Asset Tracking

- Applications and Technology Trends
- Architectures by End Application
- Key Products
- Value Proposition and Key Solutions

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Applications and Technology Trends

Applications and segmentation for Asset Tracking

Outdoor Real-Time Monitoring		Containers	Livestock monitoring	e-bike	Fleet management	Pet tracking
Industrial Logistic		Pallets	Racks	Luggage	Smart parcels	
Good Guarantee		Cold chain	Food	Medical		
Disposable		Letters	Packages	Parcels		

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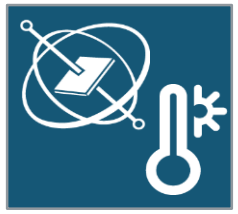
Asset Tracking

Trends and Growth Drivers

Positioning

- Outdoor Localization: Low power GNSS. Signal triangulation (SigFox, LoRa, LTE, etc.)
- Indoor Localization: Bluetooth Low Energy, Ultra-Wide Band and/or Wi-Fi



Environment and motion sensors

- High accuracy for environment sensors
- Shock sensors and inclinometer

Wireless connectivity

- LPWAN: LTE NB-IoT, LoRa and SigFox
- Wi-Fi, Bluetooth Low Energy, ZigBee, Ultra-Wide Band, UHF and NFC

Energy

- Long battery life (usually not rechargeable battery)
- Battery-less with energy harvesting (RF)
- Ultra-low power MCU

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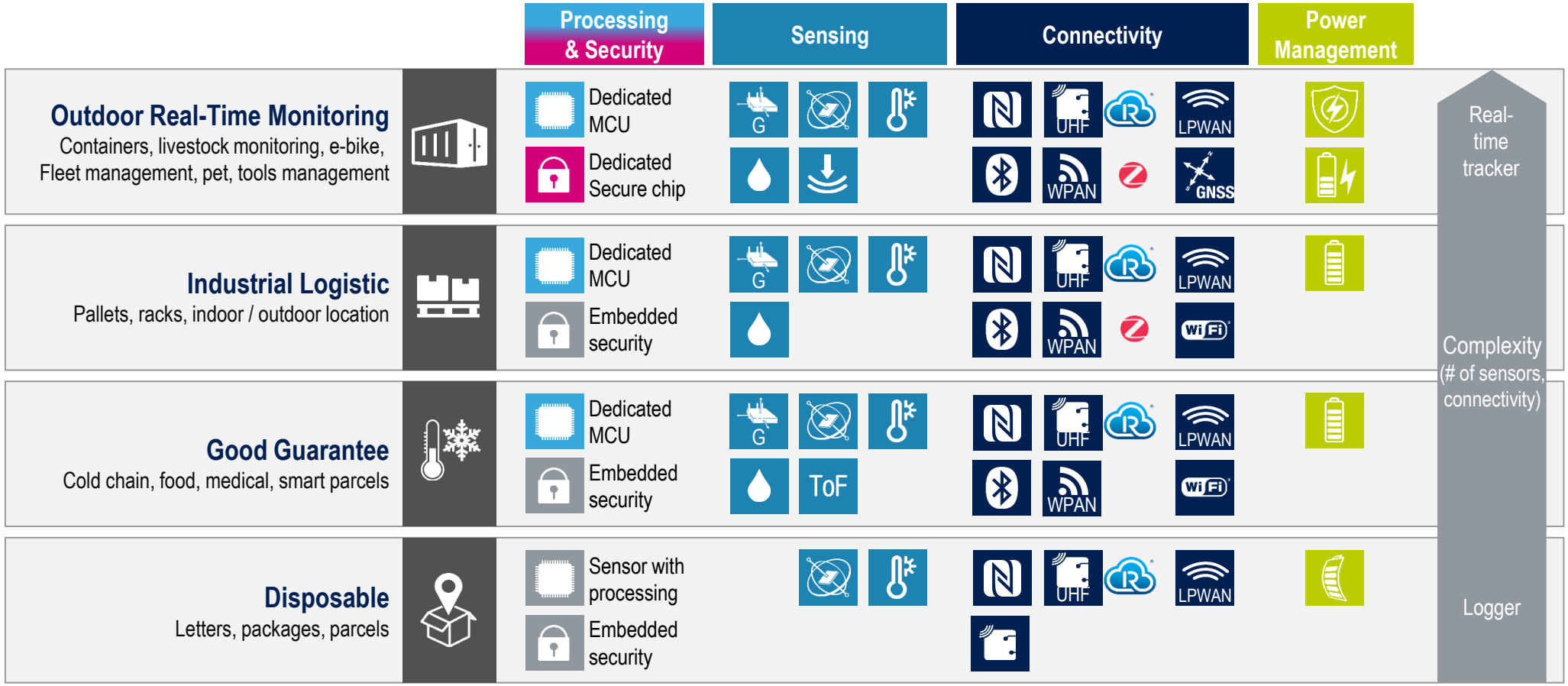
Architectures by End Application

