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Introducing STM32U5, the flagship of ultra-low-power MCUs

STM32

STM32 MCUs and MPUs portfolio

MPU

STM32MP1
4158 CoreMark
Up to 800 MHz Cortex-A7
209 MHz Cortex-M4

High Perf MCUs

STM32F2	STM32F4	STM32F7	STM32H7
Up to 398 CoreMark 120 MHz Cortex-M3	Up to 608 CoreMark 180 MHz Cortex-M4	1082 CoreMark 216 MHz Cortex-M7	Up to 3224 CoreMark Up to 550 MHz Cortex -M7 240 MHz Cortex -M4

Mainstream MCUs

STM32F0	STM32G0	STM32F1	STM32F3	STM32G4
106 CoreMark 48 MHz Cortex-M0	142 CoreMark 64 MHz Cortex-M0+	177 CoreMark 72 MHz Cortex-M3	245 CoreMark 72 MHz Cortex-M4	569 CoreMark 170 MHz Cortex-M4

Mixed-signal MCUs

Ultra-low Power MCUs

STM32L0	STM32L1	STM32L4	STM32L4+	STM32L5	STM32U5
75 CoreMark 32 MHz Cortex-M0+	93 CoreMark 32 MHz Cortex-M3	273 CoreMark 80 MHz Cortex-M4	409 CoreMark 120 MHz Cortex-M4	443 CoreMark 110 MHz Cortex-M33	651 CoreMark 160 MHz Cortex-M33

Wireless MCUs

STM32WL	STM32WB
162 CoreMark 48 MHz Cortex-M4 48 MHz Cortex-M0+	216 CoreMark 64 MHz Cortex-M4 32 MHz Cortex-M0+ ●

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Latest product generation ● Radio co-processor only

Applications are more and more demanding!

more autonomy

more integration

more security

Application examples:

- Gas and water meter
- Fitness band
- Medical monitoring devices
- POS

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Continuing our leadership in ultra-low-power MCUs

2021

STM32**U5**

First ultra-low-power STM32
with **40 nm technology**

2020	**2 billion ultra-low-power STM32s shipped**	
2019	STM32**L5**	**Introduction of M33**, excellence in ultra-low-power **with certified security**
2017	STM32**L4+**	Ultra-low-power excellence with **more performance**
2015	STM32**L4**	**Leadership** ultra-low-power Cortex-M4 **(#1 ULP 447 ULPBench™)** MCUs
2014	STM32**L0**	**Entry cost** ultra-low-power MCU
2009	STM32**L1**	**World 1st Cortex-M** ultra-low-power MCU

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Enabling key new features for embedded developers

Lower power consumption

New power management

LPBAM*, DMA and IP autonomous in LP mode

Higher security

AES and PKA, side attack resistant

Higher level of safety

ECC on Flash and SRAM

Improved data storage

100 kcycles for 512 kB of Flash

Better accuracy

ADC 14-bit

* Low Power Background Autonomous Mode

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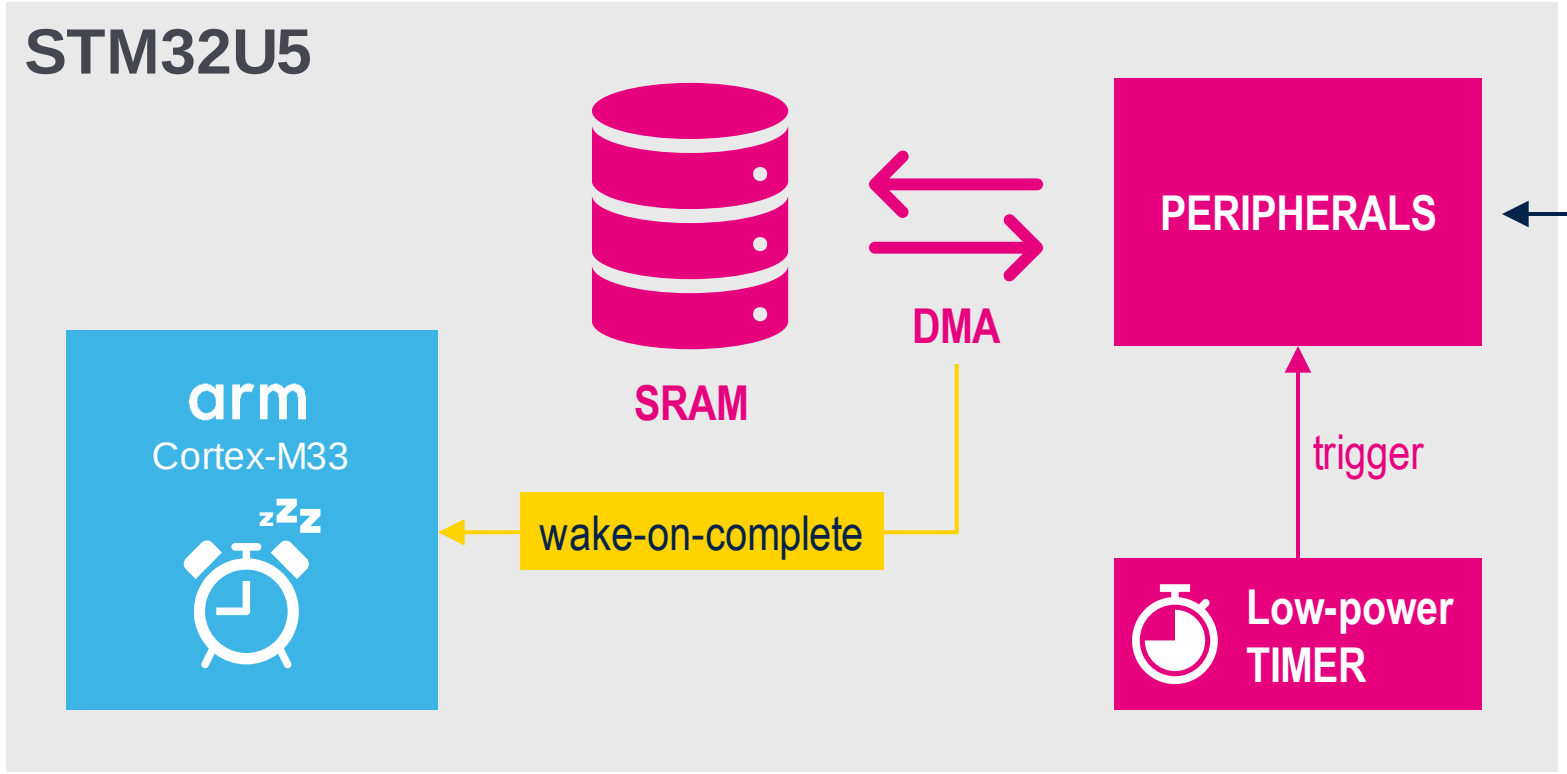
Cut MCU power consumption by 90%*

