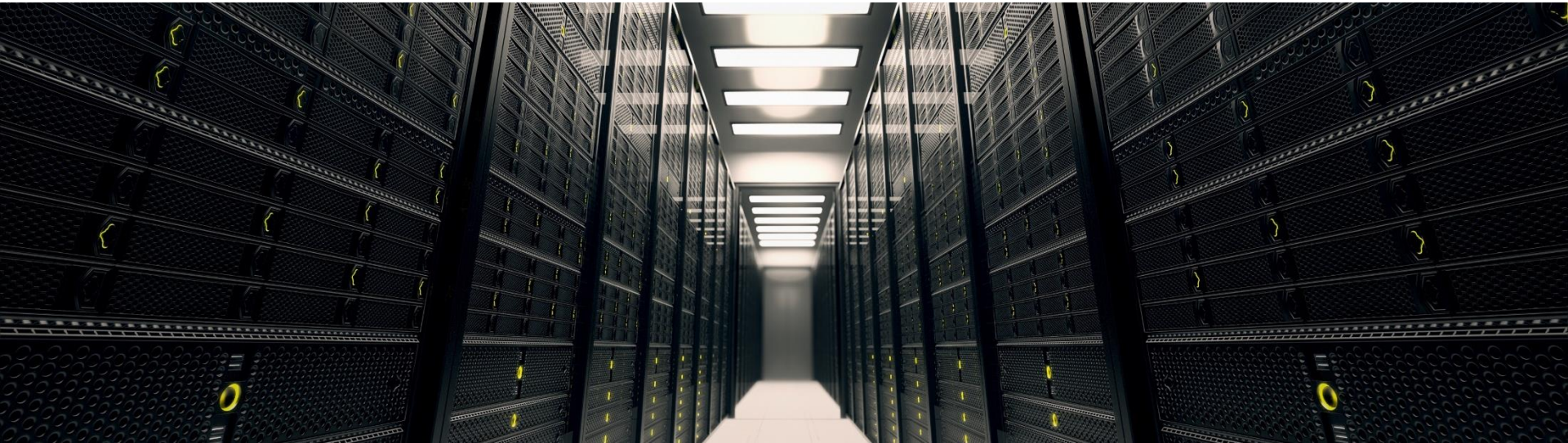


STM digital components

Dicembre 2019 – *Enrico Marinoni* (enrico.marinoni@avnet.eu)

AVNET[®] **SILICA**

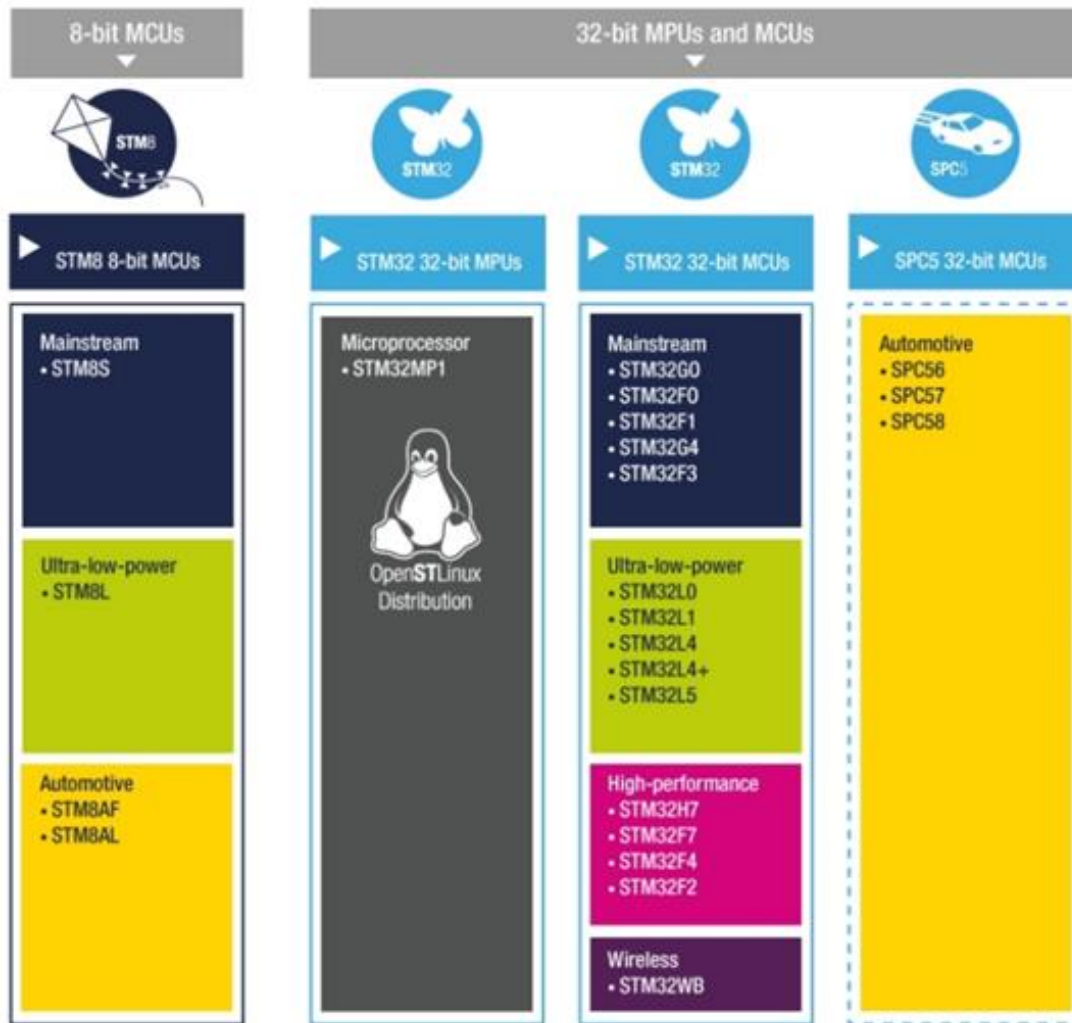


Introduction

- **MCU & MPU** (AI, Neural Networks, etc)
- **MEMS & Sensors** (Proximity)
- **WIRELESS** (Sub1Ghz, BLE, NFC)
- **Drone Technology** (Teseo family of **Global Navigation Satellite System receiver & Radar solutions**)
- **Technical support**