Needs by Asset Tracking Applications



LPWAN: LoRaWAN, LTE CATM1 / NBIoT, Sigfox

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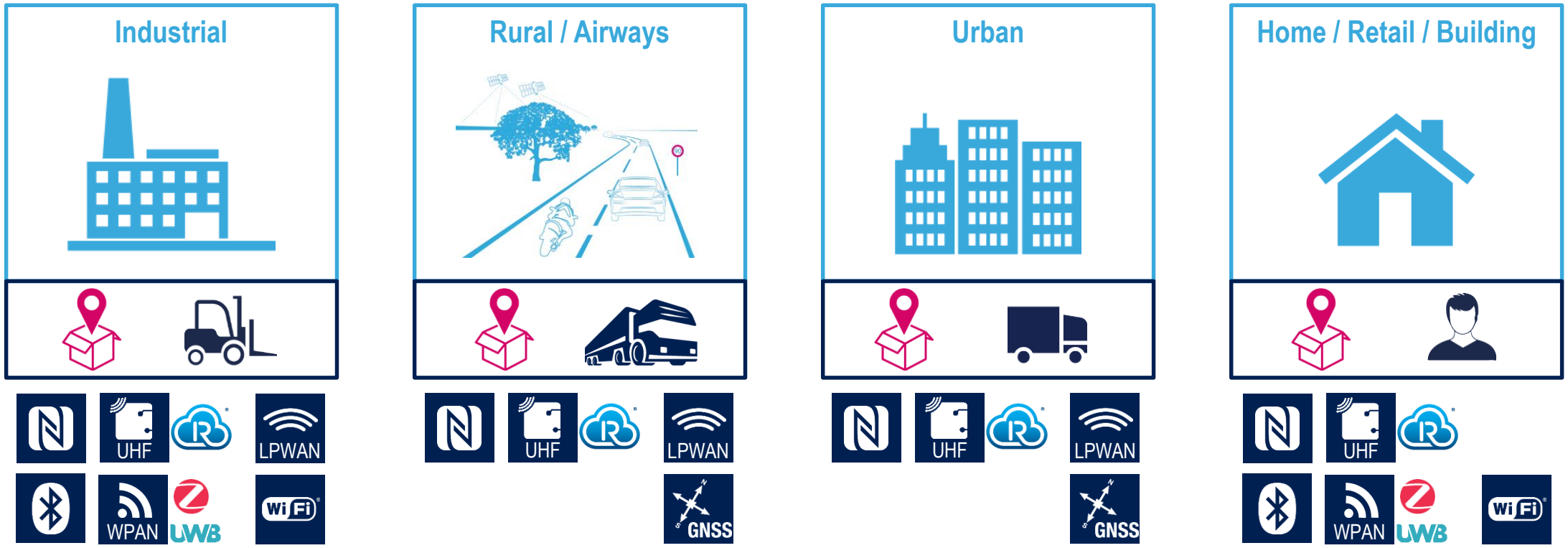
Connectivity Technologies by Applications

Position/data reliability, Battery life, & Cost determine connectivity technology



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Asset Tracking

ST 360° portfolio delivers 100% flexibility

Outdoor Real-Time Monitoring
Containers, livestock monitoring, e-bike,
Fleet management, pet, tools management