Low Power Background Autonomous Mode (LPBAM)



Peripherals:

- I2C master or slave
- SPI / UART reception or transmission
- ADC / DAC
- Voice Activity Detection
- LPTIM
- I/O

** Typical application where peripherals need to acquire data regularly*

Extends battery life

Improved flexibility versus existing STM32L series

- The STM32U5 provides a **large choice of low power modes** with fast wake-up times

See below some examples to illustrate the best-in class power consumption:

300 nA Standby

1.7 µA Stop3 (with 16kB SRAM)

6.6 µA Stop 2 (full retention: 786-Kbyte RAM)

Down to 19 µA / MHz (Run up to 160 MHz)

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STM32U5 efficiency proven by benchmarks

Best performances among 32-bit MCUs available on the market

ULPBENCH™ An EEMBC Benchmark **535 ULPMark-CP**	True energy cost of deep-sleep modes
ULPBENCH™ An EEMBC Benchmark **149 ULPMark-PP**	Common peripherals' energy impact on deep-sleep
ULPBENCH™ An EEMBC Benchmark **58 ULPMark-CM**	Active power, using CoreMark as the workload
ULPBENCH™ An EEMBC Benchmark **133000 SecureMark-TLS**	Efficiency of cryptographic processing solutions

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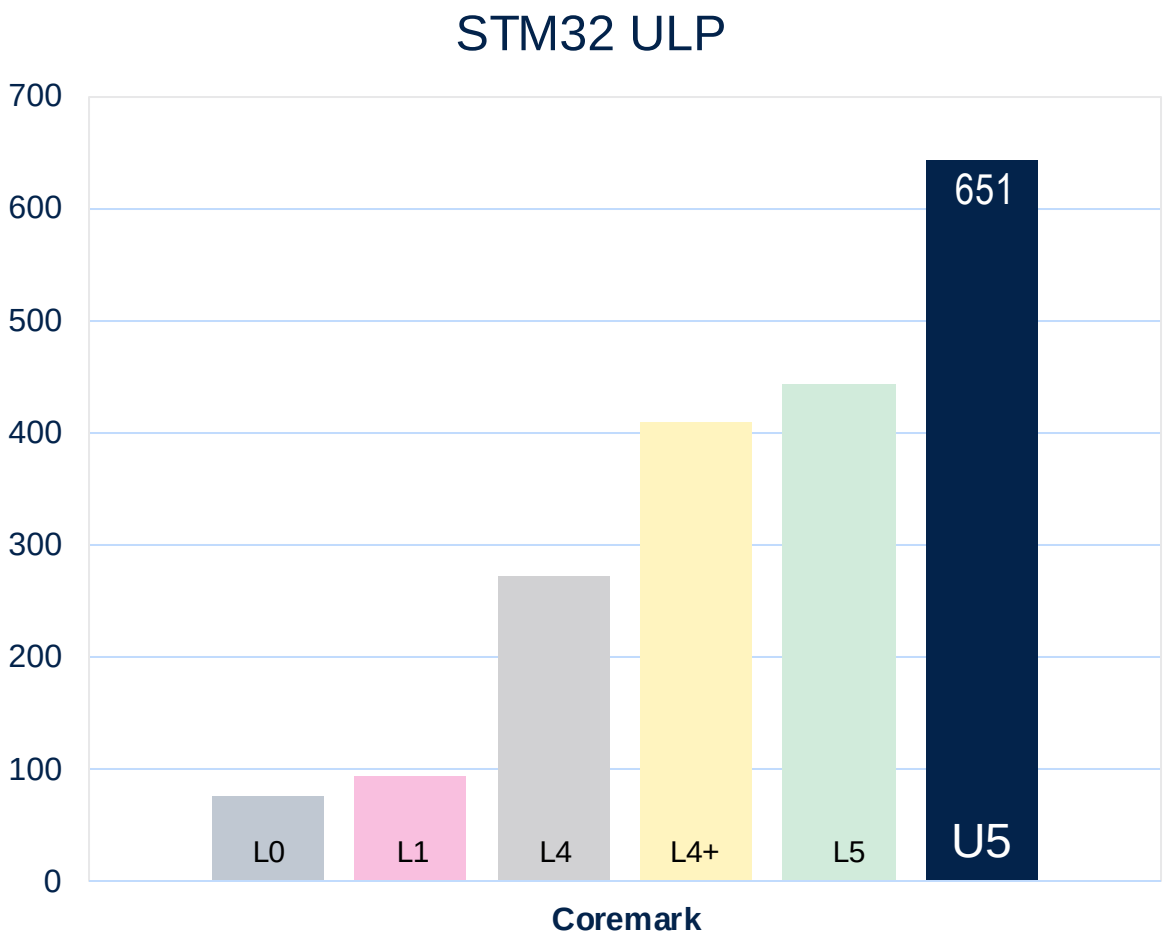
Unparalleled performance for an ULP MCU

STM32**U5**

- Arm® Cortex®-M33 at **160 MHz**
  240 DMIPS or **651 Coremark**
- Mathematics accelerators:
  FMAC and **Cordic**
- Cache for execution and **data** for internal and external memory (ART Accelerator)