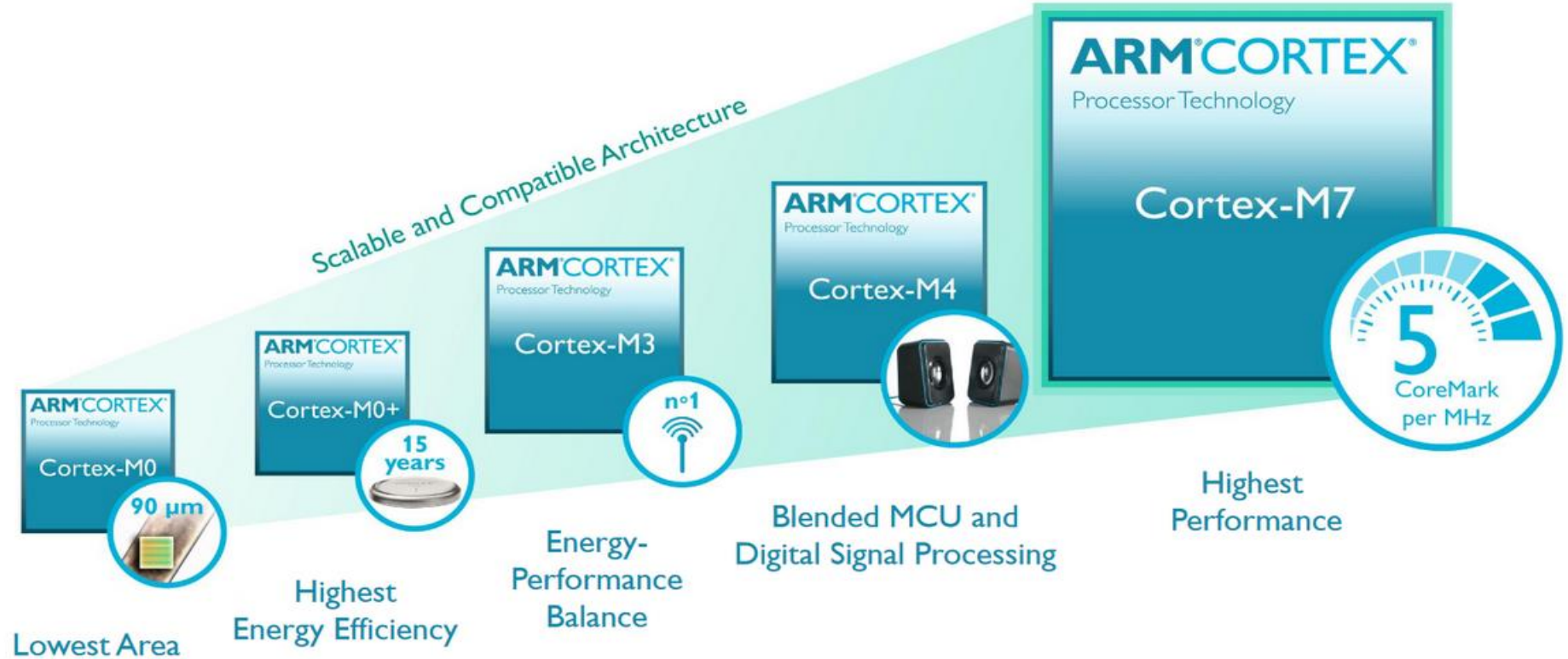


MCU - MPU



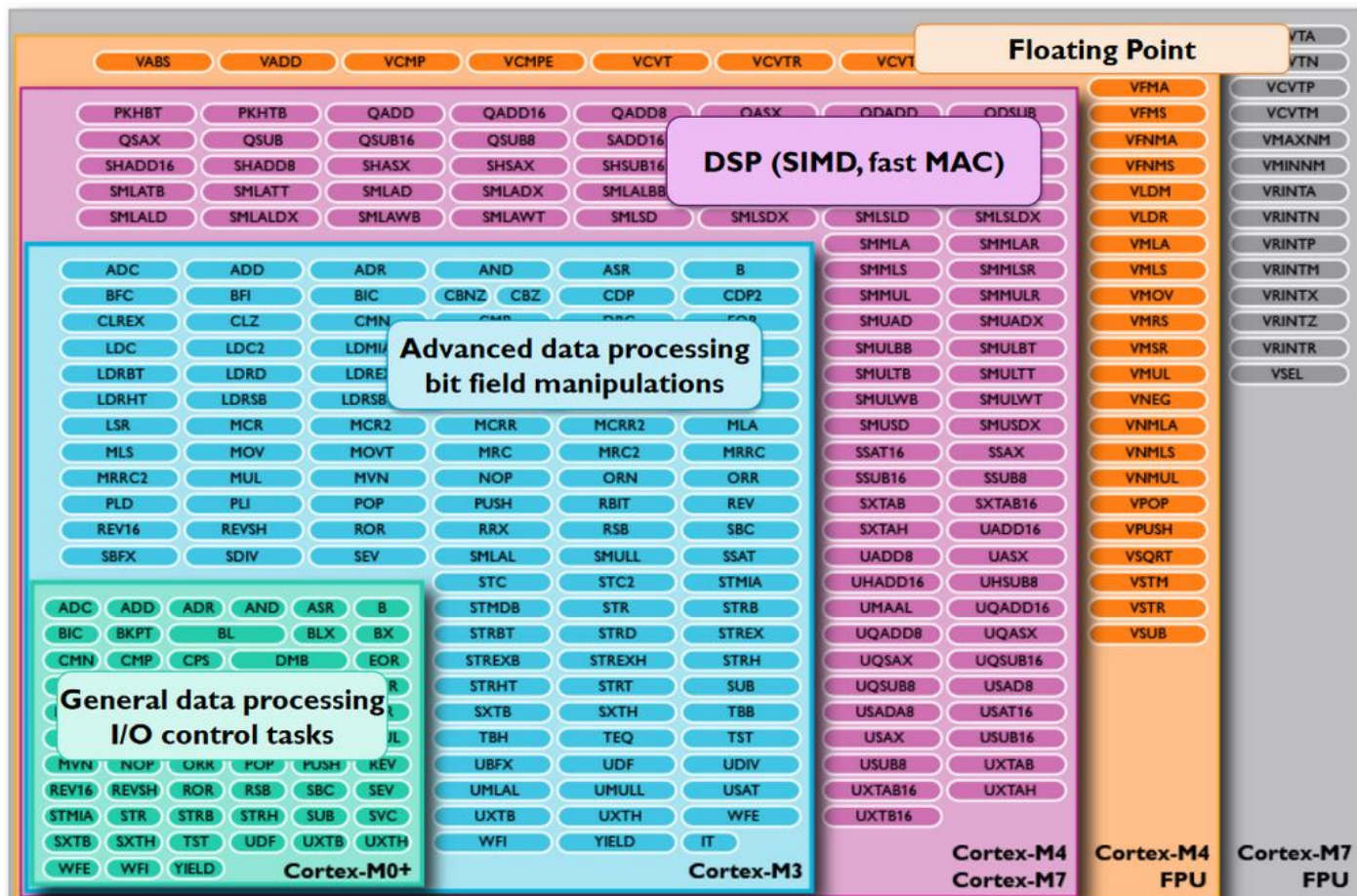


STM32 - Cortex Mx - Core 32/64bit - RISC architecture



The computing power of CORTEX M is in the range from **0.8** to **2.25** DMips/MHz.

STM32 - Powerful and Scalable instruction set (CMSIS library)





STM32 32-bit Arm® Cortex®-M MCUs

High Performance	STM32H7 3224 CoreMark 480 MHz - Cortex-M7 240 MHz - Cortex-M4		
	STM32F2 398 CoreMark 120 MHz - Cortex-M3	STM32F4 608 CoreMark 180 MHz - Cortex-M4	STM32F7 1082 CoreMark 216 MHz - Cortex-M7
Mainstream	STM32G0 142 CoreMark 64 MHz - Cortex-M0+	STM32G4 550 CoreMark 170 MHz - Cortex-M4	
	STM32F0 106 CoreMark 48 MHz - Cortex-M0	STM32F1 177 CoreMark 72 MHz - Cortex-M3	STM32F3 245 CoreMark 72 MHz - Cortex-M4
Ultra-low-power	STM32L0 75 CoreMark 32 MHz - Cortex-M0+	STM32L1 93 CoreMark 32 MHz - Cortex-M3	STM32L5 427 CoreMark 110 MHz - Cortex-M33
			STM32L4+ 409 CoreMark 120 MHz - Cortex-M4 STM32L4 273 CoreMark 80 MHz - Cortex-M4
Wireless	STM32WB 216 CoreMark 32 MHz - Cortex-M0+ 64 MHz - Cortex-M4		

Legend: ● Optimized for Mixed-signals applications

● Cortex-M0+ Radio Co-processor

STM32 Solutions



Artificial
Neural Networks



Graphic
User Interface



STM32
Motor Control



STM32Cube
Ecosystem



STM32
Community

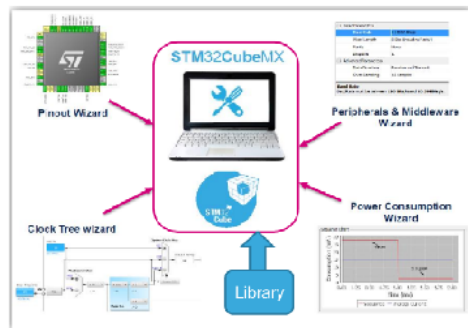


STM32
Education



STM32 family, the perfect solution for your projects

CUBE



STM32 Education



Support

AVNET-SILICA FAE
STM FAE
STM central support (Prague)

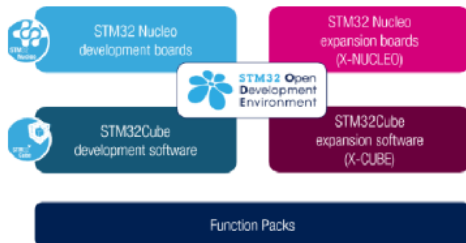
Free C IDE-COMPILER



Free for STM32L0 and F0



ODE



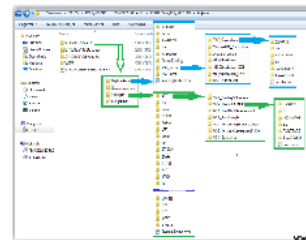
Evaluation Boards



STM Studio



Library & Examples



10 years Longevity



Low cost emulator



STM32 - Evaluation Boards

- ST offers a comprehensive evaluation boards to ease the lives of developers and unleash the creativity of makers.
- All eva-boards include the **emulator**.
- A lot of eva-boards are ready to use under ARM mBED

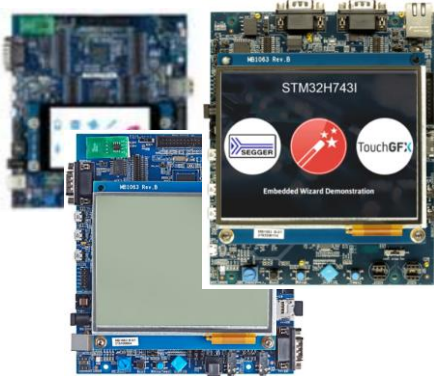


	STM32 Nucleo	STM32 MCU Discovery kits	STM32 Nucleo expansion boards	Third-party boards
	Flexible prototyping	Key feature evaluation	Sense, connect, move, power, translate	STAR OTTO
Connectors	Arduino ST morpho	Arduino (*) ST	Arduino	Arduino
mbed-enabled	Yes	Yes(*)	Yes(*)	No
Price (**)	\$10 to \$23	\$8 to \$50	< \$35	\$88
Website	www.st.com/stm32nucleo	www.st.com/stm32discovery	www.st.com/x-nucleo	www.arduino.org

(*) On selected boards

(**) Recommended

Evaluation boards



STM32 NUCLEO EXPANSION BOARDS

Few examples among a broad portfolio, available at www.st.com/x-nucleo

Bluetooth
low energy



X-NUCLEO-IDB05A1

LoRa™ networking



P-NUCLEO-LRWAN1
(Pack ST and Semtech)

Motor control



X-NUCLEO-IM01A1

Motion &
Environmental
Sensing



X-NUCLEO-INS01A1

Proximity, gesture
and ambient light



X-NUCLEO-53L0A1

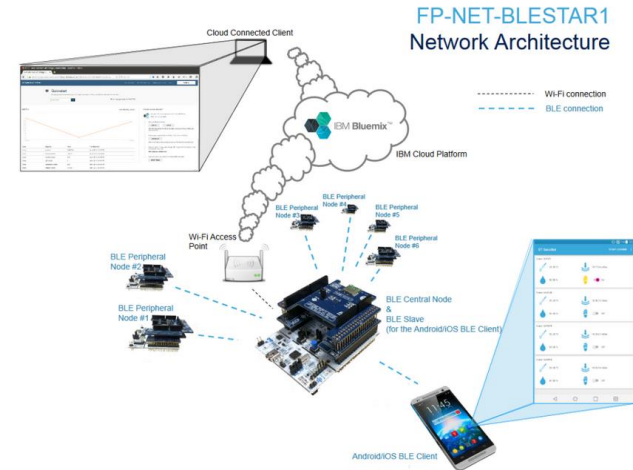
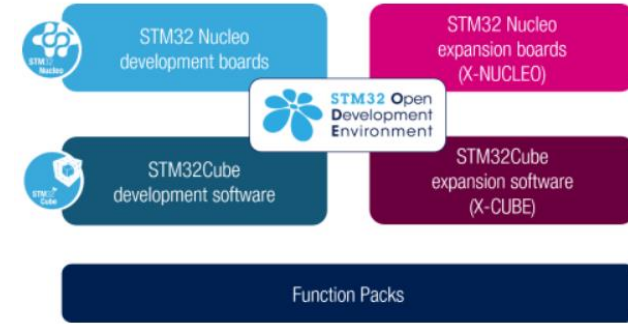
STM32 - ODE - Open Development Environment

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.

The STM32 ODE includes the following five elements:

- **STM32 Nucleo** development boards. A comprehensive range of affordable development boards for all STM32 microcontroller series, with unlimited unified expansion capability, and with integrated debugger/programmer
- **STM32 Nucleo expansion boards.** Boards with additional functionality to add sensing, control, connectivity, power, audio or other functions as needed. The expansion boards are plugged on top of the STM32 Nucleo development boards. More complex functionalities can be achieved by stacking additional expansion boards
- **STM32Cube software.** A set of free-of-charge tools and embedded software bricks to enable fast and easy development on the STM32, including a Hardware Abstraction Layer, middleware and the STM32CubeMX PC-based configurator and code generator
- **STM32Cube expansion software.** Expansion software provided free of charge for use with STM32 Nucleo expansion boards, and compatible with the STM32Cube software framework
- **STM32 ODE Function Packs.** Set of function examples for some of the most common application cases built by leveraging the modularity and interoperability of STM32 Nucleo development boards and expansions, with STM32Cube software and expansions.



