



Activity
Connecting with intelligence

Developing IoT tracking solutions with Abeeway- Murata Geolocation Module

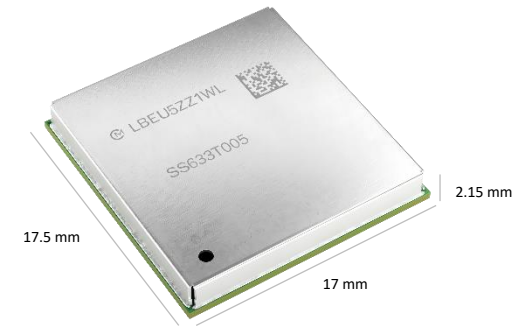
Part #1:
Module Introduction

Suman THAPA
Murata

Abeeway-Murata co developed New “*Multi-technology fused LoRaWAN geolocation module*”

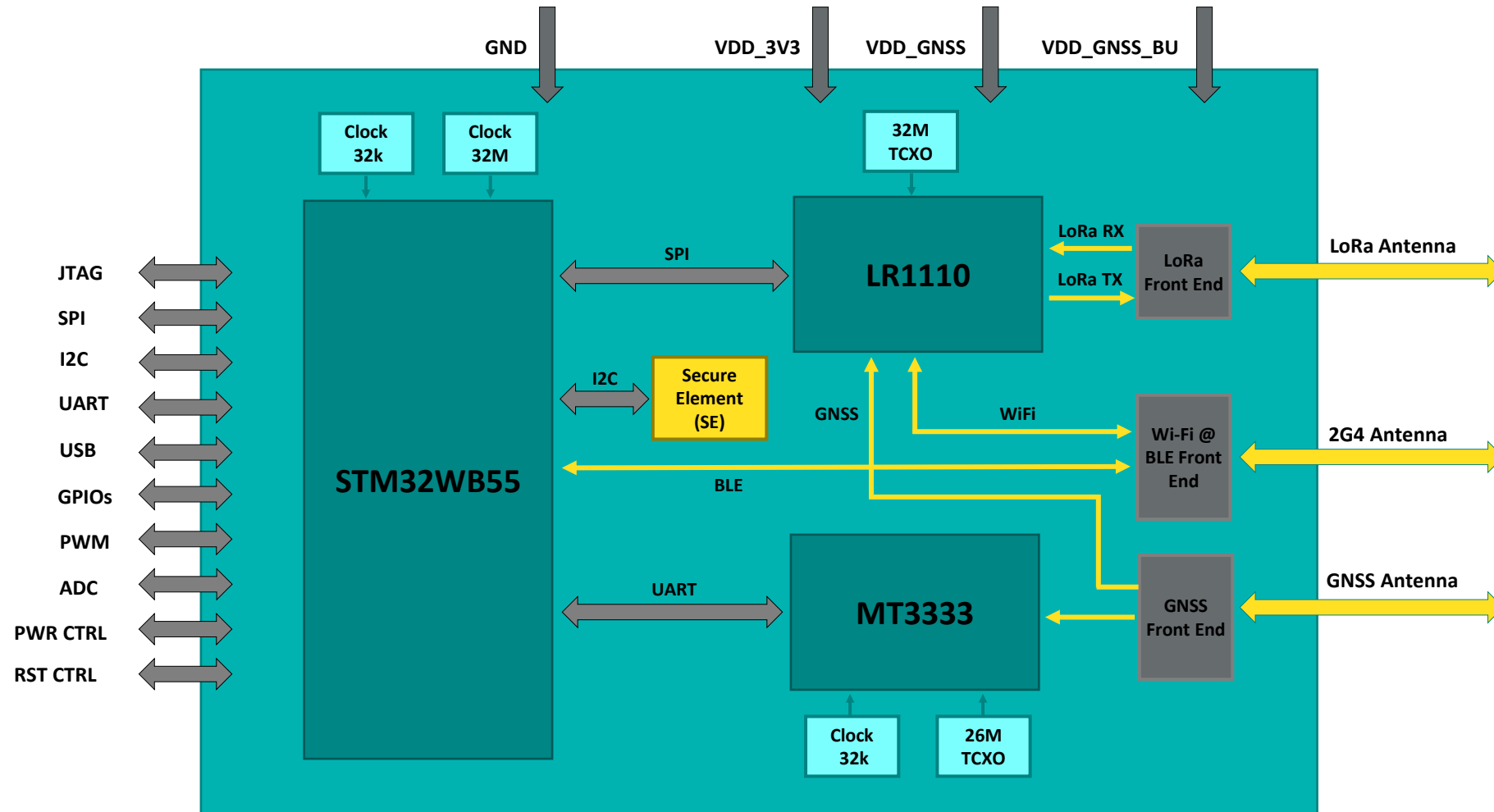
Type 1WL / ideal for Indoor-Outdoor geolocation

- ▀ Small, compact form factor
- ▀ Multi-technology: LoRa®/Wi-Fi/BLE/ GNSS
- ▀ Ultra-low power & superior sensitivity