Industrial Logistic
Pallets, racks, indoor / outdoor location

Good Guarantee
Cold chain, food, medical, smart parcels

Disposable
Letters, packages, parcels

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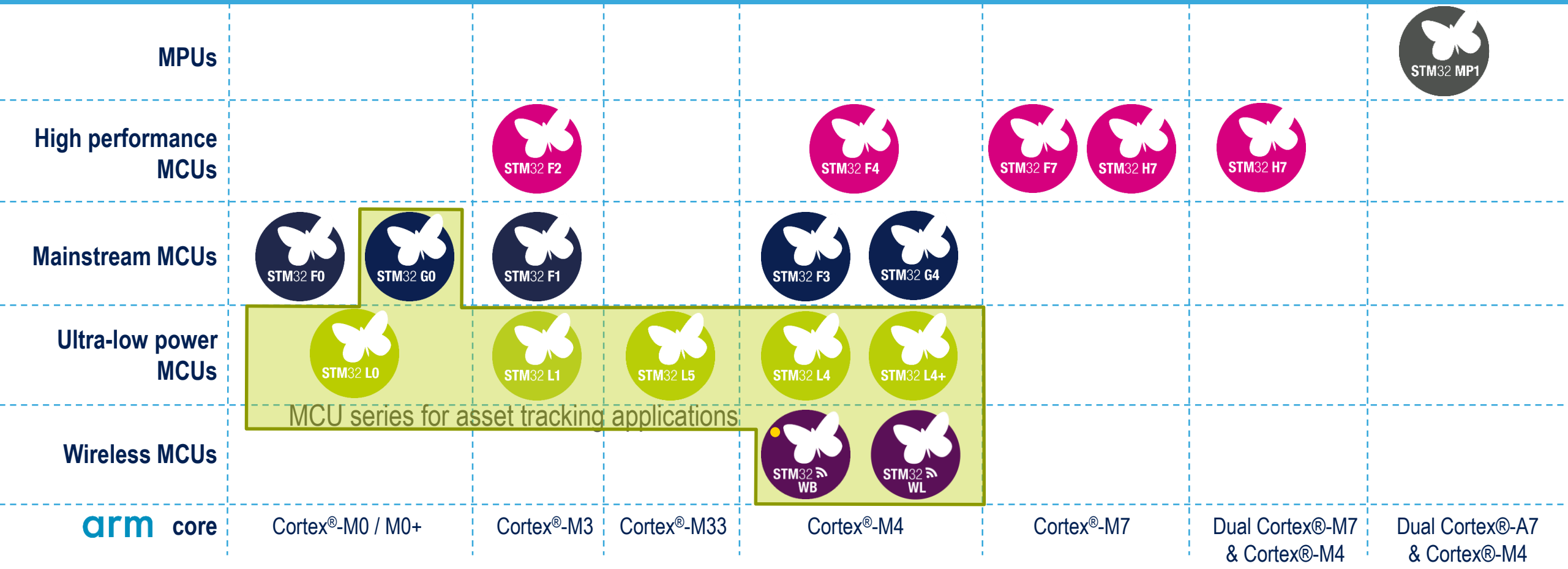
Multiple applications, one platform, one vendor

STM32 Portfolio

Keep releasing your growing creativity



● With Cortex®-M0+ radio co-processor

ST Sensors
for Asset Tracking

Accelerometers

High-g shock accelerometer	**H3LIS331DL**
Inclinometer	**IIS3DHHC** **IIS2ICLX**
Vibration	**IIS2DH**
Ultra-low power	**LISDW12**
With embedded temperature sensor	**LISDTW12**

iNEMO® Inertial Module

6x IMU	**LSM6DSx**

Pressure Sensors

Precision pressure sensor	**LPS22HH**
Waterproof pressure sensor	**LPS27HHW**

Temperature & Humidity Sensors

Humidity & temperature sensor	**HTS221**
Digital temperature sensor	**STTS751** **STTS22H**
Analog temperature sensor	**LM235** **STLM20**

MEMS Microphones

Digital high-bandwidth microphone	**MP34DT05-A**

FlightSense™ Time-of-Flight sensor

Proximity sensor and ALS	**VL6180X**
Ranging sensor	**VL53L0X**
Long distance ranging sensor	**VL53L1X**

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ST Connectivity
for Asset Tracking

NFC & RFID

NFC / RFID tags	**ST25TV**
Dynamic NFC / RFID tags	**ST25DV**
NFC Readers	**ST25R**
NFC Readers for UHF	**ST25RU3993**

Bluetooth Low Energy

Highly energy-efficient Bluetooth 5.0 Wireless SoC	**BlueNRG-2**
Balun & Filter for BlueNRG	**BALF-NRG-02D3** **MLPF-NRG-01D3** **MLPF-WB55-0xE3**
Bluetooth 5.0 Modules	**BlueNRG-M2**
Multi-protocol (BLE 5.0 / 802.15.4) Wireless SOC	**STM32WB**

Sub-1 GHz

Sub-1 GHz Transceiver Sigfox compatibility	**S2-LP**
Balun for S2-LP	**BALF-SPI2-01D3**
STM32 Sub-GHz SOC	**STM32WL**

sigfox LoRa

WPAN

Multi-protocol (BLE 5.0 / 802.15.4) Wireless SOC (balun integrated)	**STM32WB**
Balun for UWB	**BAL-UWB-x**

LoWPAN ZigBee THREAD

Positioning

GNSS Module	**TESEO-LIV3x**

GNSS

Cellular

Authorized Partner

Cellular connectivity
In collaboration with several partners

LTE-M NB-IoT

Power Management & Protections

for Asset Tracking

DC/DC converters

Synchronous converter, Output voltage flexibility, 400mA output current, Nano-quiescent current (500nA) for extended sensors battery life	**ST1PS01 /02**