STM32 - Low cost emulator

The **ST-LINK/V2** is an **in-circuit debugger** and **programmer** for the **STM8** and **STM32** microcontroller families. The single wire interface module (**SWIM**) and **JTAG**/serial wire debugging (**SWD**) interfaces are used to communicate with any STM8 or STM32 microcontroller located on an application board.

In addition to provide the same functionalities as the **ST-LINK/V2**, the **ST-LINK/V2-ISOL** features digital isolation between the PC and the target application board. It also withstands voltages of up to 1000 Vrms.

STM32 applications use the USB full-speed interface to communicate with **Atollic®**, **IAR™**, **Keil®**, **AC6** and **TASKING** integrated development environments.



STLINK-v3MINI

STLINK-v3

STM32 - STM STUDIO

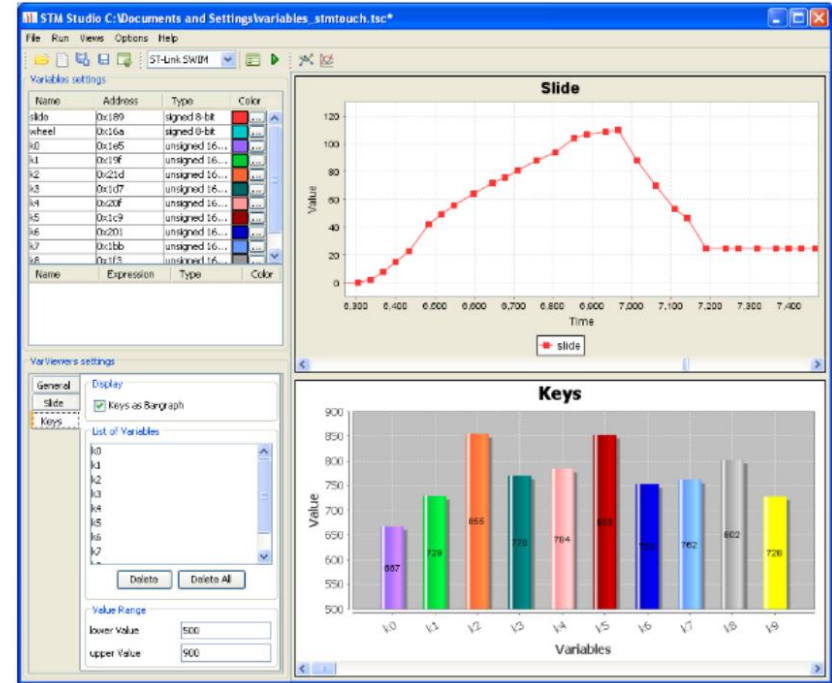
STM **Studio** helps **debug** and **diagnose** STM32 applications while they are running by **reading** and **displaying** their **variables** in **real-time**.

Running on a PC, STM Studio interfaces with STM32 MCUs via the standard ST-LINK development tools.

STM Studio is a **non-intrusive tool**, preserving the real-time behavior of applications.

STM Studio perfectly complements traditional debugging tools to fine tune applications. It is well suited for debugging applications which cannot be stopped, such as motor control applications.

Different graphic views are available to match the needs of debugging and diagnosis or to demonstrate application behavior.



The diagram illustrates the STM32CubeMX software stack architecture, organized into layers and components:

- Operating Systems:** Windows and macOS are shown at the top, with a penguin icon representing Linux/macOS.
- Initialization code:** A central layer connecting the OS to the embedded software.
- Embedded software for STM32:** The core layer, which includes:
 - Examples and demos
 - Middleware components
 - Hardware abstraction layer
- Hardware:** Represented by a microcontroller chip icon on the left and a list of processor models on the right: F0, F1, F3, F2, F4, F7, H7, L0, L1, and L4.
- STM32Cube and STM32 Logos:** The STM32Cube logo (a blue circle with a white cube) and the STM32 logo (a blue circle with a white butterfly) are positioned on the right side of the diagram.

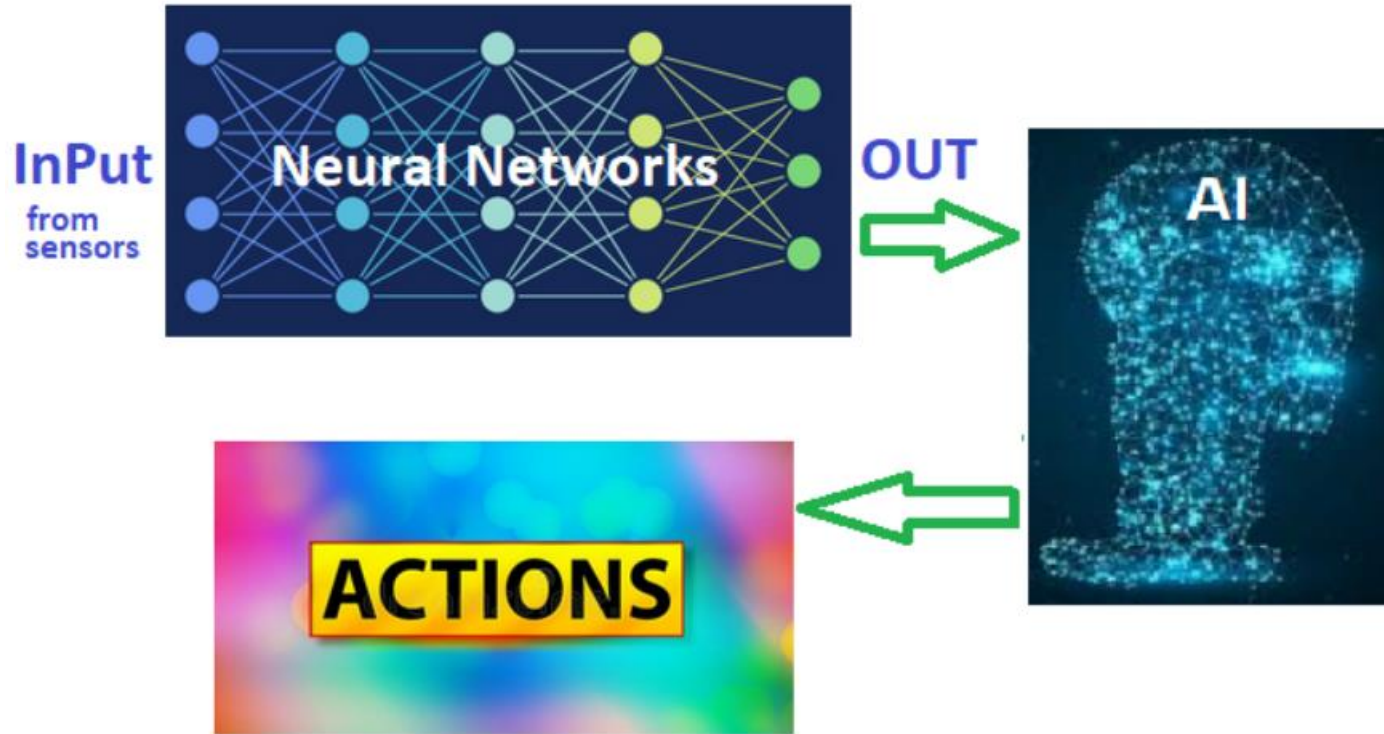
macOS® is a trademark of Apple Inc., registered in the U.S. and other countries.

macOS® is a trademark of Apple Inc., registered in the U.S. and other countries.

-



STM32 - Neural Networks, AI, Machine Learning & Predictive maintenance



See [here](#)



STM32 Education

Bring your STM32 project to life with the free educational resources created by STM.

Learn at your own pace, watch classes on your own schedule, anytime, anywhere, on any device, or join one of our live learning sessions led by our experts, close to you (trainings, tutorials, books, videos and much more).



Online training



MOOC (Massive Open Online Courses)



Videos



Webinar



Textbooks



ST training courses



Partner training courses



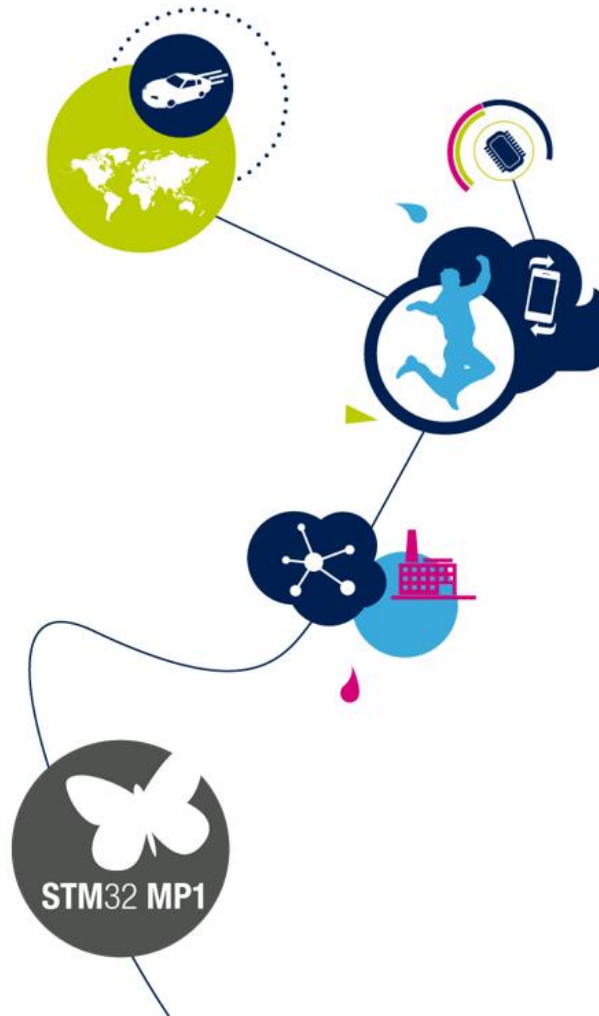
Free C IDE - Compiler

Up to now there is a lot of IDE (Compiler and Debugger) for the Cortex Mx, here there is a little list of the principal free IDE that are used for develop on the STM32.