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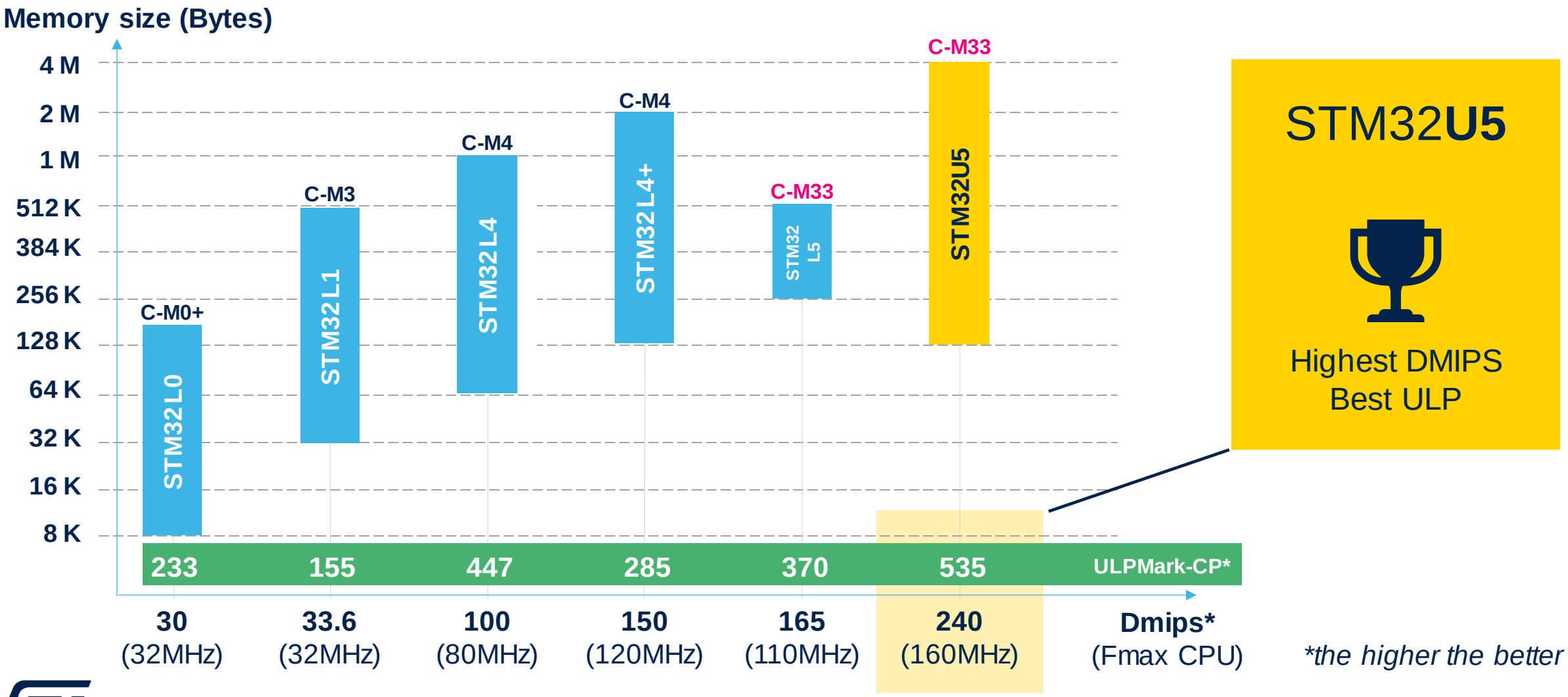
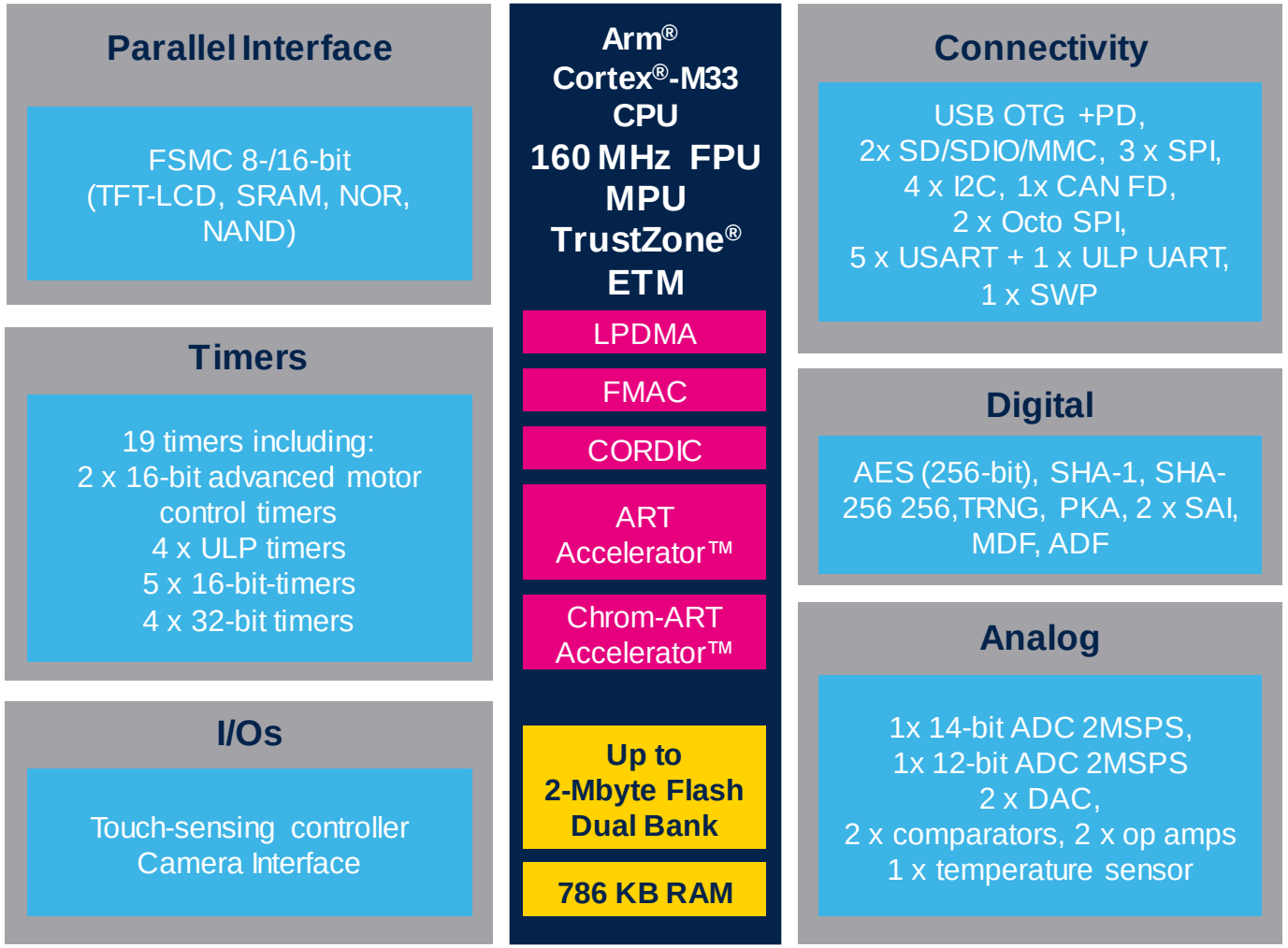
STM32U5, the new flagship of STM32 ULP series