Voltage regulators

200 mA ultra-low quiescent current LDO	**STLQ020**

Protections

SD card protection	EMIF06-MSD02N16
USB DATALINE	ECMF02-4CMX8
DC-DC protection	ESDA7P120-1U1M

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Asset Tracking Complete Offering

All building blocks for Asset Tracking devices

- Microcontrollers
- Secure solutions
- Sensors & actuators
- Connectivity solutions
- Power management
- Motor control
- Analog components

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Lower barriers for developers getting started

Stackable boards & modular SW

STM32 Nucleo Development & Expansion boards

Form-factor boards

NFC Sensor Tag

SensorTile.box

Sigfox Tracker

IoT Lora Tracker

Lower barriers from prototyping to first product

Pre-integrated software for vertical applications

- Smart Things
- Smart Home & City
- Smart Industry

Development ecosystem

- Code generators
- Prototyping software
- Development environments
- Artificial Intelligence toolbox
- Debug solutions
- Simulation and analysis tools
- On-line design tools

Enable product & service commercialization

Integration of Cloud Provider SDKs

aws

Microsoft Azure

Google Cloud

IBM

Partner Program and ST community

life.augmented Partner Program

ST Community

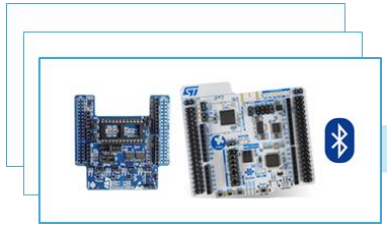
Educational Platforms

Asset Tracking Demo

Green House

X-NUCLEO-IKS01A3

P-NUCLEO-WB55



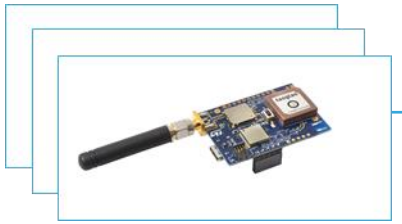
Bluetooth LE sensor nodes

Gateway

Lora Access Point

Smart Farm

STEVAL-STRKT01



Lora sensor nodes

Food Monitoring

STEVAL-SMARTAG1

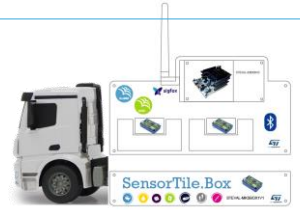
NFC sensor nodes

Gateway

Smart Track

STEVAL-MKSBOX1V1

(sensortile.box)