- [ATOLLIC](#) is now free
- [KEIL](#) is free for STM32L0xx (Cortex M0+) and STM32F0xx (Cortex M0).
For other STM32 it is free up to **32K** of exe.
- [emIDE](#)
- [mBED](#) is free ARM compiler
- Now is possible use some STM32 in the **ARDUINO IDE**.
For more info see [this tutorial](#)



MPU – STM32MPx



MPU – STM32MPx

- **STM32MP1** microprocessor series with **dual** Arm® Cortex®-A7 (**650MHz - 2470 DMIPS** with 2 A7) and Cortex®-M4 (**209MHz - 260 DMIPS**) Cores.
- Mainlined open-source **Linux** distribution with **Android** support available via partners
- **STM32Cube** firmware and embedded software libraries for Cortex-**M4** core
- An optional **3D graphics processing unit (GPU - 533MHz)** provides for advanced **HMI** development
- **Rich set of digital and analog peripherals**
- Advanced security features
- **Optimized bill of materials (BOM)** thanks to: High integration, packages compatible with low-cost PCB technologies (down to **4-layer** plated-through hole (PTH) PCBs) and dedicated Power Management IC (**PMIC**)



EMCU.EU

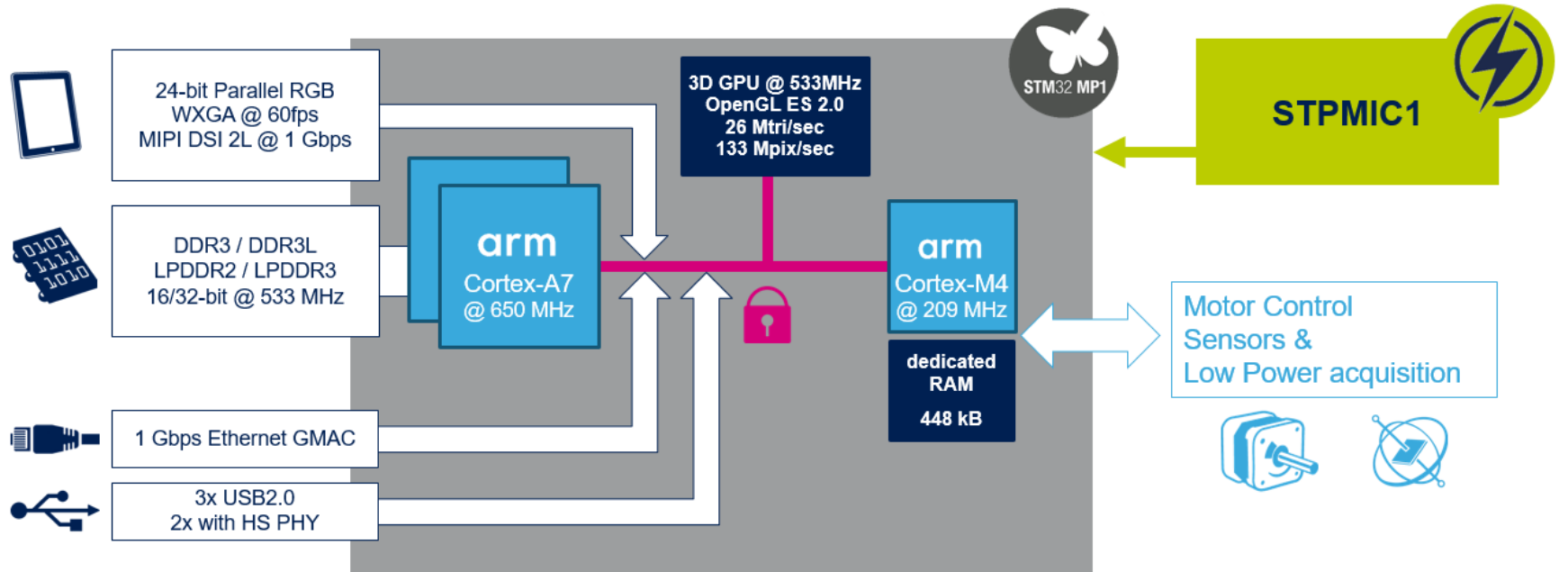
EUROPEAN MONETARY COOPERATION UNIT



STM32MP1 - Cortex-A + Cortex-M Architecture

High speed I/F & processing

Real-time



STM32MP1 - A Fully Integrated Design Suite

arm
Cortex-A7



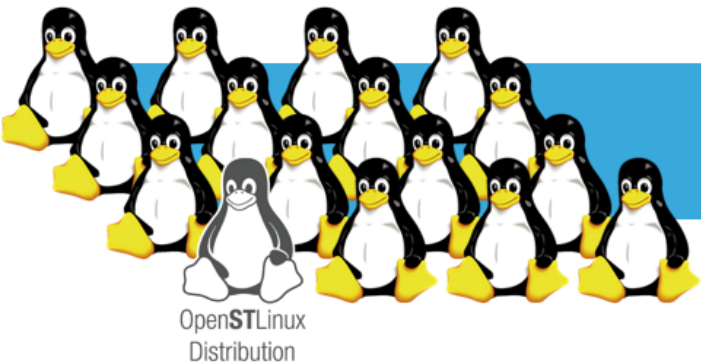
arm
Cortex-M4

STM32MP1 Embedded Software Distribution



STM32MP1 - Simplify your Linux Development

Fully mainlined open source Linux distribution for Arm Cortex-A7



STM32MP1 SoC drivers
already adopted by the Linux community

STM32MP1 supported in Linux 4.19 LTS

Fully compliant
with
open-source
standards



yocto
PROJECT



Pre-integrated
Secure OS



OP-TEE
.org



STM32MP1 - EvaBoards

Speed-up evaluation, prototyping and design



Available at
\$399



Available at
\$99

Available at
\$69



Evaluation Board

Full feature STM32MP1 evaluation

- STM32MP157A-EV1
- STM32MP157C-EV1

Discovery Board

Flexible prototyping & demo

- STM32MP157A-DK1
- STM32MP157C-DK2
 - + MIPI DSI WVGA display
 - + Wi-Fi/BT combo module

Boards & SoM*s

3rd Parties Boards for prototyping and production

- Board Specification from Linaro (96boards.org)
- Commercial SoM w/ different forms



STM32MP1 - Software, Training and Services

a Broad Ecosystem to Support Development



ST's **wiki** user guide
for beginners and experts

<https://wiki.st.com/stm32mpu>

Large selection of partners
already engaged for:

- Graphics UI
- Security
- Training and services



STM32MP1 - Links

The screenshot shows the STM32 MPU wiki by STMicroelectronics. The header includes the ST logo and a search bar. The main navigation bar has links for Welcome, Reading tips, Getting started, Development zone, and Legal notice. A sidebar on the left contains links for Main page and Glossary. The main content area displays the 'Welcome' page, which includes a green banner stating 'Approved version. Approved on: 14.22, 18 February 2019'. Below this, the text 'Welcome' is followed by five stars and '(0)'. The ST logo and the text 'STM32 MPU wiki by STMicroelectronics' are prominently displayed. A large heading reads 'Welcome to the STM32 Arm® Cortex®-based MPUs user guide!'. The text explains that the user guide aims to assist developers in using STM32 MPUs microprocessor devices from STMicroelectronics, starting with the STM32MP1 series. It also mentions that the guide contains many articles to discover the STM32MP1 series and associated ecosystems (STM32 boards, embedded software, development tools, trace & debug tools...). A diagram on the right shows a central circle with the ST logo and 'STM32 MP1' text, connected to a network of icons representing various development tools and ecosystems.

STM32 MPU wiki by

Search

Welcome Reading tips Getting started Development zone Legal notice

Approved version. Approved on: 14.22, 18 February 2019

Page 55 days, 17 hours and 21 minutes - ⌂ ☆


Welcome ★★★★★ (0)

STM32 MPU wiki by

Welcome to the STM32 Arm® Cortex®-based MPUs user guide!

This user guide aims at assisting developers to use STM32 MPUs microprocessor devices from STMicroelectronics, starting with the **STM32MP1 series**.^[1]

It contains many articles to discover the **STM32MP1 series** and associated **ecosystems** (STM32 boards, embedded software, development tools, trace & debug tools...).



See [here](#)

MEMS & Sensors



MEMS & Sensors

Accelerometers



Advanced power-saving features that make them the ideal choice for ultra-low-power applications.

Automotive sensors



Include digital accelerometers with low and high g full scale, and digital 3-axis gyroscopes.

Gyroscopes



Analog and digital gyroscopes offer superior stability over time and temperature.

e-Compasses



Include embedded self-test and smart power functionalities to minimize current consumption.

Humidity sensors



A planar capacitance technology that integrates humidity & temp. sensors in the sensing element.

Industrial sensors



A broad range of sensors offer the high-performance, accuracy, calibration, size and temperature range required for industrial design.

iNEMO inertial modules



Offer more compact, robust, and easy-to-assemble solutions compared to discrete MEMS products.

MEMS microphones



For all audio applications where small size, high sound quality, reliability & affordability are required.

Pressure sensors



Innovative MEMS techno to provide extremely high pressure resolution, in ultra-compact & thin packages.

Proximity sensors



FlightSense technology can be used in a host of application areas where accurate ranging is required.

Temperature sensors



Use in a wide range of applications: industrial, consumer, medical and computer market segments.

T-Plus MEMS sensors



Temperature sensors with embedded MEMS motion and environmental sensor ICs.

MEMS & Sensors



Industrial 10 Years Longevity Roadmap

Industrial 10 Years Longevity Roadmap

Axel

IIS2DH
2x2 LGA 12

Compact, 3-axis digital
Low Power axel
FS $\pm 2/\pm 4/\pm 8/\pm 16g$

IIS328DQ
4x4 QFN 24

High performance, 3-axis digital,
Extended temperature range
axel
FS $\pm 2/\pm 4/\pm 8g$

Gyro

I3G4250D
4x4 LGA 16

High performance, 3-axis digital
Gyroscope
FS $\pm 245/\pm 500/\pm 2000$ dps

IMU

IIS3DHHC
5x5 CLGA 16

High performance
Inclinometer
3-axis digital
FS $\pm 2.5g$

NEW Top
Selling
Product

ISM330DLC
2.5x3 LGA 14

**First 6-axis IMU on the market
with 10y committed longevity**
Ultra low power, smart features
3-axis axel FS $\pm 2/\pm 4/\pm 8/\pm 16g$
3-axis gyro FS $\pm 125 \rightarrow \pm 2000$ dps

Sample
available

IIS2MDC
2x2 LGA 12

Stand alone,
3-axis digital
magnetometer
FS $\pm 50Ga$

ISM303DAC
2x2 LGA 12

**First eCompass on the market
with 10y committed longevity**
3-axis magnetometer FS $\pm 50Ga$
3-axis axel FS $\pm 16g$

Mag & eCompass

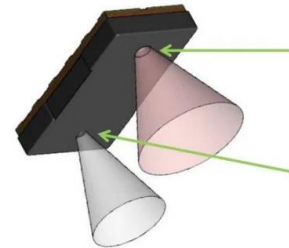
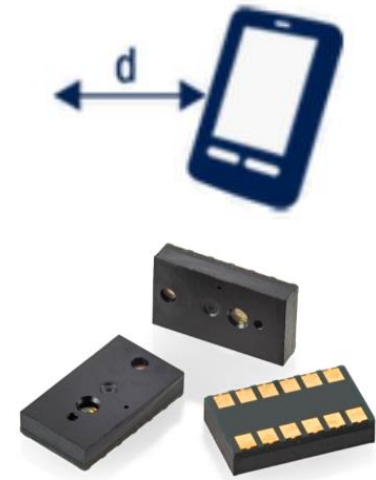


MEMS & Sensors - Proximity



STM has developed and patented its own technology, called **FlightSense™**, using **Time-of-Flight** (ToF) principle in order to propose new generation of high-accuracy **proximity** sensors. FlightSense™ technology based products are packaged in a module that integrates the proximity sensor **Single Photon Avalanche Diode** (SPAD) array, **Ambient Light Sensor** (ALS) as well as the **Vertical Cavity Surface-Emitting Laser** (VCSEL) used by the proximity sensor feature, thus greatly easing the product integration.