High level of integration



Numerous integrated peripherals

Advanced accelerators

Large embedded memory

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Enhanced security

Extensive functionality to protect your assets

Isolation

TrustZone®
Secure Peripherals
Secure DMA

Cryptography

Side channel AES, PKA
Additional AES, PKA, SHA, TRNG
CAVP certified CryptoLib

Security assurance level

psacertified™ L3

SESIP L3

1st STM32 MCU to reach Level 3

Lifecycle

RDP: **4 protection level states**
Password based regression

Memory protections

OTP, HDP, WRP, RDP, MPU
Ext. Flash encryption OTFDec
Secure Debug

Active tamper

4x active pair of tamper pins.
Volt. &Temp. monitoring (**Vbat**)
Total tamper I/Os: **8**

Trust anchor

TF-M, Secure Boot,
Secure Firmware Install
Hardware Unique Keys

New features for STM32 in bold

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Multiple options to meet the needs of developers

8 different packages

48-pin QFN
90-pin WLCSP
48/64/100/144-pin LQFP
132/169-pin UFBGA

2 memory size configurations

1 M Flash / 786 K RAM
2 M Flash / 786 K RAM

Optional security

without HW crypto
with HW crypto

24 variants

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Development tools for STM32U5 series

Speed-up evaluation, prototyping and design

$348

$65

$23

Evaluation Boards	Discovery kit for IoT node	STM32 Nucleo
Full feature STM32U5 evaluation	**Direct connection to cloud services**	**Affordable and quick prototyping**
STM32U575I-EV	B-U585I-IOT02A	NUCLEO-U575ZI-Q

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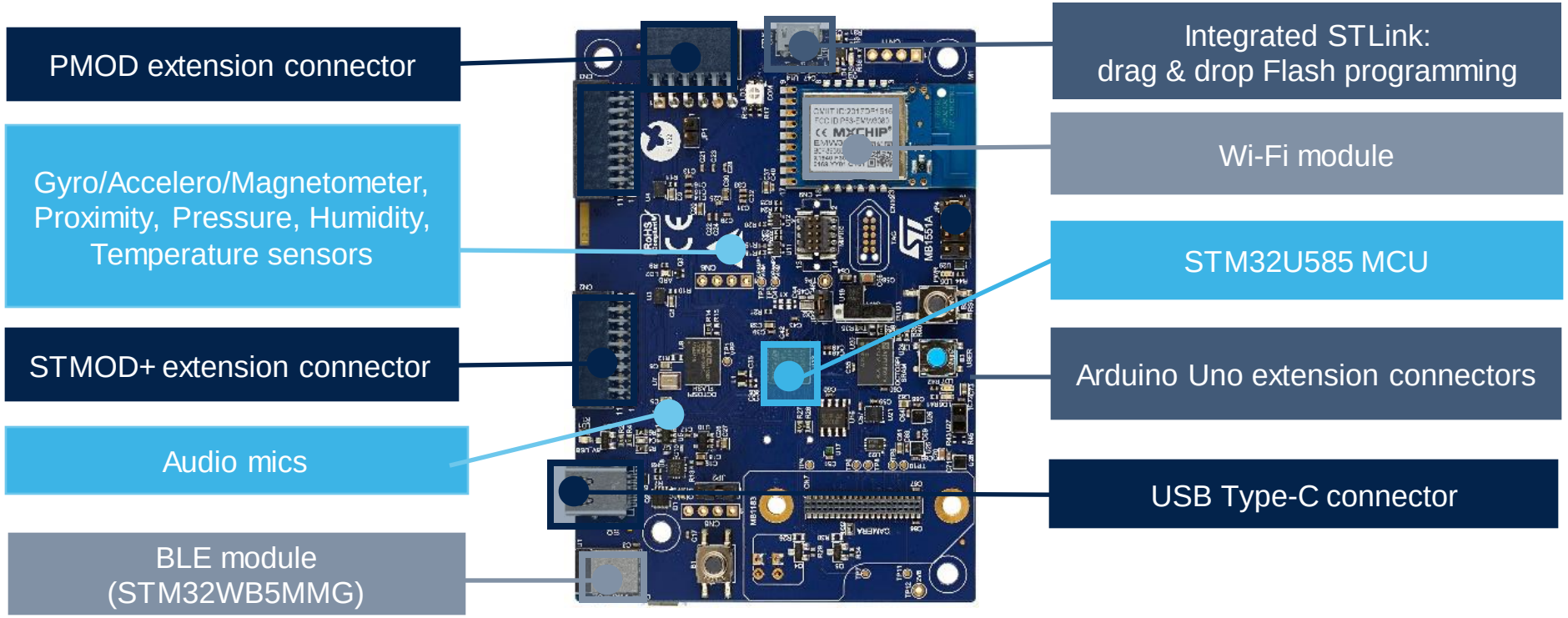
Discovery kit for IoT node with STM32U5 series

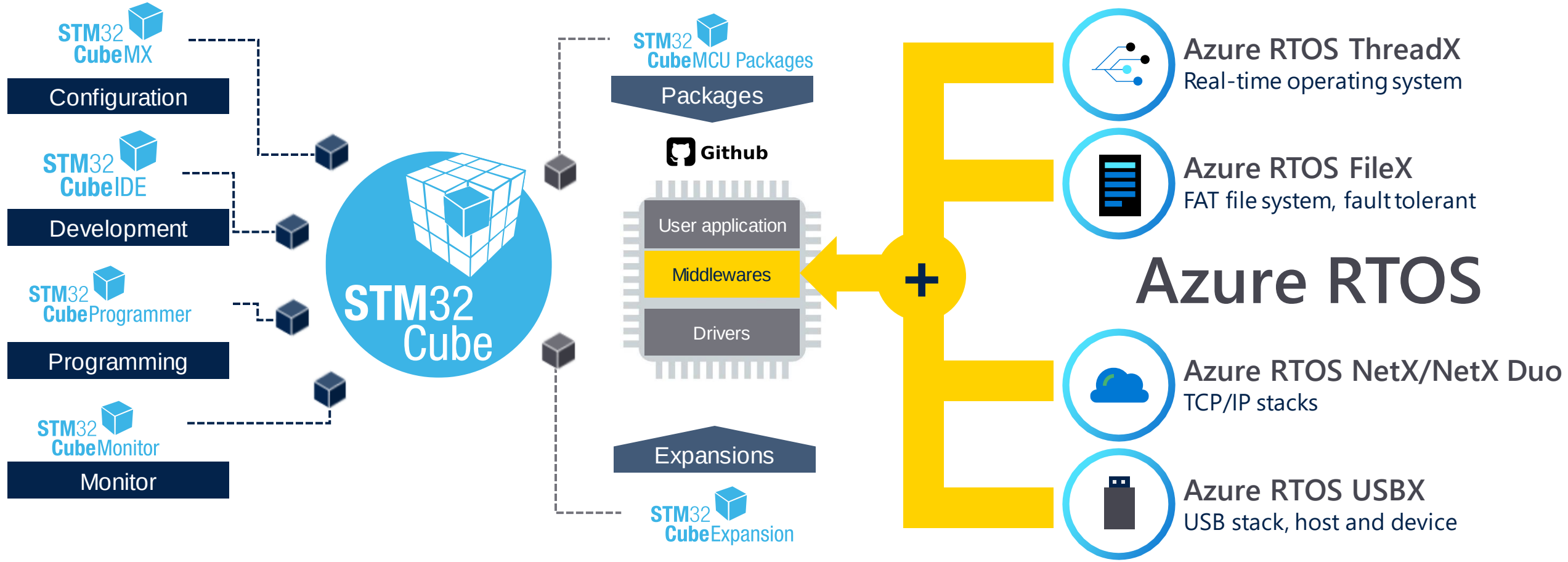
Multi-link communication, multiway sensing and direct connection to cloud services