Bluetooth LE sensors with Machine Learning

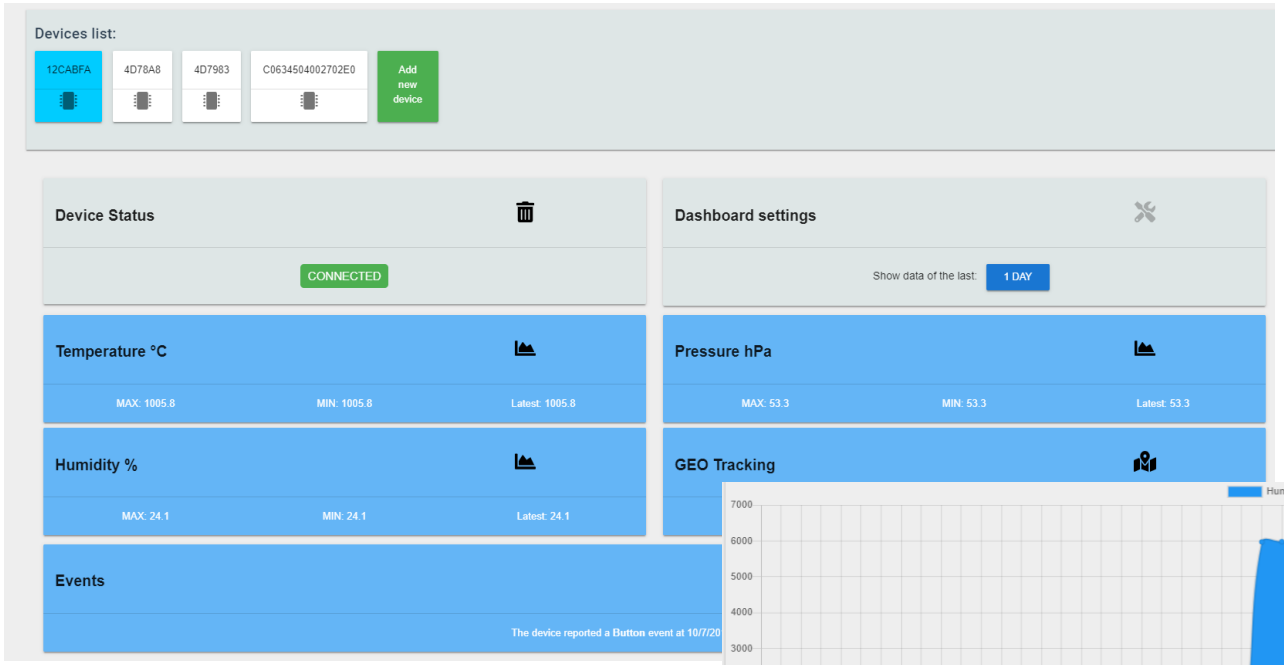
Gateway

Sigfox Access Point

Asset Tracking Dashboard

Asset Tracking **Dashboard**

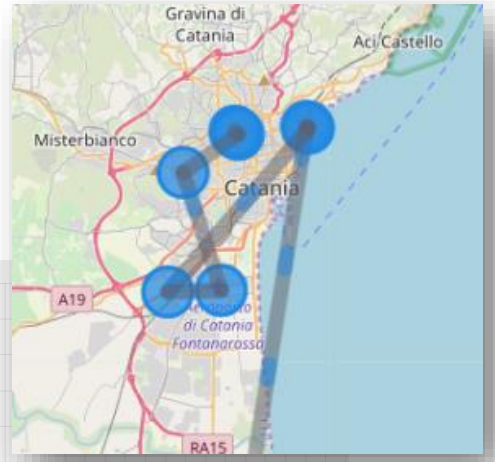
Node to Cloud

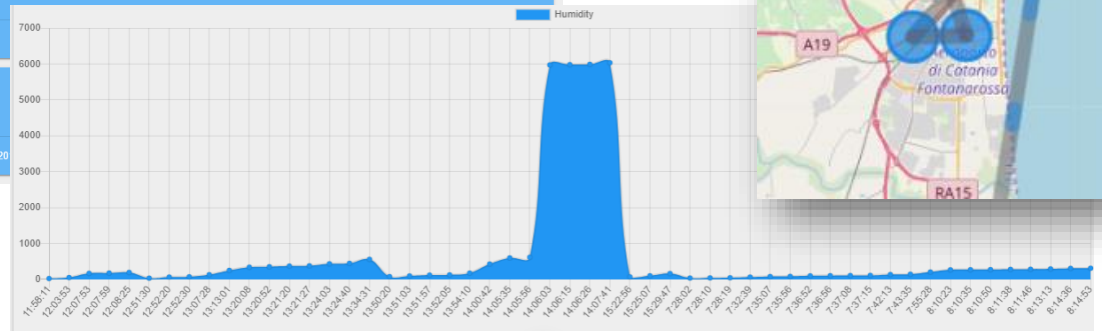


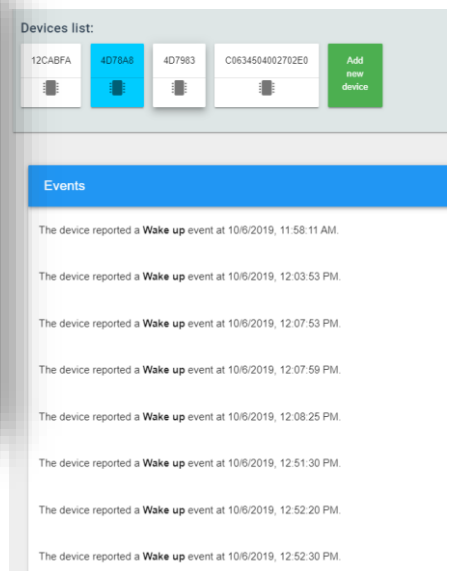
NFC sigfox LoRa

DATA SENSOR

GEOLOCATION







http://st-asset-tracking.s3-website-us-east-1.amazonaws.com/#/dashboard

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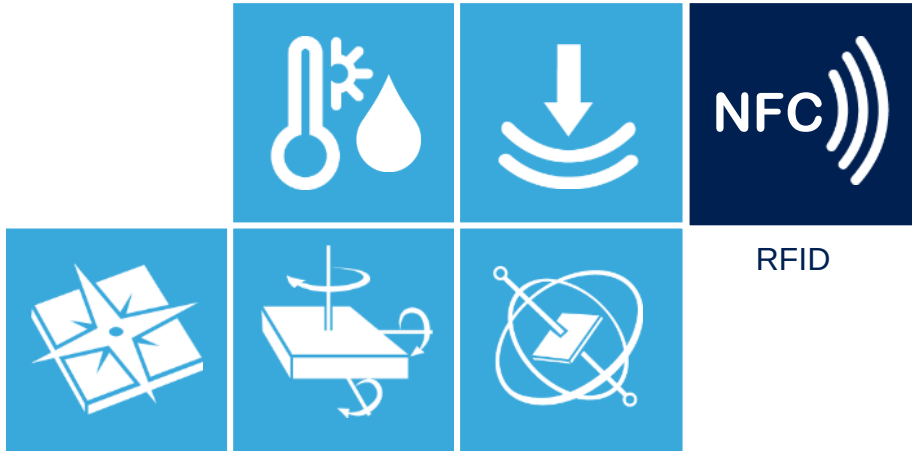
NFC Sensor TAG
for Asset Tracking