- See [this video for TOF technology](#)
- See [this video for Calibration-Free Dirty Environment Cover Glass Solution](#)
- [ST Developers Conference: Time-of-Flight Sensors](#)



VCSEL - Emitter:
Vertical Cavity, Surface Emitting Laser

SPAD - Receiver:
Single Photon Avalanche Diode
IR notch filter



MEMS & Sensors – Proximity - Products

VL6180X – Proximity sensor, gesture and ambient light sensing (ALS) module (**10...40**cm detection range)

VL53L0X – World smallest Time-of-Flight (ToF) ranging sensor (**200**cm detection range)

VL53L1 – New generation Time-of-Flight Ranging sensor with advanced multi-zone and multi-object detection (**400**cm+ detection range)

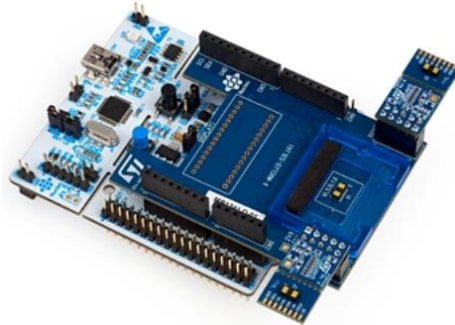
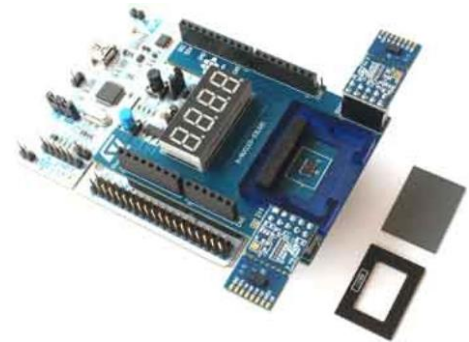
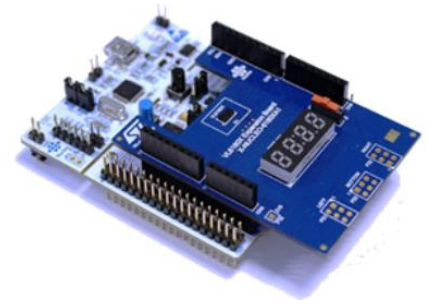


MEMS & Sensors – Proximity - EvaBoards

P-NUCLEO-6180X1 - for VL6180X (**10...40cm** detection range)

P-NUCLEO-53L0A1 - for VL53L0X (**200cm** detection range)

P-NUCLEO-53L1A1 - for VL53L1X (**400cm** detection range)



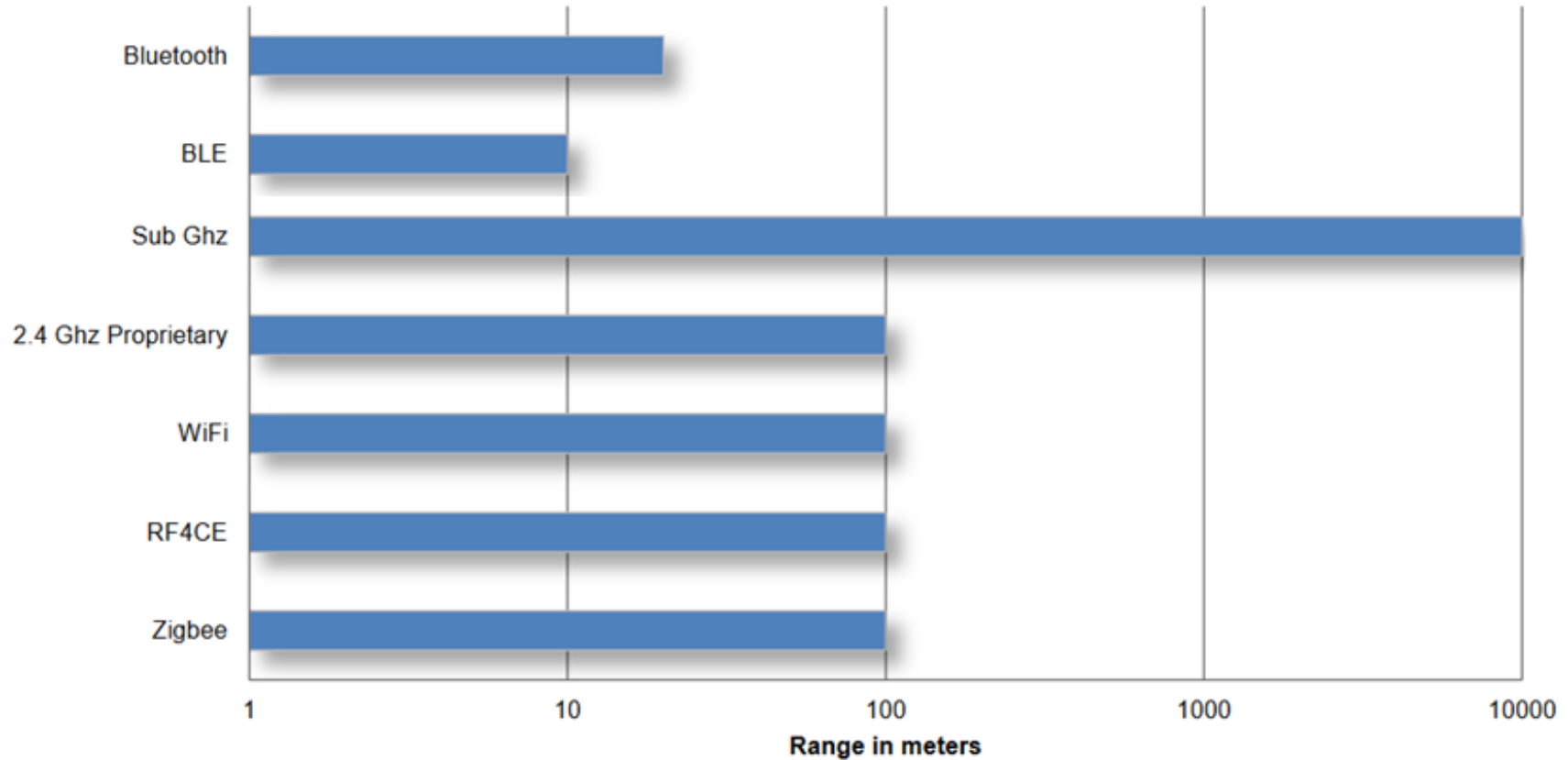
Wireless



Frequencies

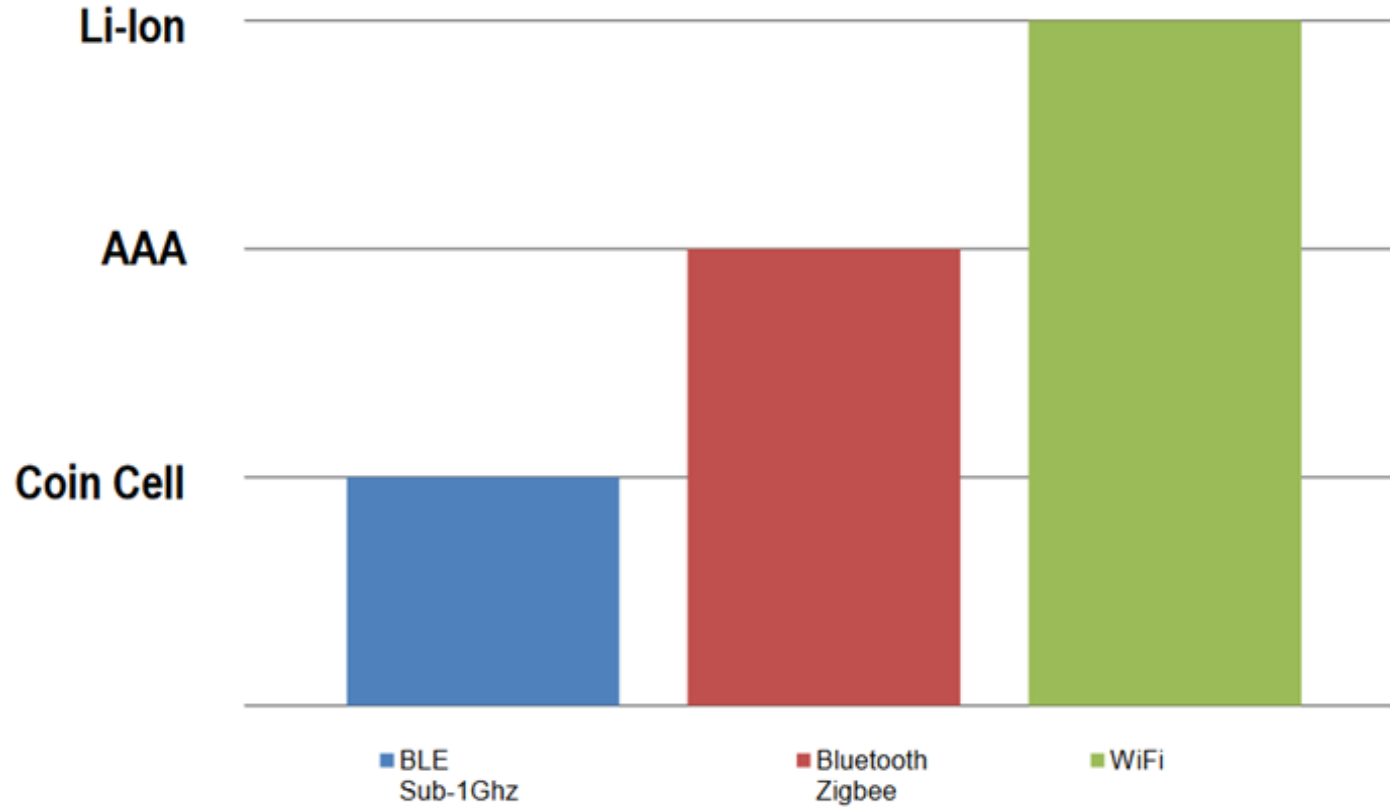
Sub 1Ghz	2.4Ghz to 5Ghz		
W-Mbus 6LoWPan	ZigBee 6LoWPAN RF4CE	Bluetooth BLE	Wi-Fi
			

Wireless





Wireless



Wireless - STM proposal

- **Sub1Ghz**
- **BLE**
- **ZigBee**



Wireless – Sub1Ghz

STM sub-1GHz solutions includes transmitters, transceivers and modules supporting a host of different applications in home and building automation (Smart Home and Smart City) as well as industrial process control (Smart Factory) and automated metering infrastructures (Smart Grid) or, more broadly, for the Internet of Things (IoT).