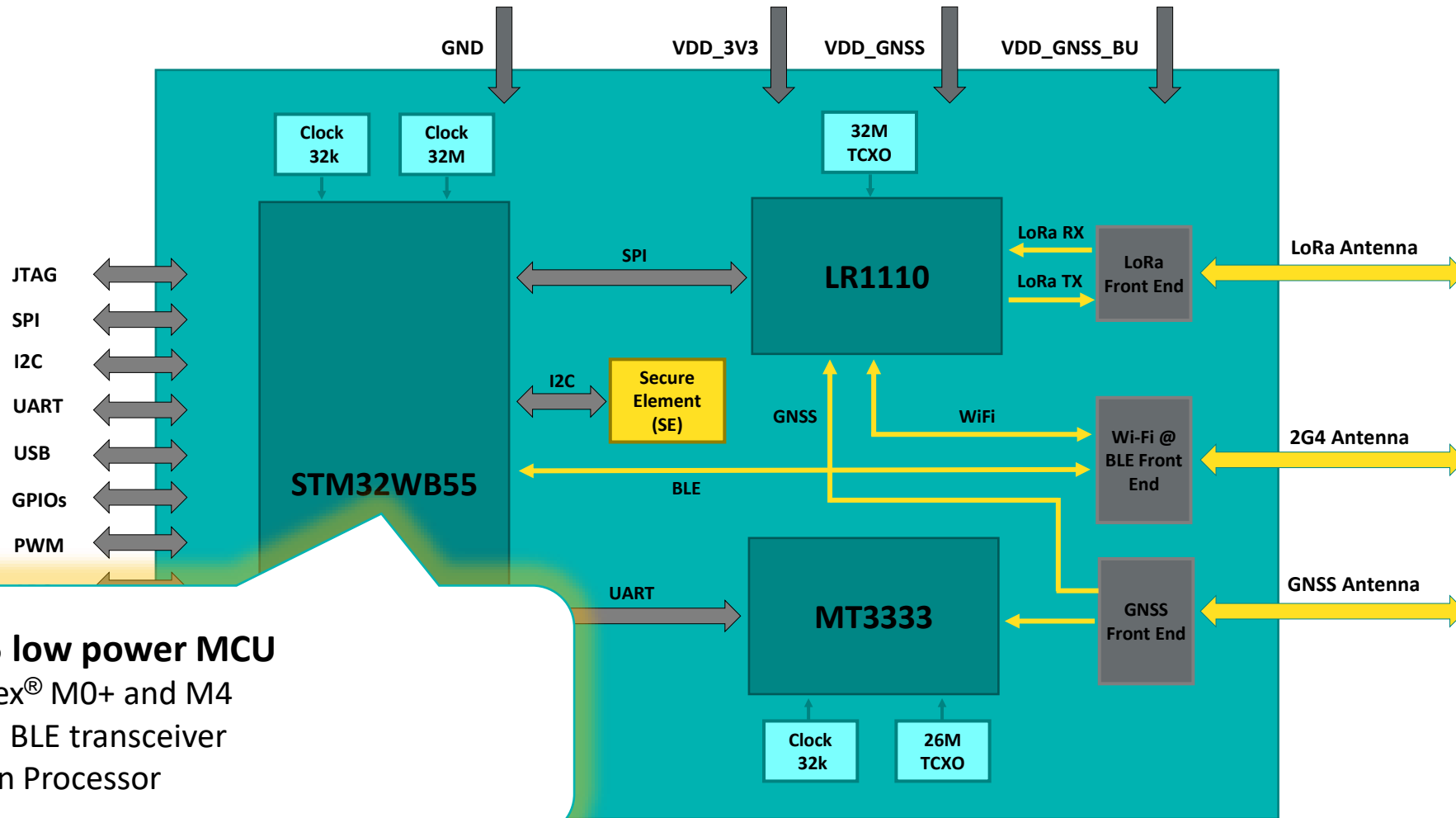


Type 1WL Module

Abeeway-Murata Geolocation Module Block Diagram



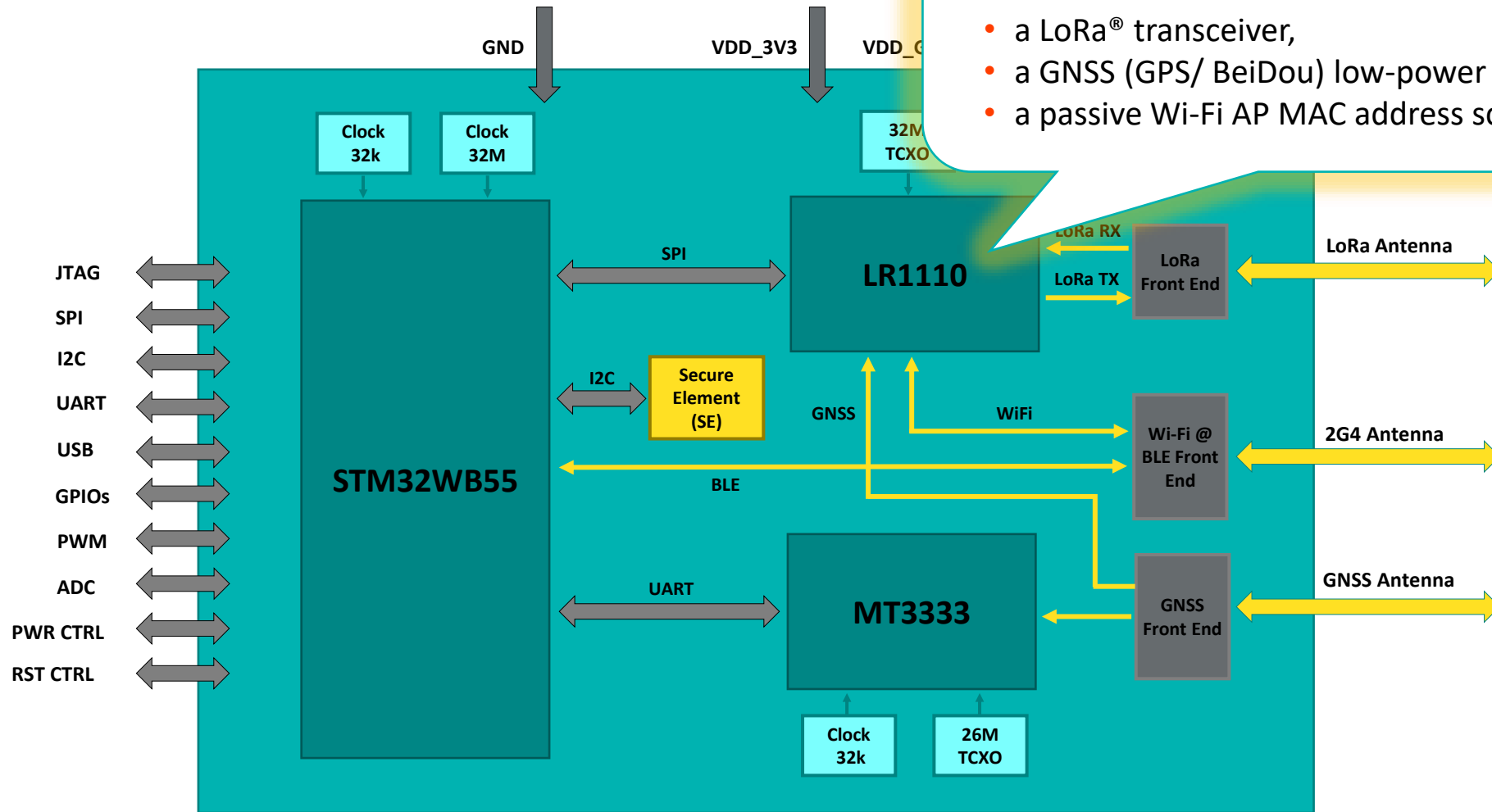
Abeeway-Murata Geolocation Module Block Diagram



STM32WB55 low power MCU

- ARM Cortex® M0+ and M4
- Integrated BLE transceiver
- Application Processor

Abeeway-Murata Geolocation Module Block Diagram

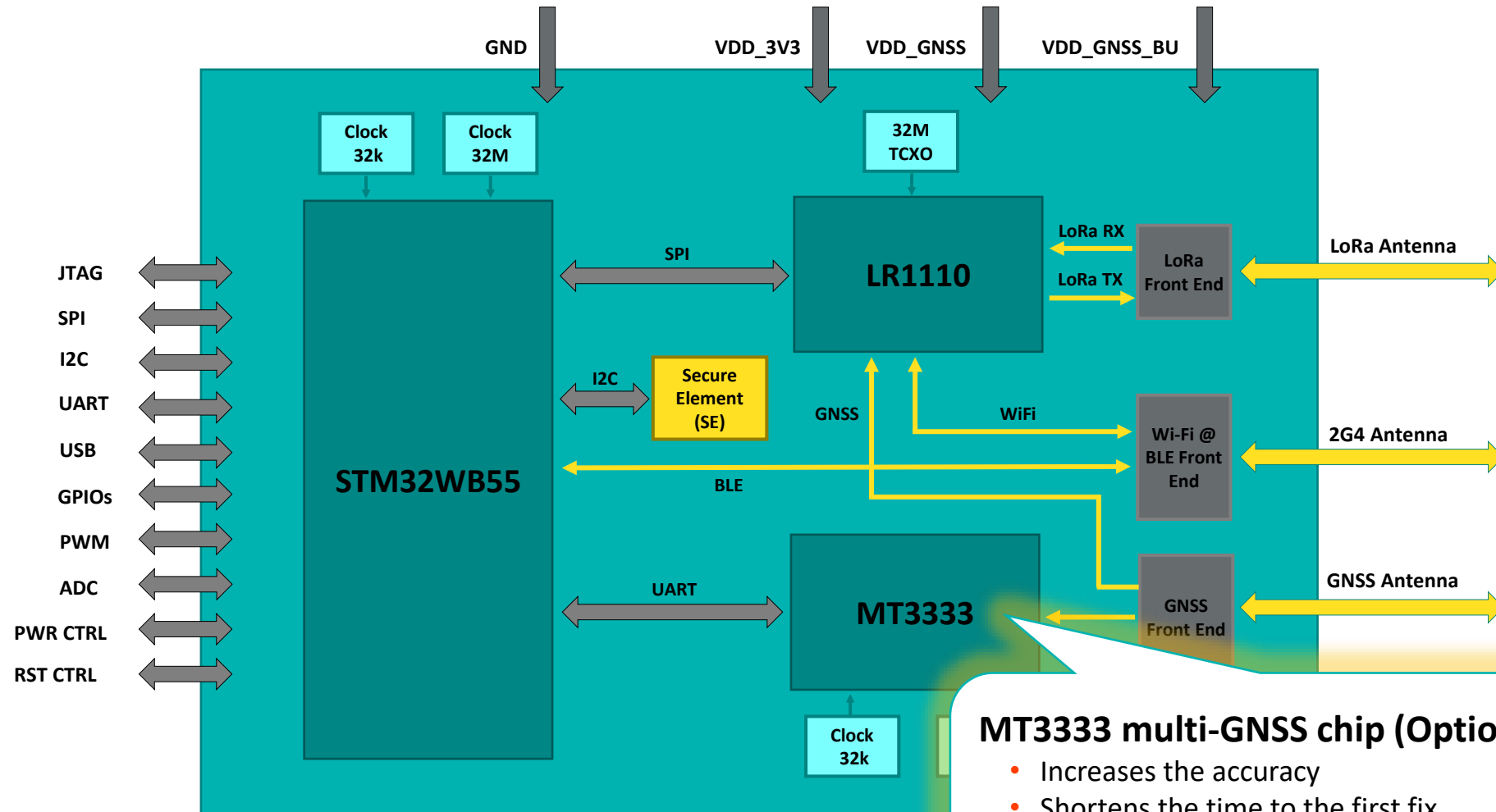


Semtech LR1110 module

Includes:

- a LoRa® transceiver,
- a GNSS (GPS/ BeiDou) low-power scanner
- a passive Wi-Fi AP MAC address scanner

Abeeway-Murata Geolocation Module Block Diagram



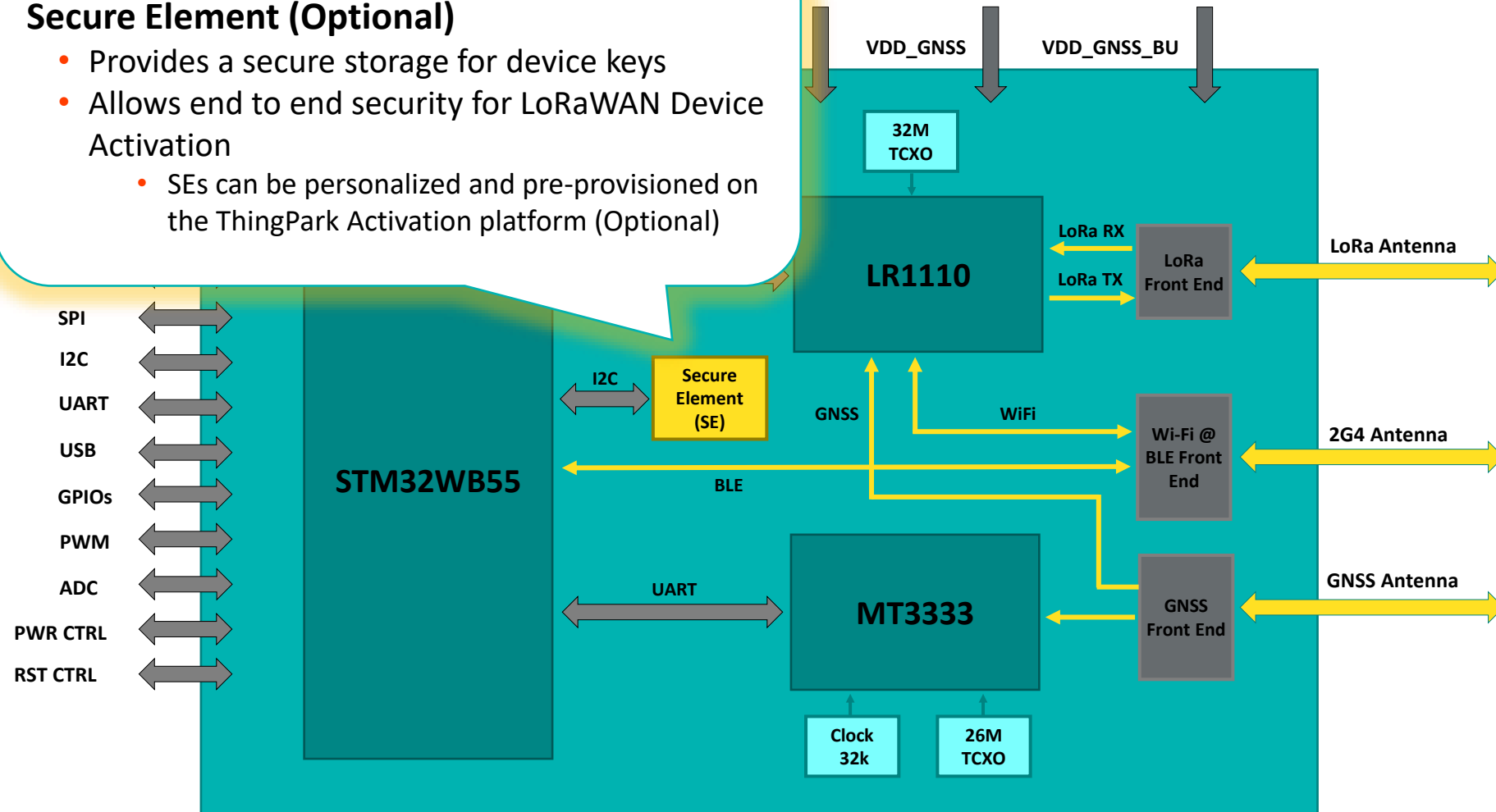
MT3333 multi-GNSS chip (Optional)

- Increases the accuracy
- Shortens the time to the first fix
- Supports GPS/GLONASS/Galileo/Baidu
- Can work in standalone mode without solver

Abeeway-Murata Geolocation Module Block Diagram

Secure Element (Optional)

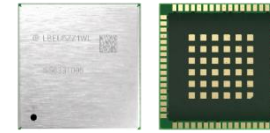
- Provides a secure storage for device keys
- Allows end to end security for LoRaWAN Device Activation
 - SEs can be personalized and pre-provisioned on the ThingPark Activation platform (Optional)



Additional Features

- ▀ 17 x 17.5 x 2.15(max)
- ▀ Ultra low power consumption
- ▀ Peripheral I/F: GPIOs, ADC, I2C, SPI, UART, USB
- ▀ Application processor with 1MB of Flash Memory
- ▀ FCC/IC/CE certification
- ▀ LoRaWAN & BLE precertification
- ▀ Single Hardware for Indoor & Outdoor geolocation

17.5 x 17.0 mm

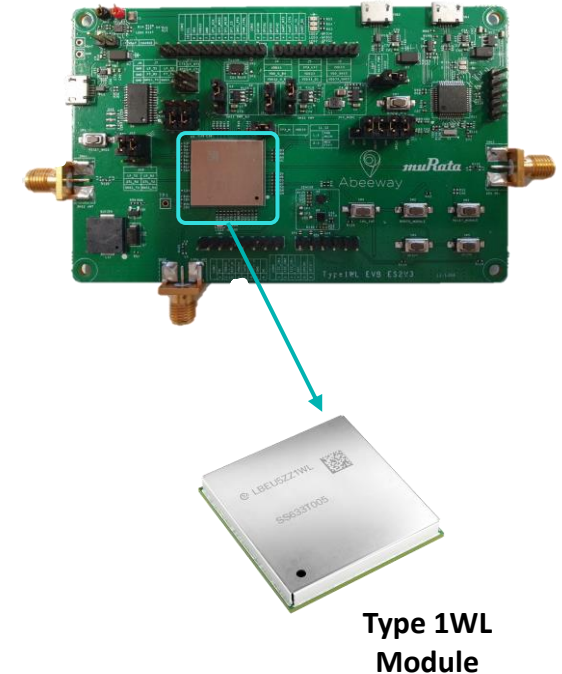


Actual size


















Type 1WL Module Benefits

- Type 1WL Module includes all necessary components of a multi-technology tracker device.
 - Fewer layers are required on the PCB
 - Simplifies product testing as all module components have been pre-tested
 - The module's RF certification can be reused for end-product certification
 - The Evaluation Board is provided for quick start of hardware development
- Develop applications with
 - Abeeway SDK