B-U585I-IOT02A

STM32Cube software suite

Software Tools | Embedded Software | **Complemented with Microsoft Azure RTOS**



Azure RTOS in STM32Cube software suite

Microsoft Azure RTOS bringing additional Key benefits to well-know STM32Cube software Suite

Microsoft Azure

+ Azure RTOS

Faster & Easier Development

Business-friendly terms

Better Quality

+

Fast performance

Complete consistent solution

Industry certifications

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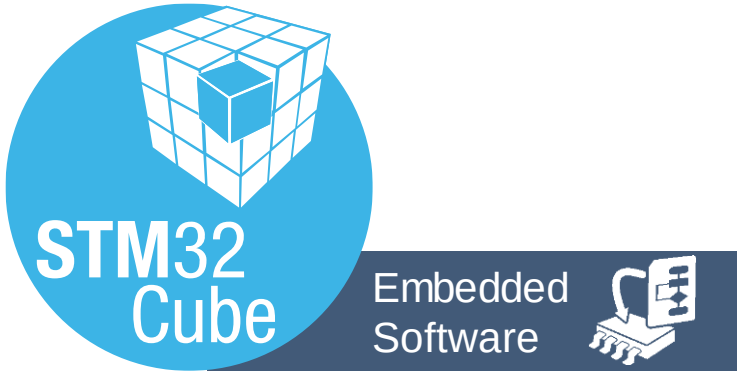
Contribute to STM32Cube embedded software

https://github.com/STMicroelectronics/STM32Cube_MCU_Overall_Offer



HAL and LL Drivers

RTOS and Middleware

Get software components and updates

Follow github issues, submit problems

Propose alternate solutions and new features

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Expand STM32Cube embedded software

Create your own STM32Cube Expansion Package with STM32PackCreator

+

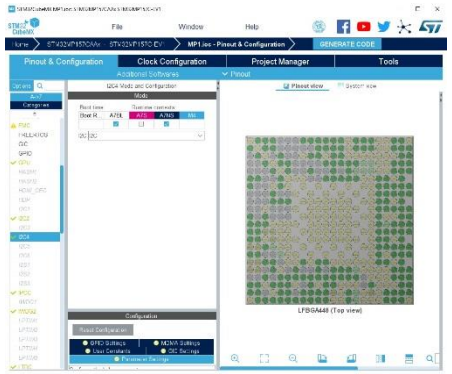
STM32 CubeExpansion

- Add a companion chip driver
- Add a custom board support
- Share your software component

Software tools for STM32U5

Complete support of Arm V8-M Cortex-M33 architecture

STM32 CubeMX

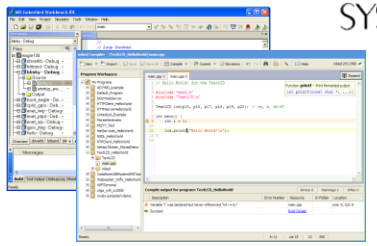


STM32 CubeIDE

arm KEIL

IAR SYSTEMS

eclipse



STM32 CubeProgrammer

STM32 CubeMonitor

STM32CubeMX

Graphical tool for easy configuration

- Configure and generate Code
- Peripherals and middleware configuration
- Resources allocation to security domains
- LPBAM tool (*)

IDEs Compile and Debug

Simple and powerful Solutions

- Partners IDE
- Free IDE based on Eclipse
- TrustZone debug
- RTOS aware debug

STM32 Programming & Monitoring tools

STM32CubeProg
STM32CubeMonitor

- Device and memory configuration
- Program the application
- Secure Firmware install
- Monitor variables at run-time