They support network operated in the license-free ISM and SRD frequency bands at **169, 315, 433, 512, 868,** and **915** MHz and several modulation schemes such as 2(G)FSK, 4(G)FSK, OOK and ASK.

STM transceivers also support advanced technologies such as frequency hopping, auto-acknowledgment and antenna diversity to secure error-free data transmission even in harsh-environmental or challenging-logistical conditions.

STM Sub-1GHz **modules**, operating in IMS and SMD band, are based on our transceivers and are equipped with antenna, xtal and balun. They provide a ready to use solution, fully RF, ETSI, IC and FCC certified, that helps minimize time to volume.

STM ICs and module are supported by an extensive set of evaluation boards, software, firmware and application notes.



Wireless – Sub1Ghz - components

- S2-LP - transceiver (TX/RX)
- SPIRIT1 - transceiver (TX/RX)
- STS1TX - transmitter (TX only)
- **STM32WL** - STM32 + transceiver (TX/RX) in a single component coming soon



Wireless – Sub1Ghz - modules

SPSGRFC – available at 433, 868 or 915 MHz – (UFL connector for external antenna + SPIRIT1)

SPSGRF – available at 868 or at 915 MHz – (Antenna + SPIRIT1)



Wireless – Sub1Ghz – S2-LP

S2-LP – transceiver (TX/RX)

Band: **433**, **868** and **915/920** MHz

Modulation: **2(G)FSK**, **4(G)FSK**, **OOK**, **ASK** and max **+16** dBm.

Consumption: **7** mA **RX** and **10** mA **TX** @ **+10** dBm

Ready for: **Sigfox**, **Wireless M-Bus**, **6LowPAN**, **ENOCLEAN** and **IEEE 802.15.4g** networking connectivity, simplifying the design of **IoT** applications and enabling remote sensors to directly connect to the cloud without the need for a local gateway.



Wireless – Sub1Ghz – S2-LP

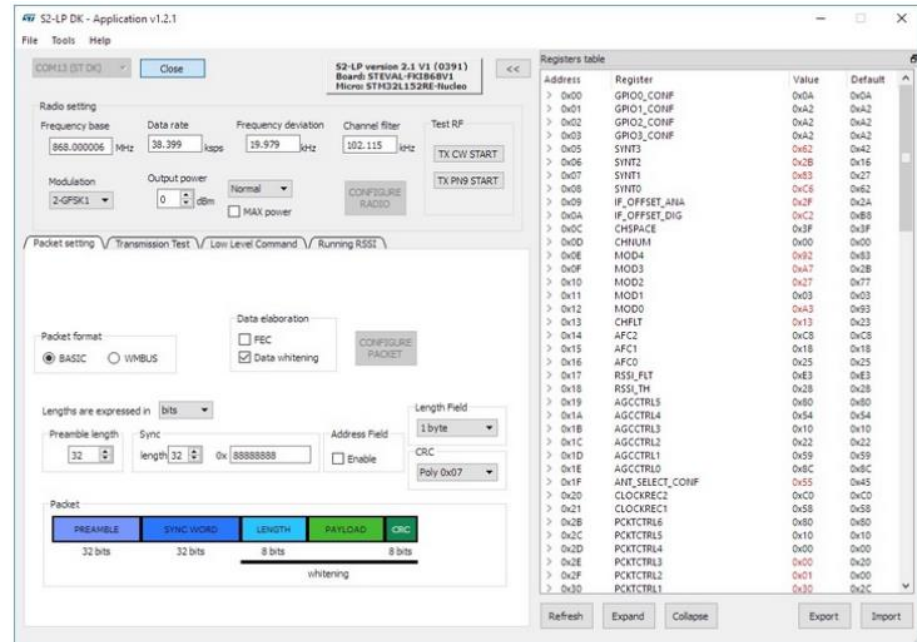


The evaboard is:

- **STEVAL-FKI868V2** – Sub-1GHz transceiver development kit based on S2-LP

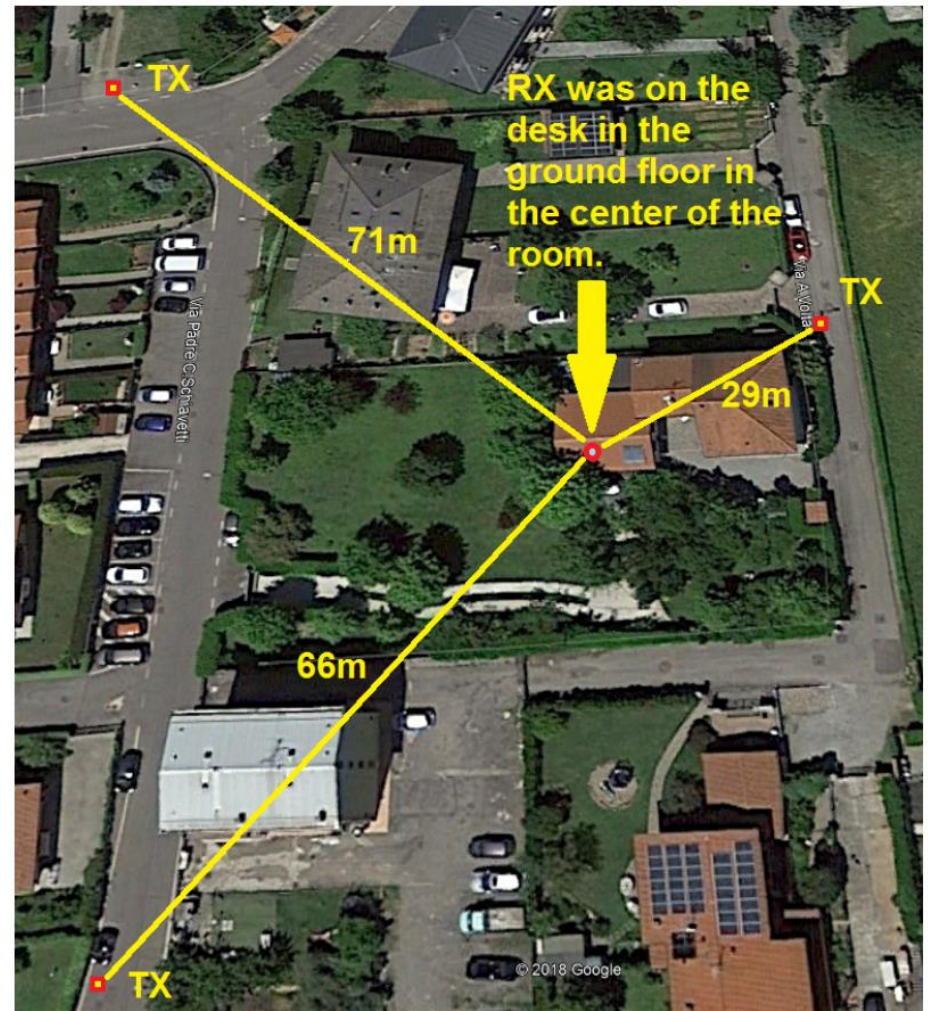
STSW-S2LP-DK – Evaluation SW package based on **S2-LP**

STSW-S2LP-SFX-DK – Evaluation SW package for **SigFox** based on S2-LP

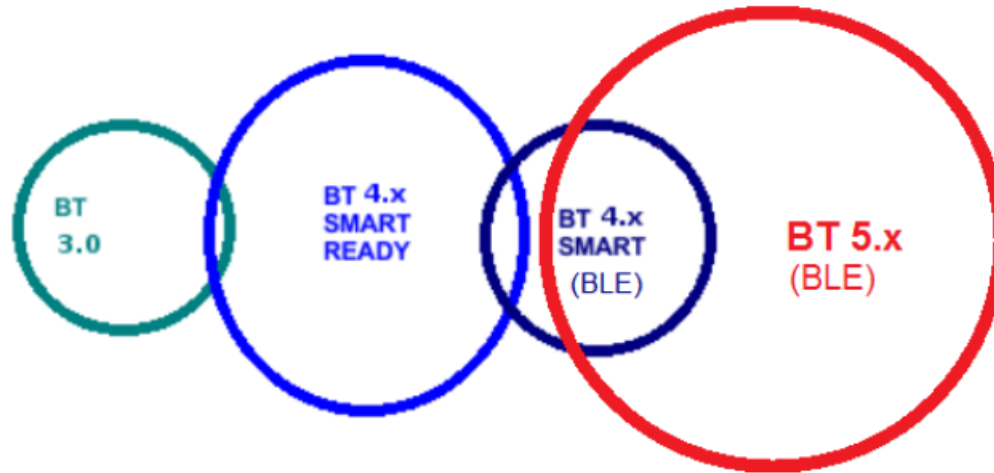


Wireless – Sub1Ghz – S2-LP

P2P based on S2-LP (STEVAL-FKI868V1) and NUCLEO-L053R8



Wireless – BLE



Wireless – BLE - Components

BlueNRG-1 Bluetooth Low Energy System On Chip (BTLE v.4.2)

The BlueNRG-1 extends the features of award-winning BlueNRG network processor, enabling the usage of the embedded Cortex M0 for running the user application code.

BlueNRG-2 – Bluetooth Low Energy System On Chip (v.4.2 and compliance with Bluetooth smart v5.0)

The BlueNRG-1 extends the features of award-winning BlueNRG network processor, enabling the usage of the embedded Cortex M0 for running the user application code.

STM32WB – Bluetooth 5.0 + ZigBee + IEEE 802.15.4 + STM32 core + ...