Type 1WL Geolocation Module Variants

Modules	Chipsets	Features
Type 1WL-857 <i>LBEU5ZZ1WL-857</i>	STM32WB + LR1110	   
Type 1WL-633 <i>LBEU5ZZ1WL-633</i>	STM32WB + LR1110 + MT3333	    
Type 1WL-042 <i>LBEU5ZZ1WL-042</i>	STM32WB + LR1110 + MT333x + TO136	     

Target applications

1WL is a good fit for various of Geolocation applications

- Supply chain monitoring
- Tools monitoring
- Shared scooters tracking
- Parking policy enforcement
- Cattle tracking
- Pet tracking
- Social distancing
- Visitor tracking
- Guard tour monitoring
- Child/elderly safety and protection
- Geofencing



Availability

1WL Module and Evaluation Board Kit will be available from Thing Park Market & Murata worldwide distribution partners

ThingParkMarket by Actility

- **1WL Module:** samples Available now
- **Evaluation Kit:** Available now

( [order from here](#))

Murata Distribution Partners

- **1WL Module:** Q1 2023
- **Evaluation Kit:** Q1 2023

( contact Murata local sales)



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Part #2:
Speeding up application development with Abeeway Murata Evaluation Kit

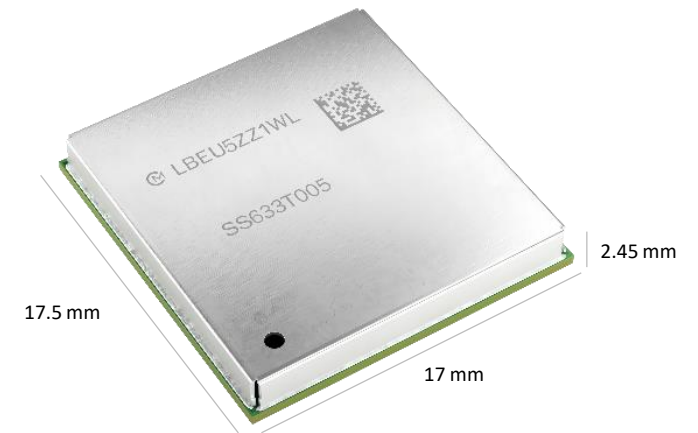
Norbert HERBERT
Activity

Activity



Murata-Abeeway co developed Geolocation Module

- Ideal for Indoor-Outdoor geolocation
 - Compact circuit component
 - Ultra-low power consumption
 - Includes everything that a tracker devices needs
 - STM32WB MCU
 - Semtech LR1110 LoRa chip
 - MT3333 GNSS chip



Type 1WL Module

What kind of geo-location solutions can be built from this module?

Abeeway Tracker Portfolio



Industrial tracker

Large battery, hardened casing, high-precision tracking : designed to last
IP65, 19Ah type D battery.
Up to 3 years battery life in motion tracking mode at 120 position per day.



Micro tracker

Light, handy, yet powerful. Enables you to track and protect things (or people and pets) of value.
IP 65, ATEX, 450mAh rechargeable battery*
Buzzer, multimode button.

Battery life :

- *Proximity mode : 5 days to 2 weeks depending on data precision*
- *Location mode : 90 days battery life at 40 fix per day with indoor/outdoor positioning.*



Compact tracker

Solid and lightweight, built for heavy-duty tracking.
Asset tracking and management, even in the harshest environments.
3xAA 2.7Ah replaceable batteries, IP 68, ATEX, temperature & motion sensors*
Up to 4 years battery life in LP GPS at 24 fix per day.



Smart Badge

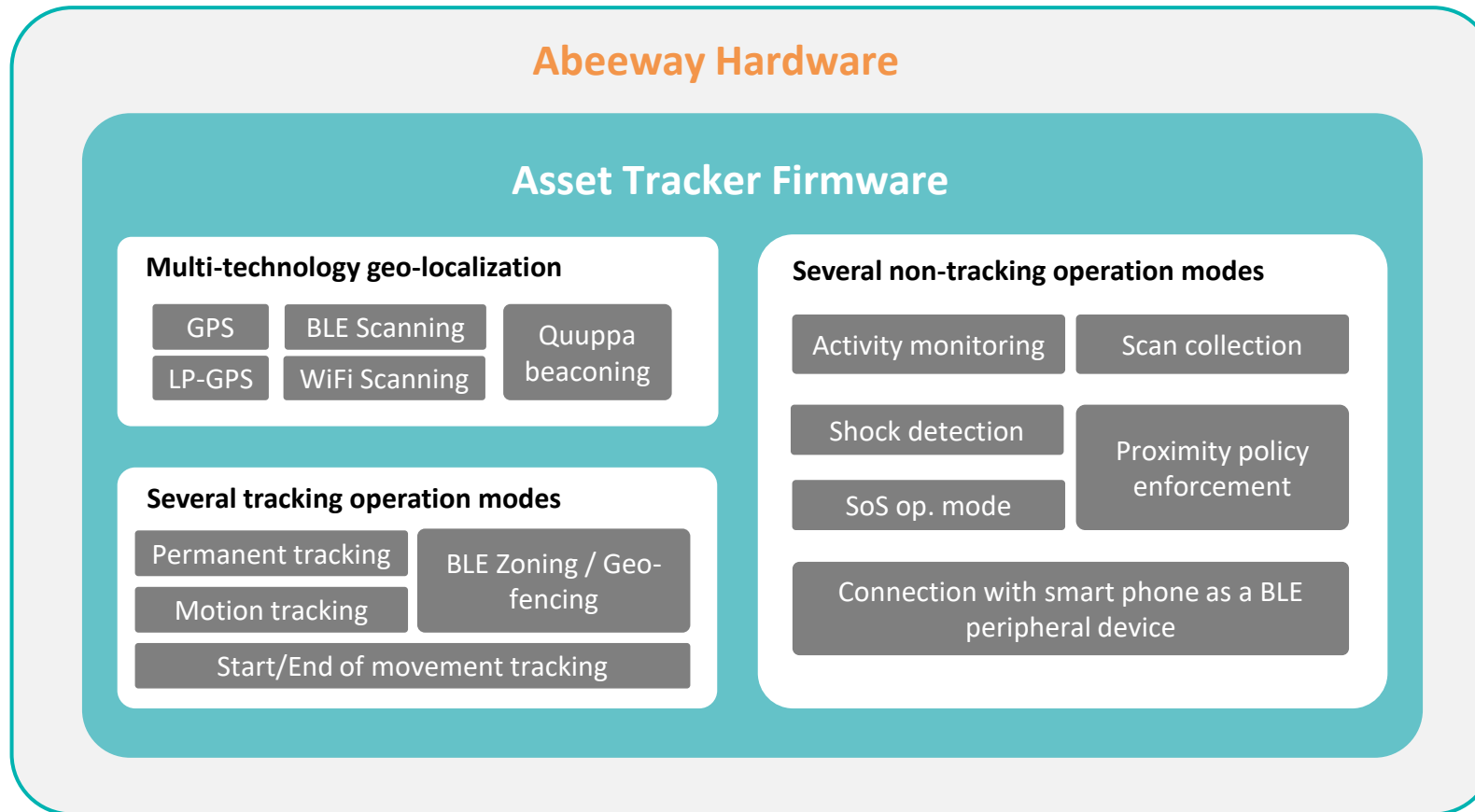
Sleek, smart, and multi-functional.
ideal for worker protection and zone alerts
IP65, ATEX, Buzzer with 100dB high volume, industrialized magnetic connector, 1300mAh rechargeable battery, multimode button.*

Battery life :

- *Proximity mode : 1 to 2 months depending on data precision*
- *Location mode : 120 days battery life at 60 fix per day with indoor/outdoor positioning.*