STEVAL-SMARTAG1 as Data Logger



ST25DV64K NFC Dynamic Tag sensor node (motion, environmental) based on STM32 as host.

EVAL & equivalent Nucleo boards

STEVAL-SMARTAG1

NUCLEO-L053R8
X-NUCLEO-NFC04A1
X-NUCLEO-IKS01A2

Sensors & Power

LIS2DW12 – 3x accelerometer
LPS22HH – Pressure sensors
HTS221 – Temperature & humidity
STLQ015 – Voltage regulator

Available Function Packs

FP-SNS-SMARTAG1

Mobile App

ST NFC Sensor

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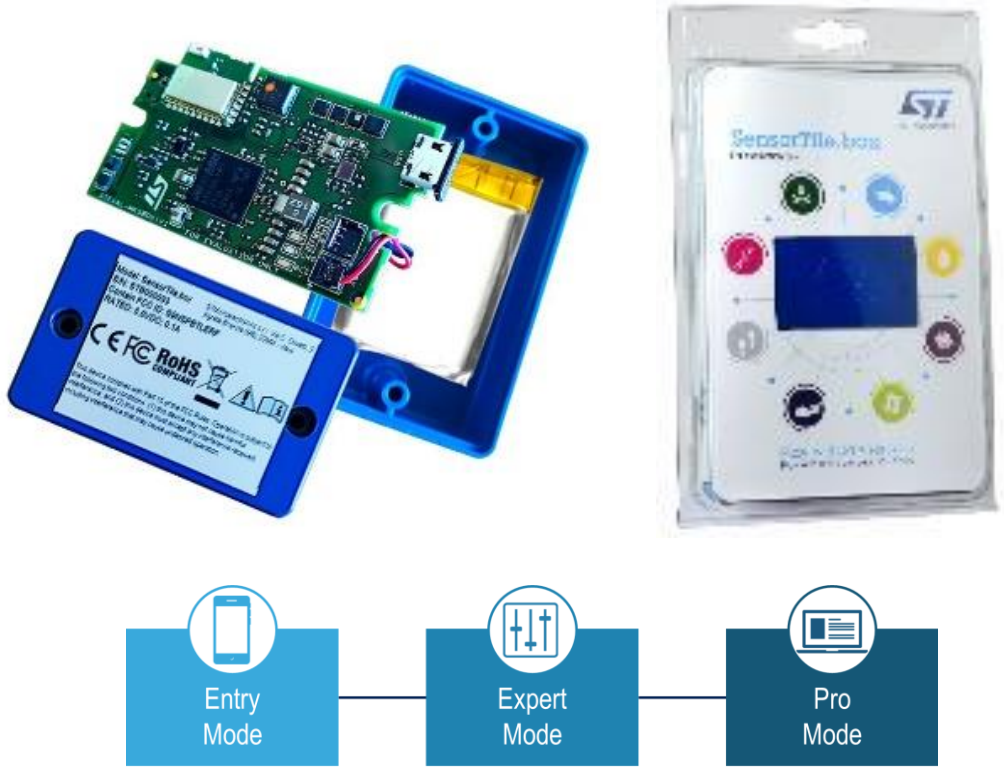
STM32 Open Development Environment

SensorTile.box

STEVAL-MKSBOX1V1



Bluetooth Low Energy solution with Environmental and Motion Sensors with Machine Learning, running on STM32

Sensors

LSM6DSOX – 6x IMU with ML
LPS22HH – Pressure sensors
HTS221 – Temp. & humidity
STTS751 – Temperature
LIS2DW12 & LIS3DHH – Accelerometer and Inclinometer
LIS2MDL – Magnetometer
MP23ABS1 – Analog Microphone