Wireless – BLE - module



LEGACY PORTFOLIO	UPCOMING PORTFOLIO
	5.0 BlueNRG-M2SP 7dBm
4.2 SPBTLE-1S 4 dBm	5.0 BlueNRG-M2SA 5 dBm
4.1 SPBTLE-RF 4 dBm	4.2 BlueNRG-M0A 6 dBm
4.1 SPBTLE-RF0 4dBm	4.2 BlueNRG-M0L 6 dBm

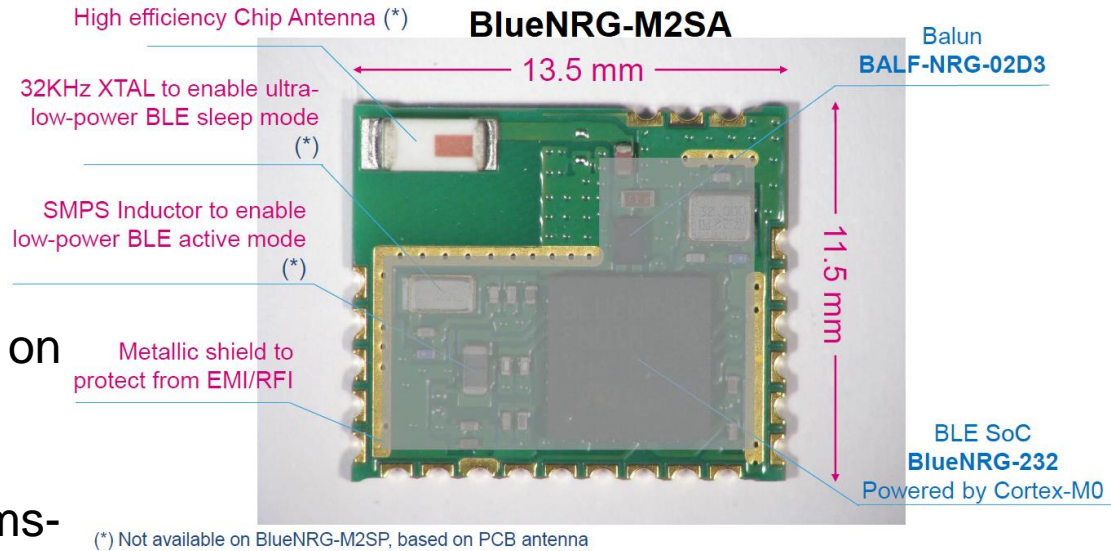


Wireless – BLE - module

BlueNRG-M2xx BlueNRG-M0xx

STSW-BLUENRG1-DK -

evaluation SW package is based on the BlueNRG-1 and BlueNRG-2 very low power Bluetooth low energy (BLE) single-mode systems-on-chip with 160 KB and 256 KB of Flash memory, respectively, 24 KB of RAM, 32-bit core ARM® Cortex®-M0 and ADC, GPIOs, I²C, RTC, SPI, Timers, UART, WDG and RTC peripherals.



Wireless – BLE – module – Eva Boards



STEVAL-IDB008V1M
BlueNRG-M2SA

Availability on st.com in Q1' 20.
Contact ST for evaluation prior this date

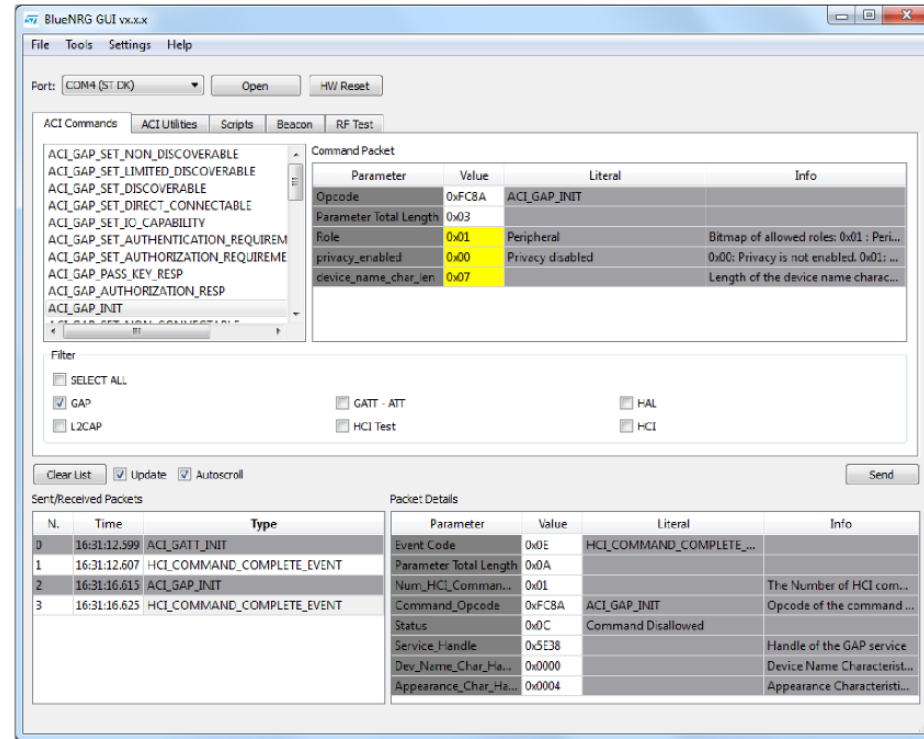


X-NUCLEO-BNRG2A1
BlueNRG-M2SP

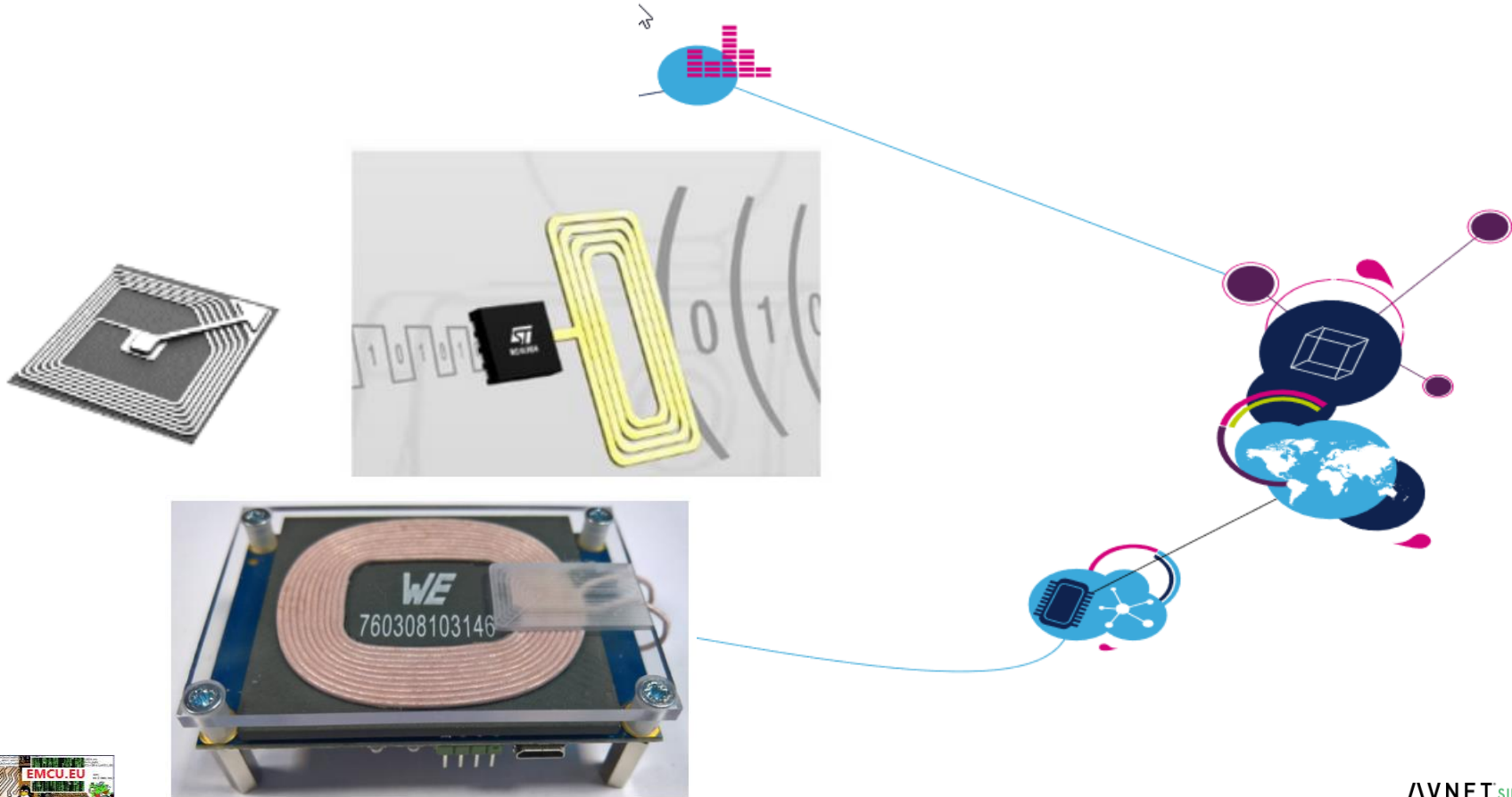
Availability Q4' 19

Wireless – BLE - module - GUI

STSW-BNRGUI - software package consists of a graphical user interface (GUI) PC application that can be used to interact and evaluate the capabilities both of the BlueNRG and BlueNRG-MS Bluetooth low energy network processors, which are low power Bluetooth® Smart ICs, compliant with the Bluetooth® specifications. It also supports the BlueNRG-1 and BlueNRG-2 Bluetooth low energy systems-on-chip: low power Bluetooth® smart ICs that are compliant with the Bluetooth® specification, both in master and slave roles.



NFC, RFID, Harvesting



NFC, RFID, Harvesting

Near-Field Communication (NFC) Radio Frequency Identification (RFID)



	RFID LF	NFC & RFID HF 	RFID UHF 
Coupling mode	Inductive	Inductive	Electro-magnetic backscatter
Operating frequency	125kHz – 134kHz	13.56MHz	860MHz – 960MHz
Antenna	Coil	Coil	Dipole
Max operating distance	up to 1m	Vicinity: <1.5m Proximity: <10cm	~10m
Regulation	Worldwide harmonized	Worldwide harmonized	Different regulations per country
Standards	ISO14223 ISO18000-2	ISO14443 A/B ISO15693 ISO18092 ISO18000-3 NFC Forum	ISO18000-6 B/C EPC Class 1 Gen 2
Environmental influences	Small influence on operating distance Works in metal and industrial environment	Small influence on operating distance Works in metal and industrial environment	Influence on operating distance by reflection and absorption (metal and liquids)
Applications	Animal tagging	Product identification Public transport / Libraries Access control	Pallets and container ID Retail / Logistics Authentication



NFC, RFID, Harvesting



- **M24SR** series: **ISO14443-A** NFC forum **type 4** dynamic tag designed for consumer electronics, wearable, home appliances and more.

- **M24LR** series: **ISO15693** dynamic tag optimized for industrial, metering, healthcare, medical equipment and more.

*Capable of **energy harvesting**.*

- **ST25DV** series: **ISO15693** NFC forum **type 5** dynamic tag suited for consumer electronics, industrial, metering, electronic shelf labels IoT objects and more.