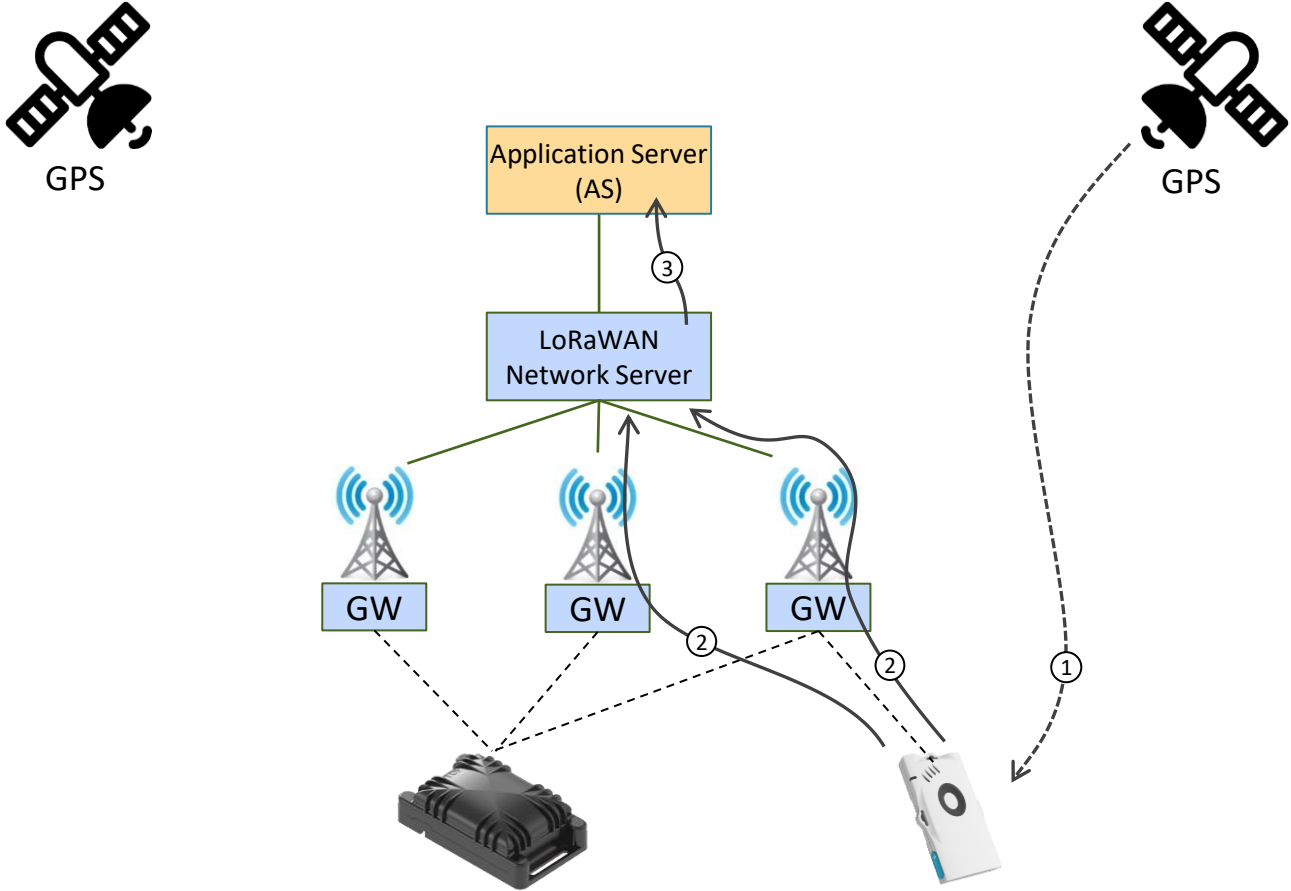


Abeeway Asset Tracker Firmware

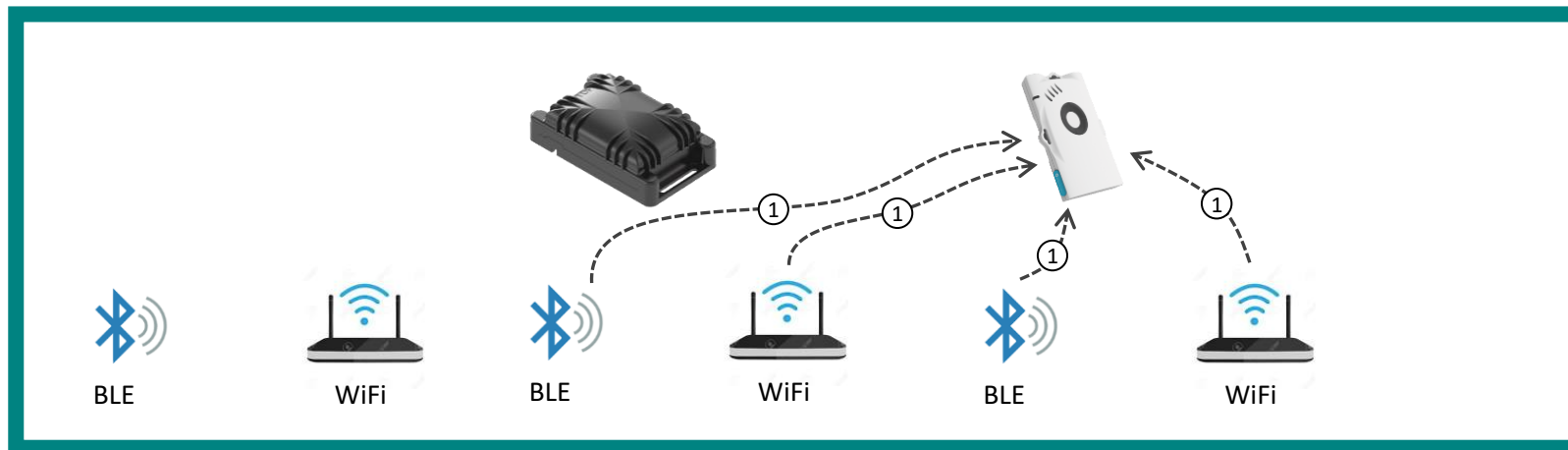
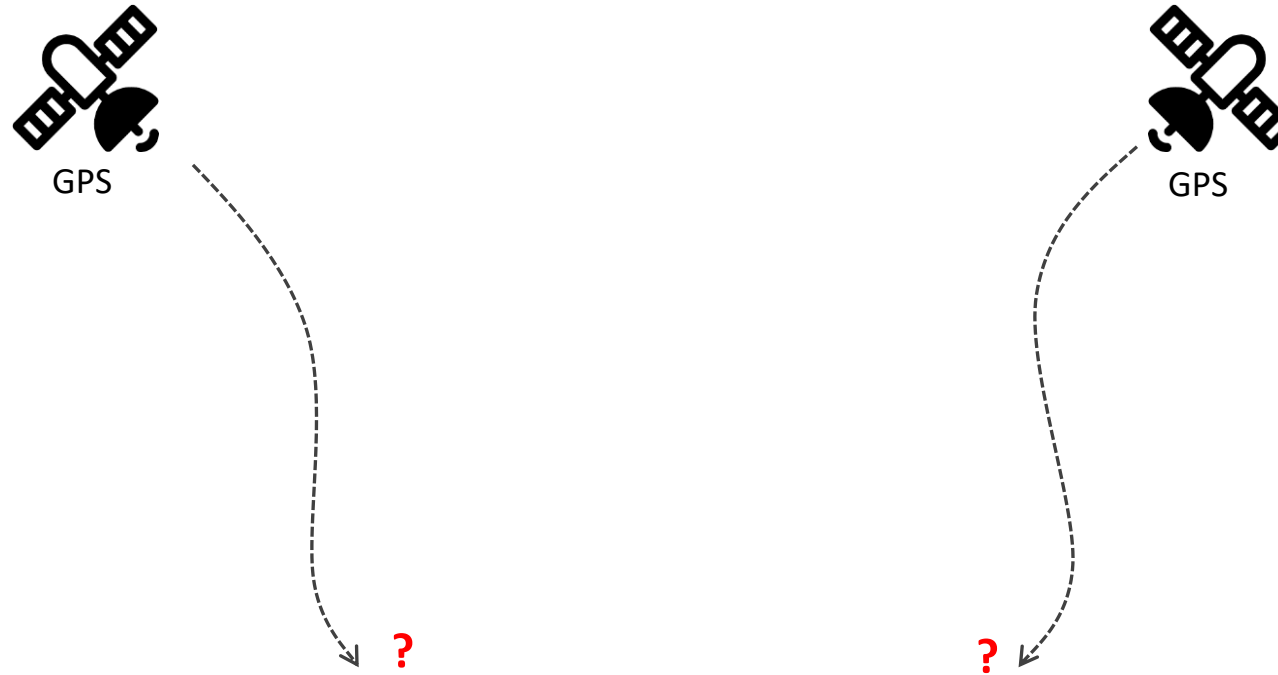


How can we connect these devices to
the backend?
How can we receive location updates
at our App Server?