(*) Available in a future release

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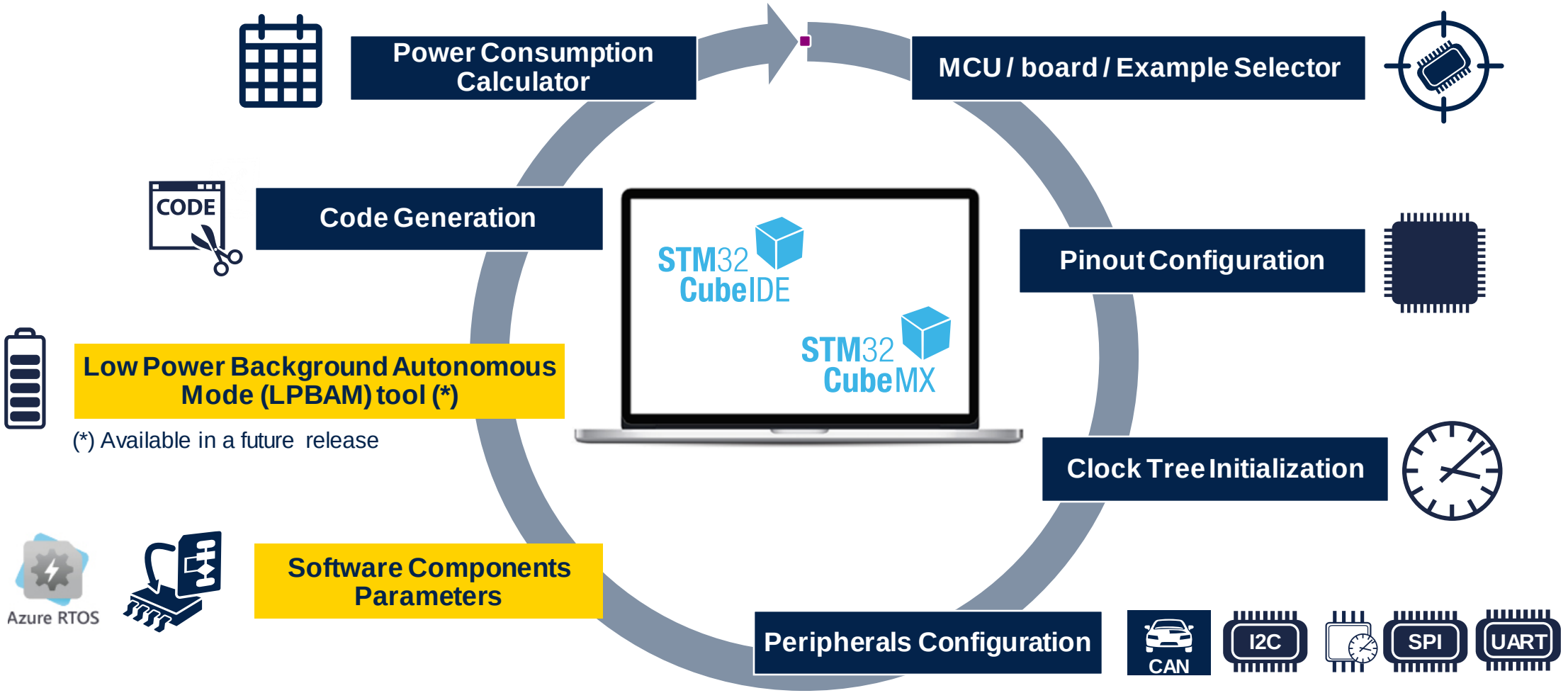
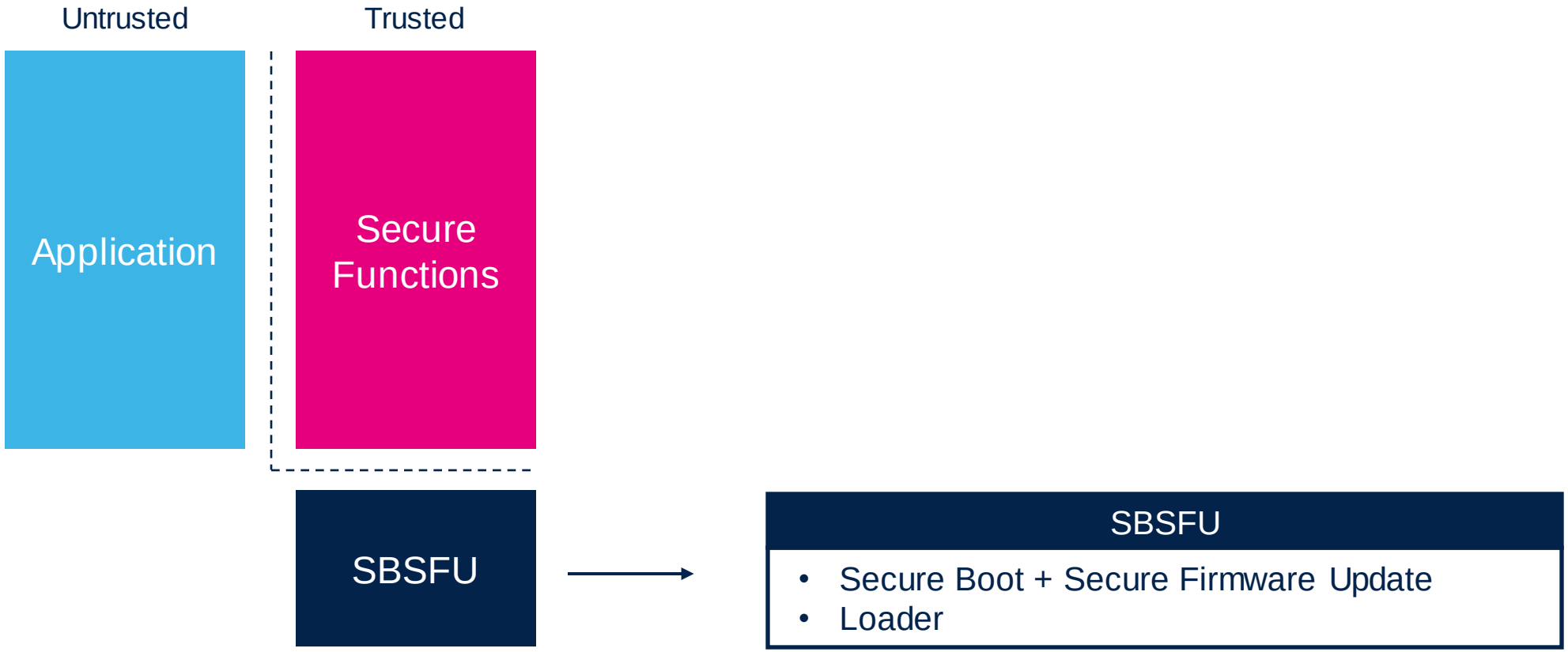
STM32Cube configuration tool



