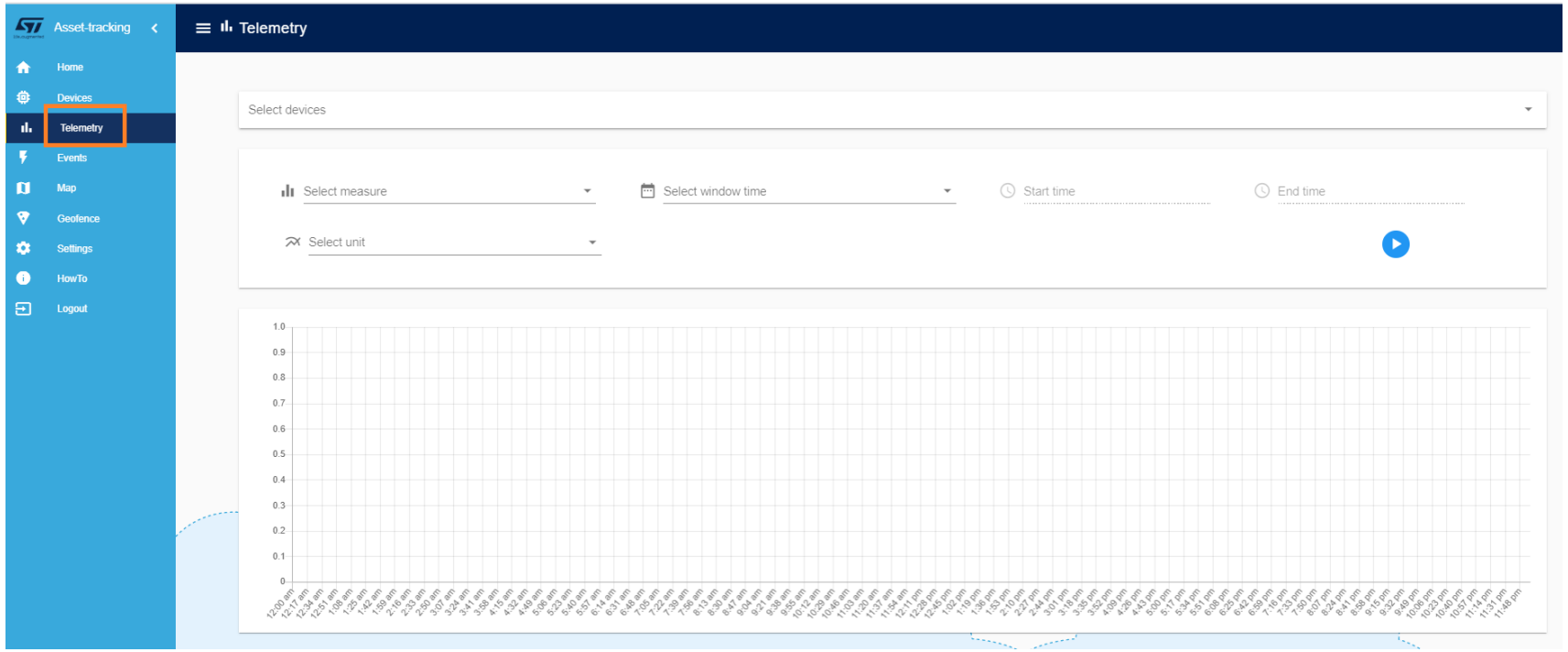
2.4- Stream Device data to ST Dashboard

Return to ST Dashboard to see Sensors Data



Select a Device to see Sensors Data

- Go to “Telemetry”
  - Select data sending Device from *Select Devices*
  - Select a Sensor from *Select Measure*
  - Select *Realtime* from *Select Window Time*
  - Click the Play button to see the data on Window