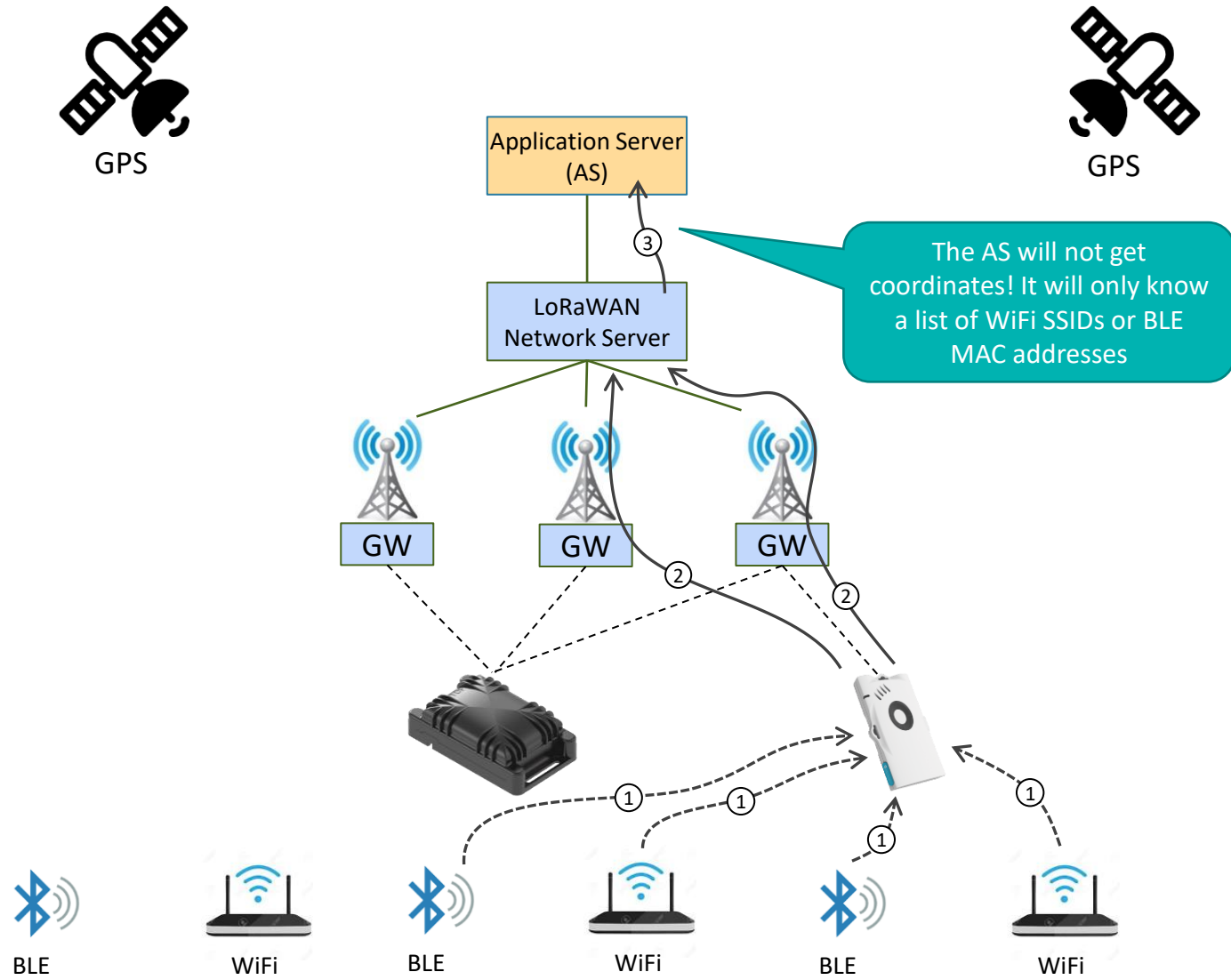
Outdoor geo-location with GNSS



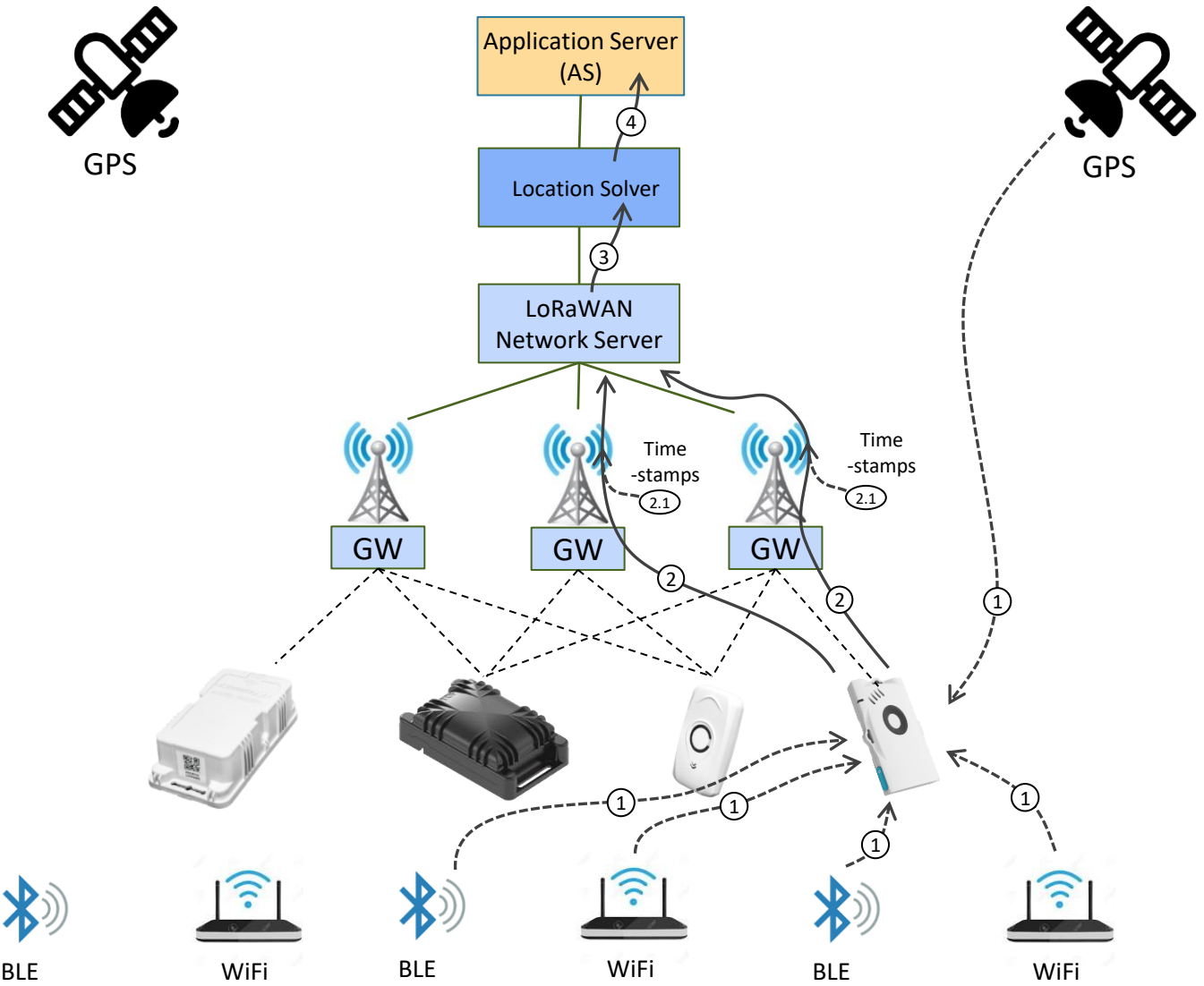
GNSS does not work in an indoor environment



Indoor geo-location with WiFi/BLS scanning



Multi-mode tracking with ThingPark Location Solver (TPX Location Engine)



We can still not address all use cases.
How can we help our partners to
develop their own solution?