EVAL boards

STEVAL-MKSBOX1V1

Available Function Packs

FP-ATR-BLE1*

Mobile App

ST BLE Sensor

*Available in Q1 2020

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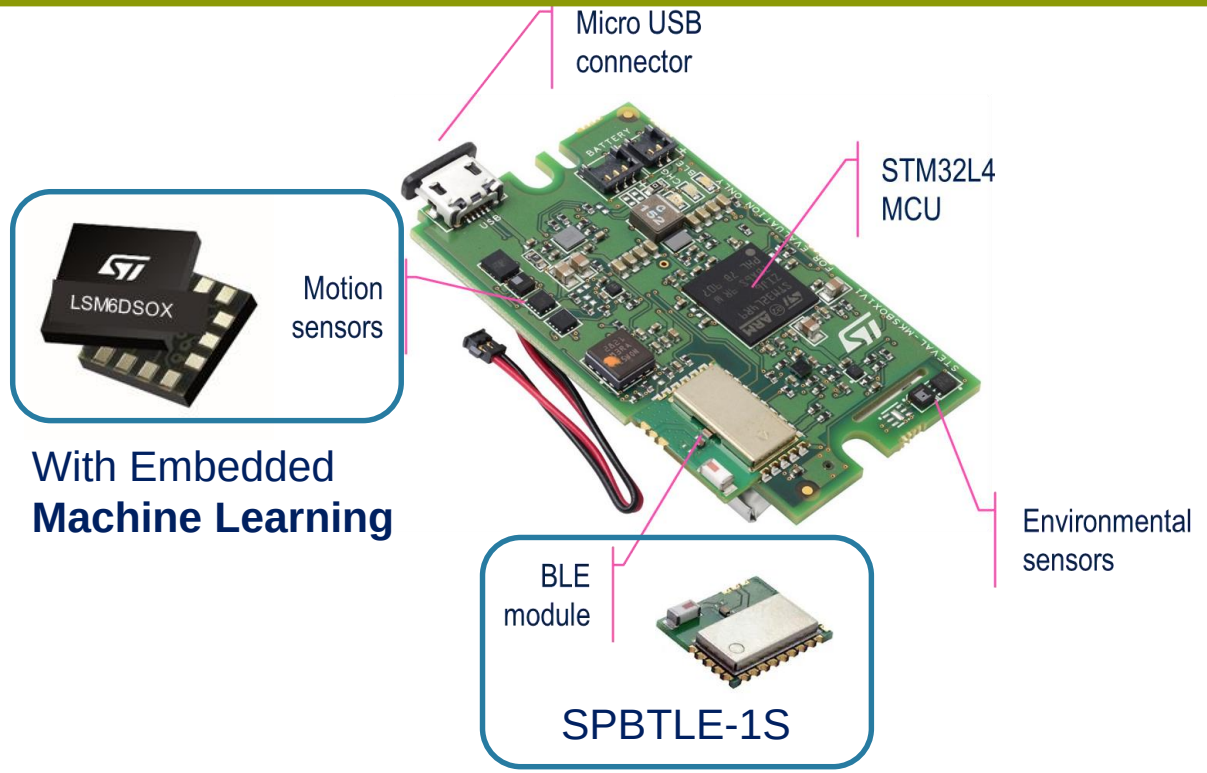
SensorTile.Box and Machine Learning

STEVAL-MKSBOX1V1



A ready-to-go IoT Node

- Built into a compact IP54 casing
- Bundled with app for Smartphone
- 500 mA-h Li-Po battery
- 8 GB µSD card as mass memory extendable to 64 GB