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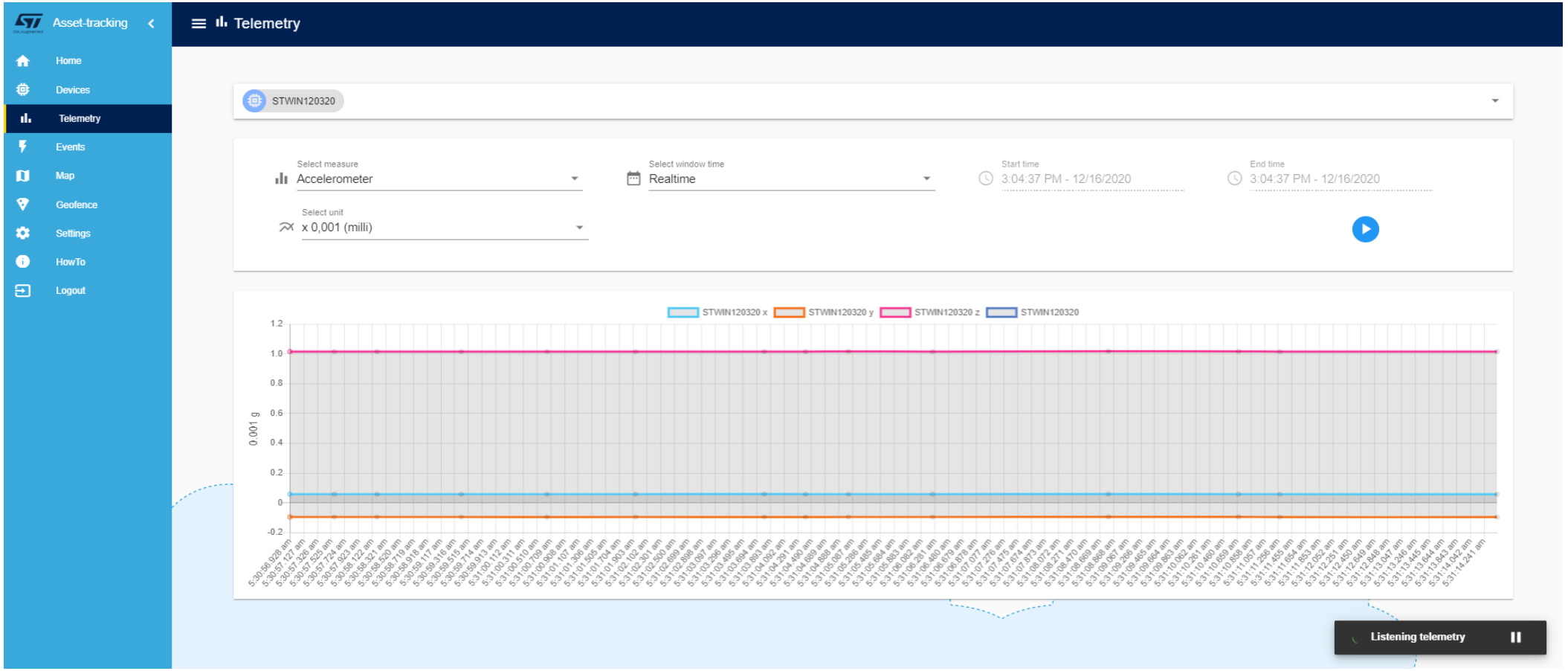