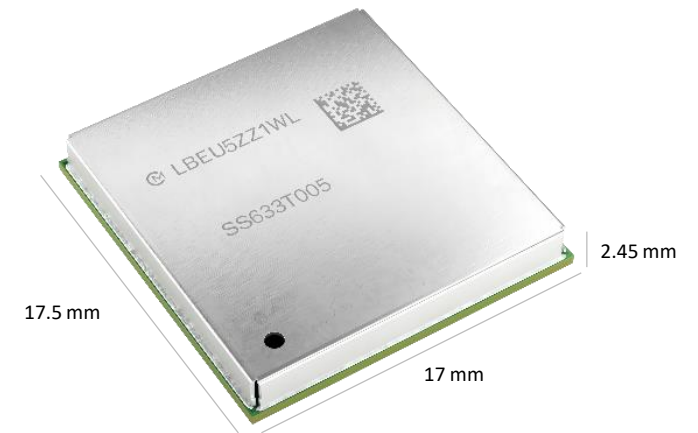
muRata
INNOVATOR IN ELECTRONICS

 Abeeway

Actility

Murata-Abeeway co developed Geolocation Module

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 - Compact circuit component
 - Ultra-low power consumption
 - Includes everything what a tracker devices needs
 - STM32WB MCU
 - Semtech LR1110 LoRa chip
 - MT3333 GNSS chip



Type 1WL Module

How can we help the development
process?

muRata
INNOVATOR IN ELECTRONICS

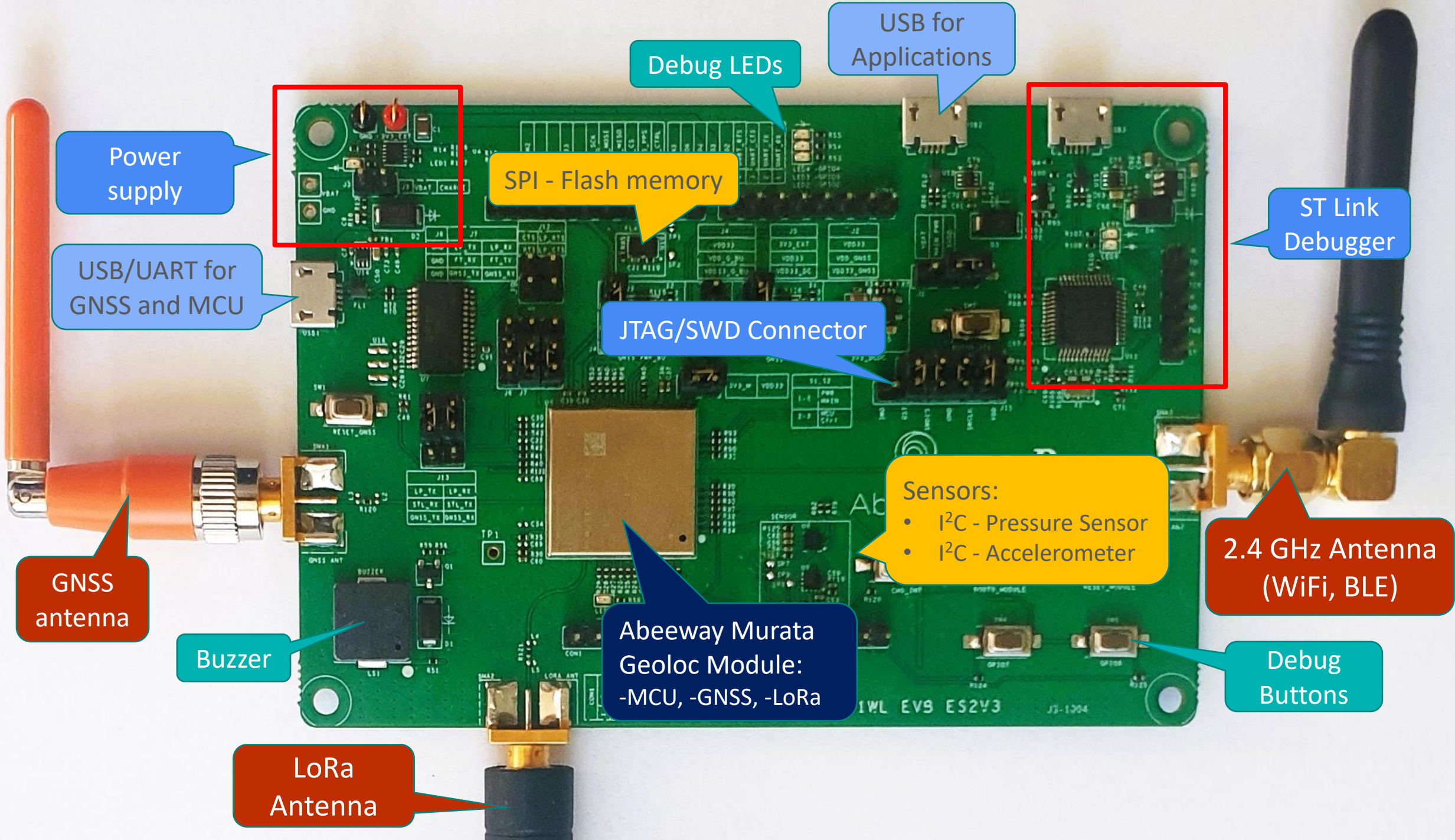
 Abeeway

Actility

Abeeway Murata Geolocation Module Evaluation Board

- Evaluation Board (LBEU5ZZ1WL-TEMP-EVK) includes
 - Abeeway-Murata Geoloc Module LBEU5ZZ1WL-633
 - ST-LINK/V2-1 debugger,
 - I2C Sensors
 - pressure sensor (LPS22HB)
 - accelerometer (LIS2DW12)
 - SPI Peripherals
 - flash memory (W25Q16)
 - Buttons and LEDs
 - Buzzer
 - IO Port pins
 - USB ports
- Evaluation Board delivered with
 1. 2.5GHz antenna
 2. ISM 868-915MHz antenna
 3. GNSS antenna
 4. USB cable A Male to micro USB Male
 5. Quick Start Guide





Evaluation Board - Software

- The Board is delivered with
 - STM32CubeIDE Integrated Development Environment
 - Drivers to demonstrate integration with onboard peripherals
 - Example IoT applications (running on FreeRTOS)

<https://github.com/Abeeway/abeeway-geolocation-module>

STM32CubeIDE : integrated development environment to write your application

The screenshot displays the STM32CubeIDE interface. The main editor shows the source code for `main.c`, which includes headers for FreeRTOS, task management, and board-specific configurations. The code defines application parameters like `APP_MAIN_LED_PERIOD` and `APP_TASK_STACK_SIZE`, and sets up a task named `TaskHandle_t`.