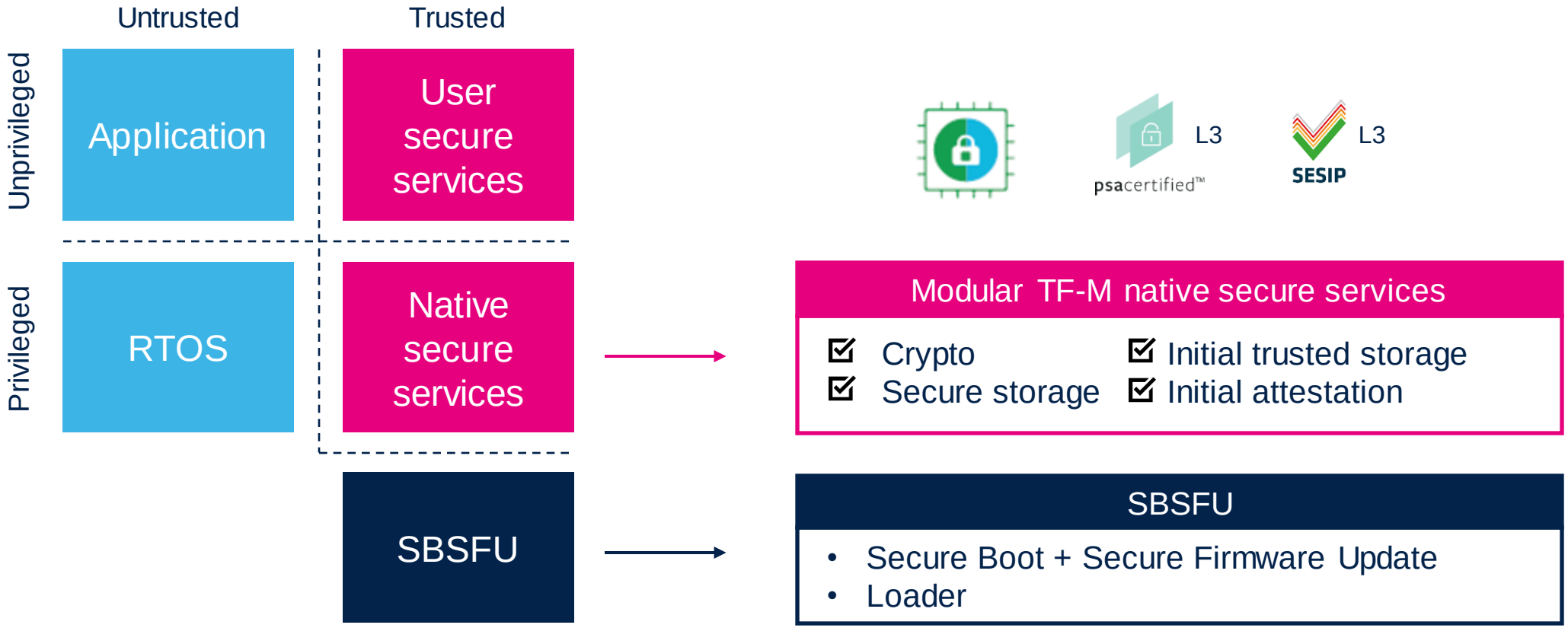
STM32Cube SBSFU

Reference code for PSA immutable Root of Trust



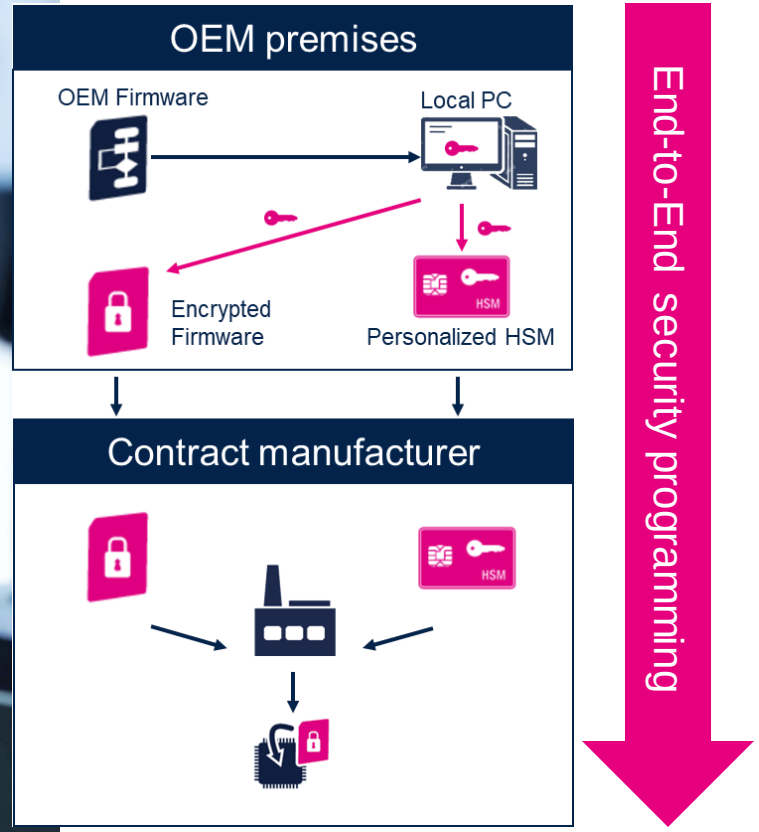
STM32Cube TF-M

Scalable reference code framework leveraging STM32U5 security features



Secure your production flow with Secure Firmware Install (SFI)

Protect application firmware at the contract manufacturer



Complete toolset to encrypt OEM binaries with the STM32 Trusted Package Creator software

Securely flash the STM32 with licenses from a STM32HSM at the programming partner location