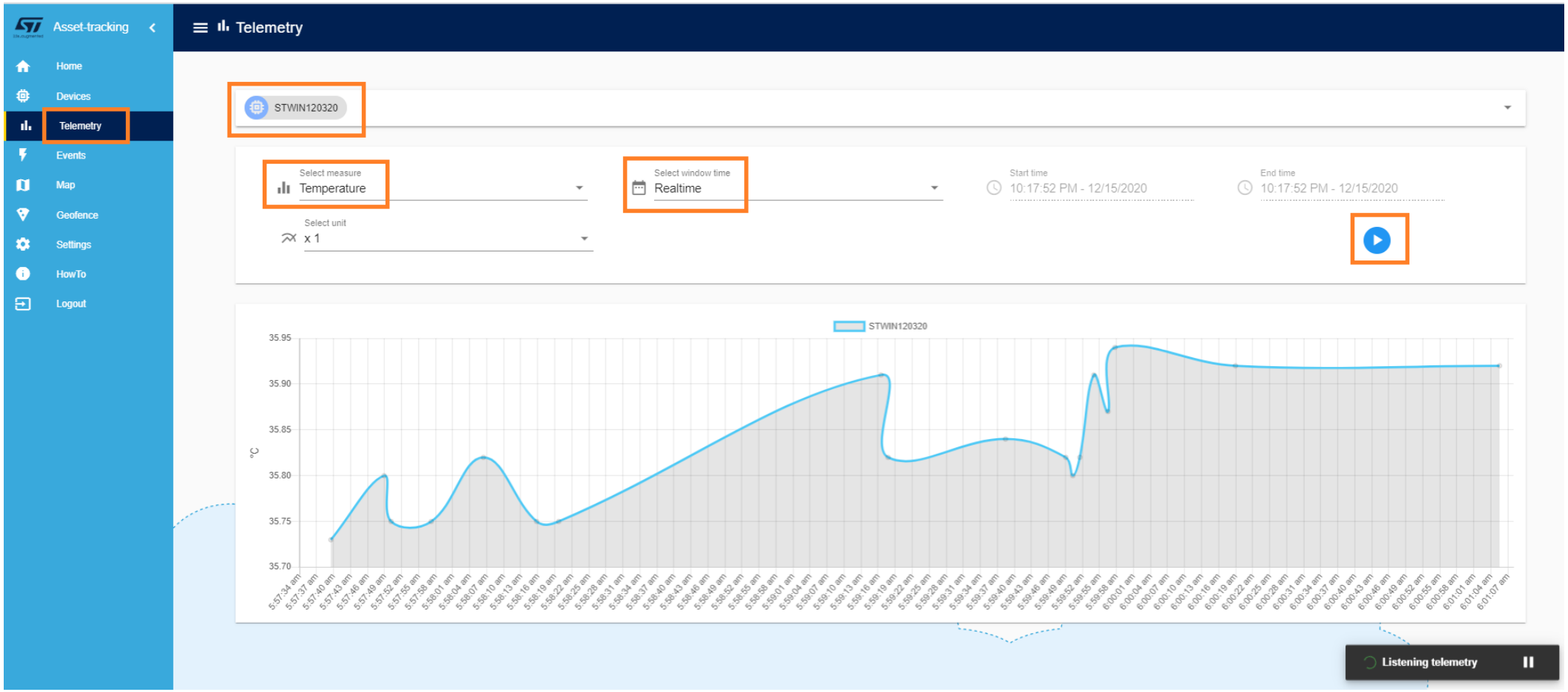
Accelerometer Data