The console window shows the following debug output:

```
<terminated> aos-app-demo-debug [STM32 Cortex-M C/C++ Application] ST-LINK (ST-LINK GDB server) (Terminated Jul 29, 2022, 5:22:58 PM)
Device CPU : Cortex-M4
BL Version : 0xd5
Debug in Low Power mode enabled

Memory Programming ...
Opening and parsing file: ST-LINK_GDB_server_a14688.srec
File : ST-LINK_GDB_server_a14688.srec
Size : 224151 Bytes
Address : 0x08000000

Erasing memory corresponding to segment 0:
Erasing internal memory sectors [0 54]
Download in Progress:

File download complete
Time elapsed during download operation: 00:00:05.003
```

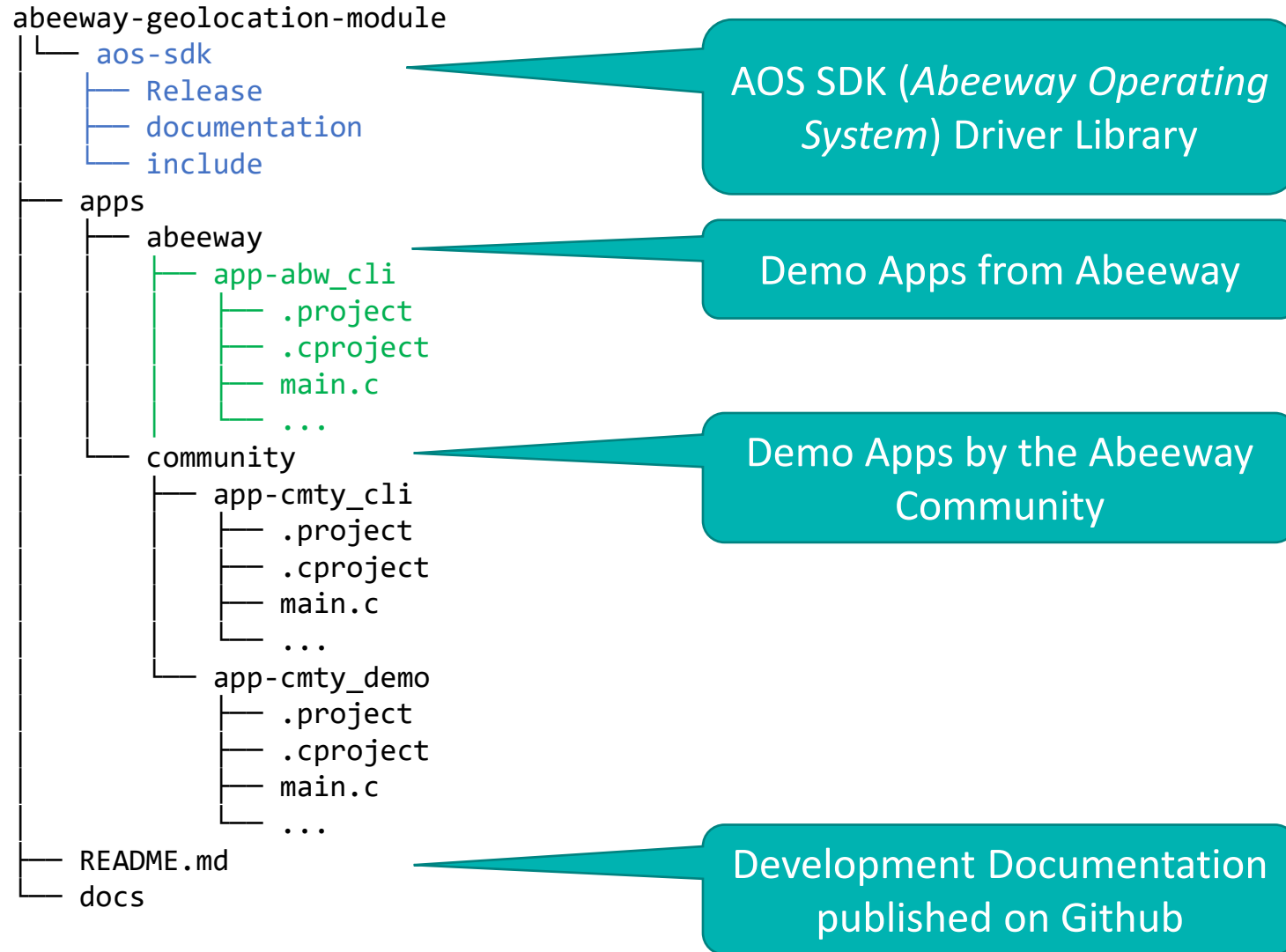
The Build Analyzer window shows the memory usage for the `aos-app-demo.elf` binary:

Region	Start address	End address	Size	Free	Used	Usage (%)
FLASH	0x08000000	0x0809e000	632 KB	413.11 KB	218.89 KB	34.63%
APP_BANK	0x08000000	0x0804f000	316 KB	97.11 KB	218.89 KB	69.27%
DFU_BANK	0x0804f000	0x0809e000	316 KB	316 KB	0 B	0.00%
SBSFU	0x0809e000	0x080ae000	64 KB	64 KB	0 B	0.00%
DFU_SWAP	0x080ae000	0x080ba000	48 KB	48 KB	0 B	0.00%
EEPROM	0x080ba000	0x080c4000	40 KB	0 B	40 KB	100.00%
BLE_RFU	0x080c4000	0x080c7000	12 KB	12 KB	0 B	0.00%
BLE_STK	0x080c7000	0x080ec000	148 KB	148 KB	0 B	0.00%
BLE_FUS	0x080ec000	0x08100000	80 KB	80 KB	0 B	0.00%
RAM1	0x20000004	0x20030000	192 KB	114.25 KB	77.74 KB	40.49%
RAM_SHAR...	0x20030000	0x20032800	10 KB	7.42 KB	2.58 KB	25.85%

Software components assembled in the SDK

- **FreeRTOS Kernel V10.3.1**
 - Source: CubeMX generated
 - Copyright (C) 2020 Amazon.com, Inc. or its affiliates.
 - Portion Copyright (C) 2019 STMicroelectronics, Inc.
- **STM32WB55 HAL**
 - Source: CubeMX generated
 - Copyright (c) 2019 STMicroelectronics.
- **BLE**
 - Source: CubeMX generated
 - STM32_WPAN
 - Copyright (c) 2018-2021 STMicroelectronics.
 - BLE application example
 - Source: CubeMX generated
 - Copyright (c) 2022 STMicroelectronics.
- **USB CDCACM driver**
 - Source: CubeMX generated
 - Copyright (c) 2015 STMicroelectronics.
- **LoRaWAN MAC (v5.0.0-branch, git tag 1ded7077 dated March 10 2022)**
 - Source: <https://github.com/Lora-net/LoRaMac-node>
 - License: <https://github.com/Lora-net/LoRaMac-node/blob/master/LICENSE>
 - Copyright Semtech Corporation 2021. All rights reserved.
 - Copyright Stackforce 2021. All rights reserved.
 - Copyright MCD Application Team (C)(STMicroelectronics International).
- **LR1110 driver (v7.0.0)**
 - Source: https://github.com/Lora-net/lr1110_driver
 - License: https://github.com/Lora-net/lr1110_driver/blob/master/LICENSE.txt
 - Copyright Semtech Corporation 2021. All rights reserved.
- **EEPROM Emulation (v4.0.0)**
 - Source: www.st.com en.x-cube-eeeprom_v4.0.0.zip
 - License: MCD-ST Liberty SW License Agreement V2
 - Copyright (c) 2020 STMicroelectronics.
- **CMSIS**
 - Source: CubeMX
 - Copyright (c) 2009 - 2015 ARM LIMITE
 - Copyright (c) 2009 - 2015 ARM LIMITED
 - Copyright (C) 2010-2015 ARM Limited. All rights reserved.

<https://github.com/Abeeway/abeeway-geolocation-module>



The CLI App (`app-abw-cli`)

- Demonstrates all features of the module by a Command Line Interface
- The CLI app is a useful component of any other applications
- Key features
 - WiFi config and test commands
 - BLE config and test commands
 - GNSS config and test commands
 - GPIO config and test commands
 - LoRa config and test commands
 - System config and test commands

The Community Demo App ([app-cmtty-demo](#))

- Demonstrates how you can start application development by enhancing the feature-set of the CLI application
- Basic (“Hello world!” like) example applications:
 1. Blinking an LEDs of the board
 2. Sending a LoRaWAN uplink message upon pressing a button on the board
 3. Turning an LED on/off by sending LoRaWAN downlink messages to the board



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A question? Get in touch with us



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