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www.st.com/sensortilebox

Machine Learning Core steps

Machine Learning Core configuration

Operating Mode

Capture Data

1

2

Label Data
Filters and Features
computation

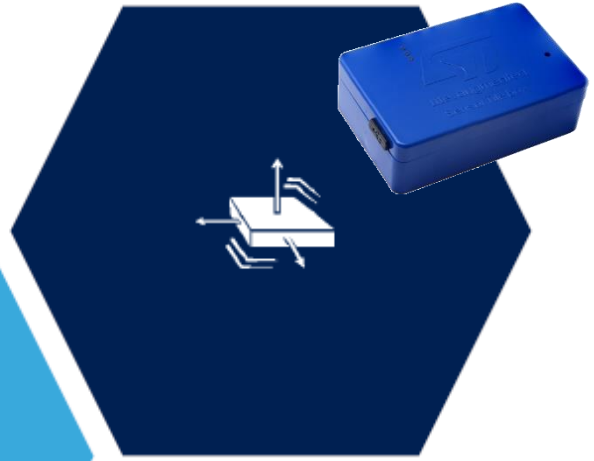
Build Decision Tree

3

4

Embed Decision Tree
in MLC configuration

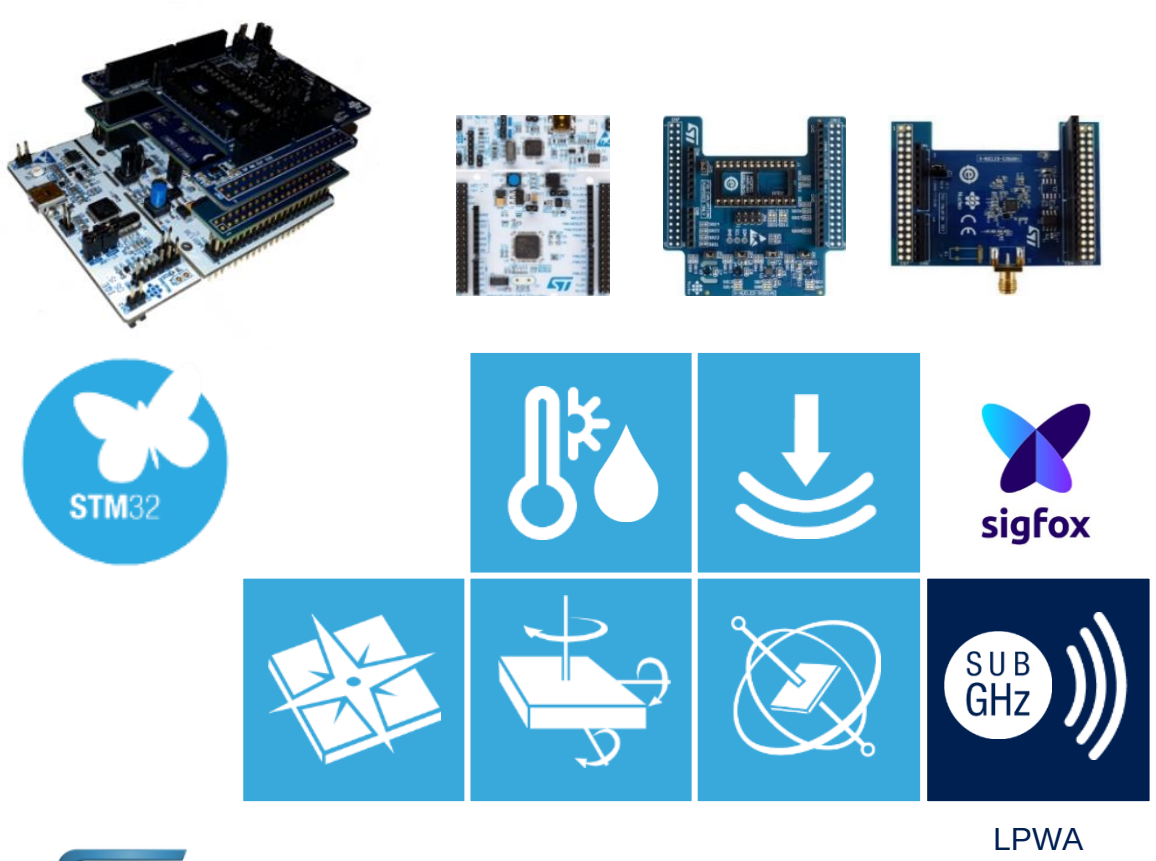
Process new data
using trained Decision Tree



5

SigFox™ Tracker

SigFox To Cloud



IoT tracker node with Sigfox™ connectivity and sensors, based on STM32 as host

Connectivity

S2-LP, ULP RF transceiver SigFox Compatible

Featured Sensors

LSM6DSL – Accelero + Gyroscope

LSM303AGR – Accelero + Magneto

LPS22HB – Pressure

HTS221 – Temperature & humidity

Nucleo boards

NUCLEO-L053R8/L476RG

X-NUCLEO-S2868/915A1

X-NUCLEO-IKS03A1

X-NUCLEO-IDB05A1

Function Packs

FP-ATR-SIGFOX1

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STM32 Open Development Environment

IoT LoRa® Tracker
for Asset Tracking

LoRa Technology with MachineQ Service

RF SubGHz LoRa sensor node (motion, environmental), based on STM32 as host.

Connectivity

STM32L0+SX1276 (LoRa® Module CMWX1ZZABZ)

TESEO-LIV3F GNSS positioning

EVAL and equivalent Nucleo boards

STEVAL-STRKT01

B-L072Z-LRWAN1

X-NUCLEO-GNSS1A1

X-NUCLEO-IKS01A2

Sensors

LIS2DW12– accelerometer

LPS22HH - pressure

HTS221 – temp + humidity

Power management

STBC02 – Li-Ion battery charger

ST1PS01 – Step-down converter

STUSB1600A – USB Type-C contr.

Function Packs

FP-ATR-LORA1

STM32 Open Development Environment

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