Temperature Data



3- Documents & Related Resources

Documents & Related Resources

FP-SNS-AWS1:

- **DB3232:** STM32Cube function pack for IoT node with Wi-Fi and sensors, connected to ST Dashboard on Cloud – **databrief**
- **UM2186:** Getting started with STM32Cube function pack for IoT node with Wi-Fi and sensors, connected to ST Dashboard on Cloud – **user manual**

DSH-ASSETRACKING:

- **DB4207:** Cloud Amazon-based web application for asset tracking 2.0 – **databrief**

X-CUBE-AWS:

- **UM2178**: Getting started with X-CUBE-AWS STM32Cube Expansion Package for Amazon Web Services® IoT – **user manual**

X-CUBE-SBSFU:

- **UM2262:** Getting started with the X-CUBE-SBSFU STM32Cube Expansion Package – **user manual**

Visit www.st.com for the complete list

Documents & Related Resources

STEVAL-STWINKT1B:

- **Gerber files, BOM, Schematic**
- **DB4345**: STWIN SensorTile Wireless Industrial Node development kit and reference design for industrial IoT applications – **databrief**

STEVAL-STWINWFV1:

- **Gerber files, BOM, Schematic**
- **DB3971:** Wi-Fi expansion for the SensorTile Wireless Industrial Node (STWIN) kit – **databrief**

B-L4S5I-IOT01A:

- **Gerber files, BOM, Schematic**
- **DB4184:** Discovery kit for IoT node, multi-channel communication with STM32L4+ Series 1.0 – **databrief**
- **UM2622**: Discovery kit for IoT node, multi-channel communication with STM32L4+ Series 1.0 – **user manual**

Visit www.st.com for the complete list

4- STM32 Open Development Environment: Overview

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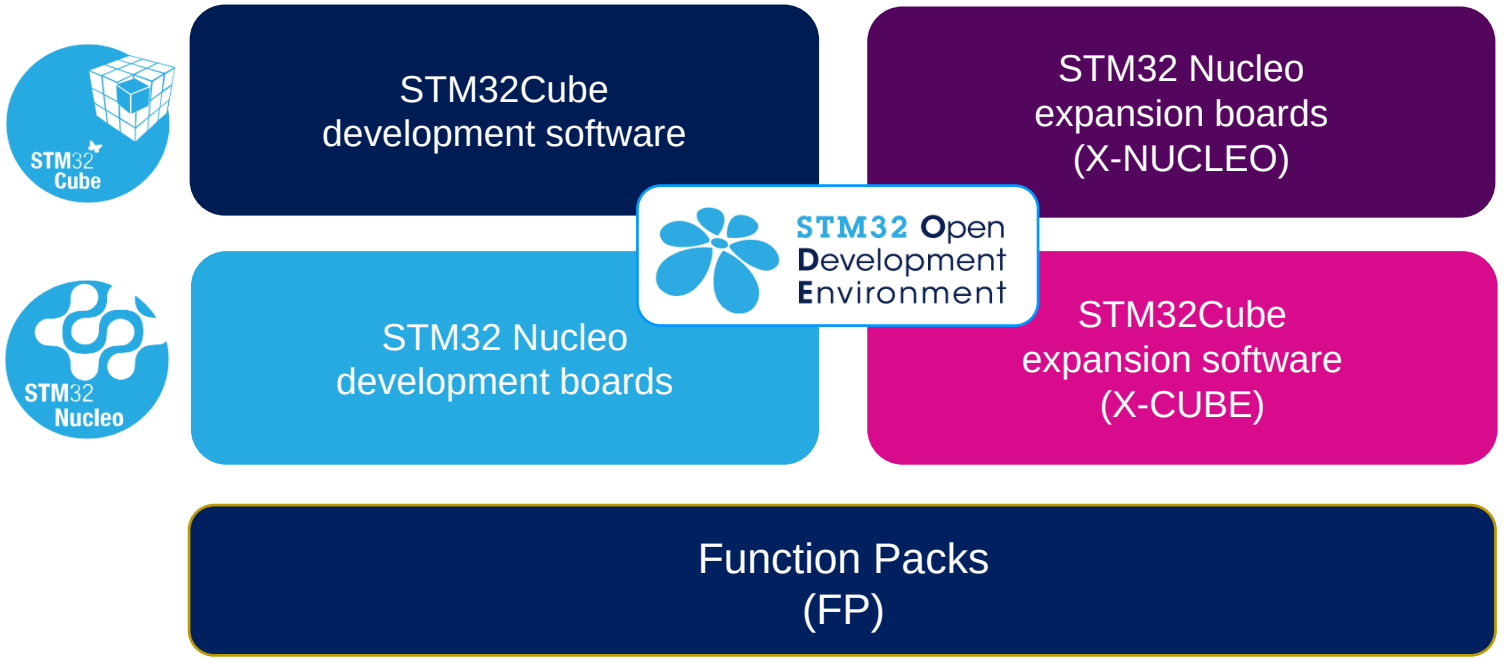
STM32 Open Development Environment
Fast, affordable Prototyping and Development

- 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

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Thank you

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