*Capable of **energy harvesting**.*

ST25DVxx is pin to pin compatible with the M24LExx.

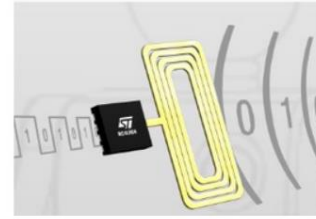
Ideal for industrial, consumer and IoT applications.

- **ST25TA** series: **ISO14443-A** NFC forum tag **type 4**. Ideal for wireless pairing (WiFi, BLE) and product identification, features counters, data protection (password), and able to wake-up the host chip thanks to a general purpose output.

- **ST25R** reader series: provides multiprotocol support for 13.56 MHz NFC / RFID communications as **ISO14443** Type **A** or **B**, **ISO15693**, **ISO18092**, **FeliCa** and **NFC Forum protocols**.



NFC, RFID, Harvesting



One of the suggested kit for test the NFC is:
X-NUCLEO-NFC04A1 + NUCLEO-L053R8

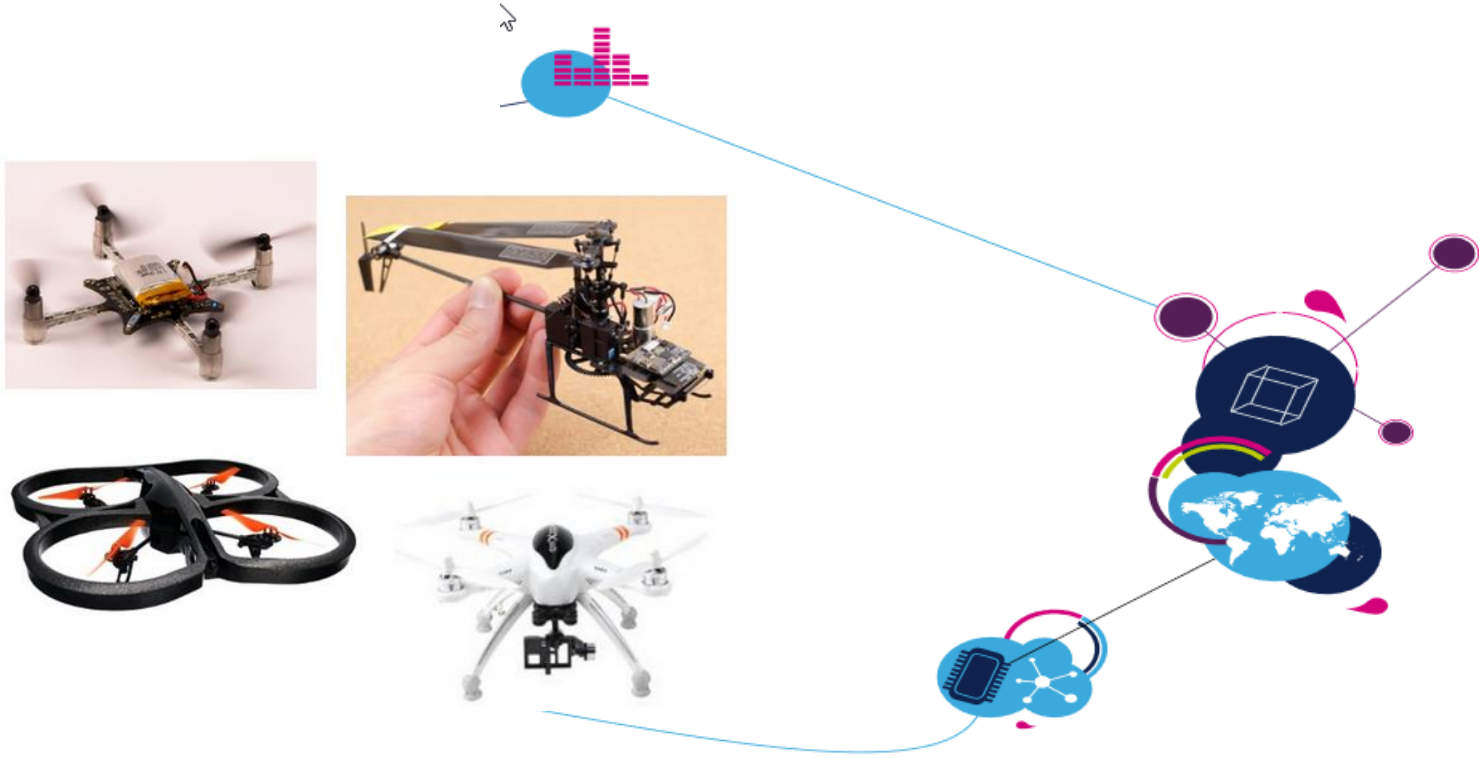


NFC, RFID, Harvesting (wireless battery charger)

EVALSTWBC-EP is a wireless battery charger TX evaluation kit based on the STWBC including EVALSTWBC-EP demo-board and EVALWBCDNGV1 USB-UART dongle, designed for charging devices such as smartphones or tablets where high power levels are required. The evaluation board supports wireless battery charging of **Qi-compliant** devices up to **15W**. It also supports proprietary fast charging modes up to **10W**.

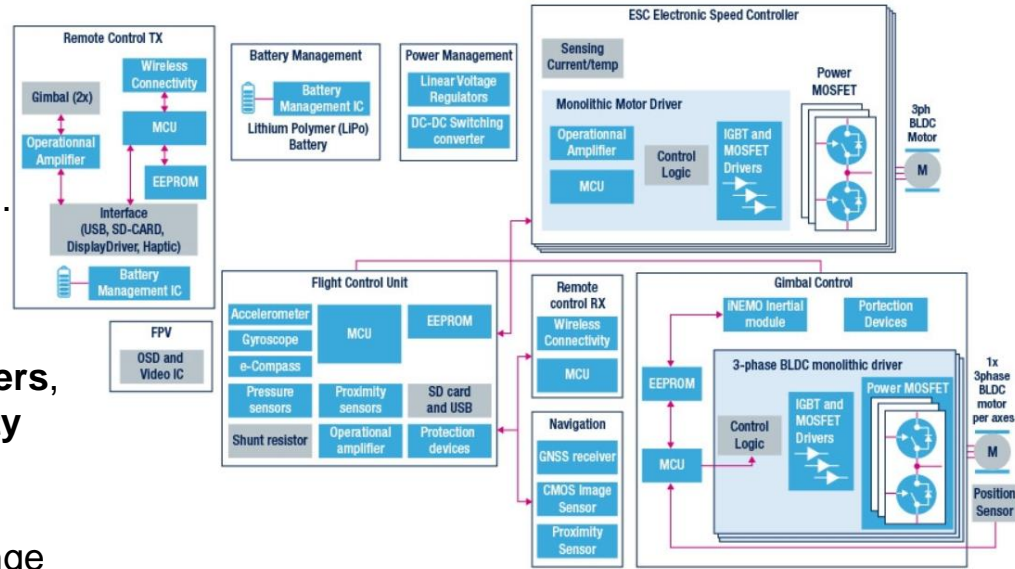


DRONES & STM32



DRONEs & STM32 - Drones & STM electronic components

- STM offers solutions covering the full Bill of Materials (**BOM**) for drones.
- STM microcontrollers are market leader in **UAV** applications and are compatible with most of the open source firmware for both Electronic Speed Controllers (**ESC**) and Flight Control Units (**FCU**).
- STM **sensors** support key functions such **flight stabilization**, **altitude control**, **obstacle avoidance** and **autonomous navigation**.
- STM also offer **motor control**, precision **amplifiers**, **battery management systems** and **connectivity** solutions to complete any drone design.
- STM **design tools** and **development boards** support creators in optimizing any design challenge and our online community is an appreciated resource for the students, hobbyists and professionals.
- For more details see [here](#) and see also [this](#) presentation.



DRONEs & STM32

ST BLE DRONE	ACTIVE	Embedded Software	Wireless Connectivity Software	Drone remote controller app for Android
STEVAL-DRONE01	ACTIVE	Evaluation Tools	Solution Evaluation Tools	Mini drone kit with flight controller unit, motors, propellers, frame and battery
STEVAL-ESC001V1	ACTIVE	Evaluation Tools	Solution Evaluation Tools	ESC - electronic speed controller reference design for drones
STEVAL-FCU001V1	ACTIVE	Evaluation Tools	Solution Evaluation Tools	Flight controller unit evaluation board for toy drones
STEVAL-GMBL02V1	ACTIVE	Evaluation Tools	Solution Evaluation Tools	Reference design kit for Gimbal controller for drones and handheld applications
STSW-FCU001	ACTIVE	Embedded Software	Evaluation Tool Software	Reference design firmware for mini drones
STSW-GMBL02V1	ACTIVE	Embedded Software	Evaluation Tool Software	Gimbal controller firmware and GUI for drones and handheld applications



The **Teseo-LIV3F** module is an easy to use **Global Navigation Satellite System** (GNSS) standalone module, embedding Teseo3 single die standalone positioning receiver **IC working simultaneously on multiple constellations** (GPS/Galileo/Glonass/BeiDou/QZSS).

Key Features

- Simultaneously multiconstellation
- 163 dBm navigation sensitivity
- 1.5 m CEP accuracy positioning
- 16 Mbit embedded Flash for data logging and FW upgrade
- 2.1 V to 4.3 V supply voltage range
- Tiny LCC 18 pin package (9.7×10.1)
- Operating temperature (-40°, 85°C)
- Free FW configuration
- 17 μ W standby current and 75 mW tracking power consumption



The Eva board is: X-NUCLEO-GNSS1A1

For more info see [here](#)



24 GHz Radar

Short- and mid-range radars (SRR) in the 24-GHz frequency band are used to analyze the ...

77 GHz Radar

77 GHz radars enhances automotive safety by enabling vehicles to identify dangerous...

If you need more info we propose to organize a conf.call with the automotive division.



Support

The support is divided in three levels that are:

- **AVNET-SILICA** local **FAE** (8) & **Specialist** (4)
- **STM** local **FAE**
- **STM central digital support team** (T.O.M.A.S.) based in Prague
- **STM central wireless support team** based in France
rf-support-emea@st.com



Links

- [EMCU.EU](#)
- [CUBE & STM32 Library](#)
- [STM Studio](#)
- [ST-LINK](#) (low cost emulator/programmer)
- [What should I use to develop on STM32](#)
- [Suggested KIT for developing on STM32](#)
- [STM32 Education](#)
- [ODE](#) (Open Development Environment)
- STM32 [evaluation boards](#)
- STM32 [10 years longevity](#)
- [Support](#)
- [Seminars & Training](#)
- [MCU Design Consultants directory](#)





Thank you!