Control the number of devices programmed with the firmware

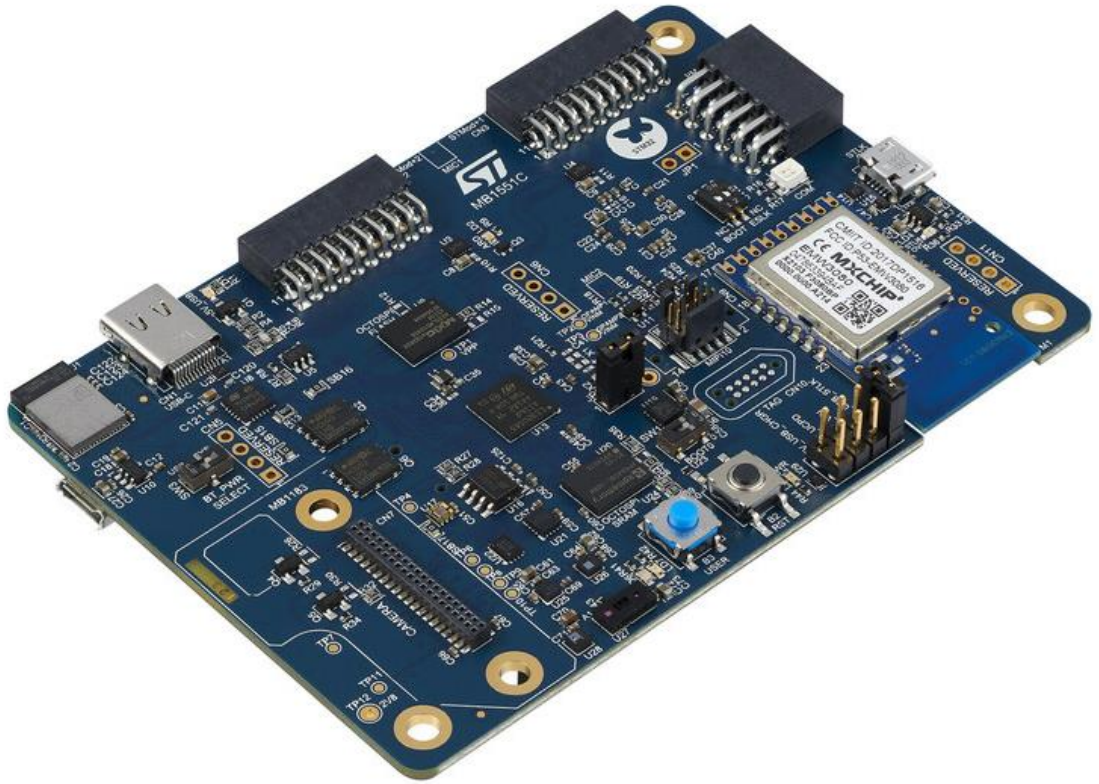
STM32U5 in open-source frameworks

STM32U5 is ready for communities' contribution

arm MBED

Zephyr™

ARDUINO™



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Azure IoT Platform certified for Azure IoT Plug and Play

Build end-to-end IoT solution with discovery kit for IoT node

Microsoft Azure Certified

B-U585I-IOT02A

Github

Supports Azure IoT and App Services

Azure IoT Hub (Device Provisioning Service)
Azure IoT Central
Azure IoT Middleware (Azure Device SDK)
IoT Plug and Play
Azure Defender for IoT

Visualization of real sensor data

State-of-the-art security based on TF-M

Based on Azure RTOS software components

Wi-Fi connectivity, Device management, OTA, gather insights, intelligent cloud and edge

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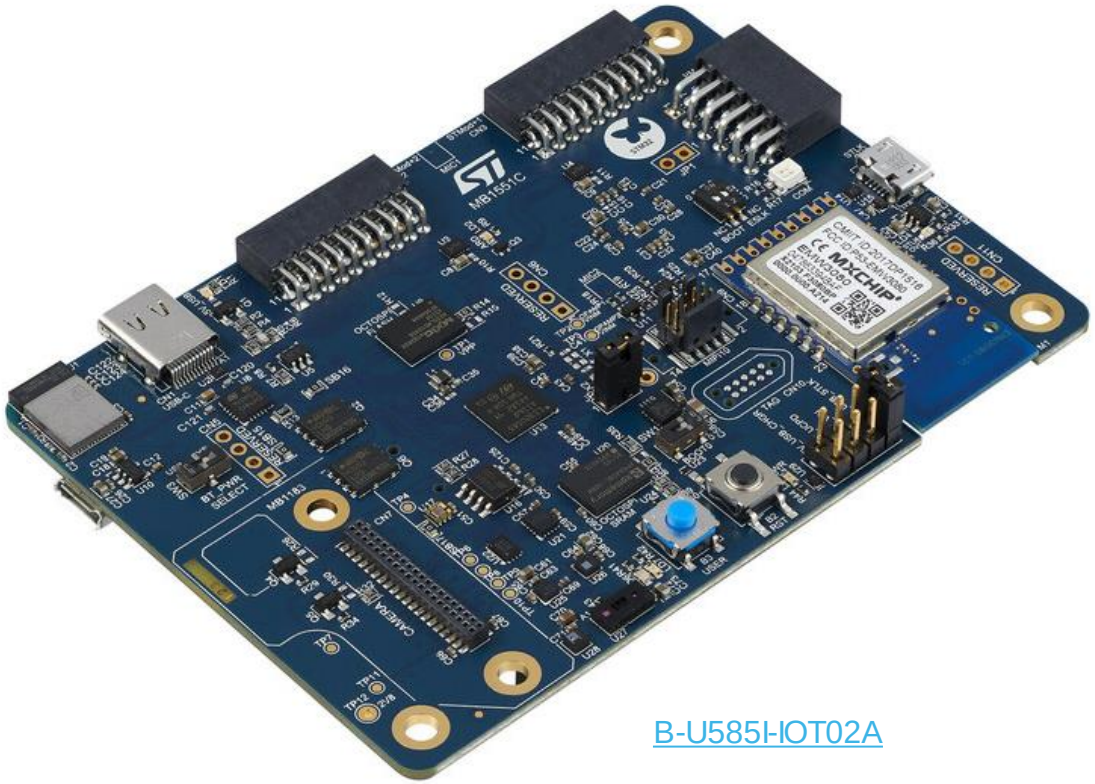
Microsoft Azure

A reference board for AWS IoT

STM32U5, recognized for IoT and cloud connection solutions



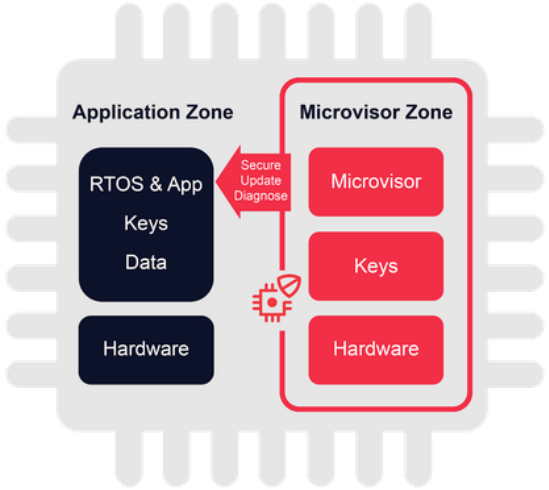
B-U585I-IOT02A

B-U585I-IOT02A discovery kit selected as reference board for **Amazon "Qualified for FreeRTOS"** program [1]

(1) Development and qualification in progress

IoT Device Builder Platform

Secure IoT foundation components with Twilio Microvisor



Microvisor

IoT Device Builder Platform

Secure boot & secure firmware OTA

Secure remote debug of application

Secure Wi-Fi, Bluetooth®/BLE or cellular communication

Keep your RTOS, existing code, development environment, and toolchain

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Start your project based on the STM32U5 now!

STM32U5

Ultra-low-power
Performance
Security

Available now !

Releasing your creativity

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- @ST_World
- community.st.com
- www.st.com/STM32U5
- wiki.st.com/stm32mcu
- github.com/STMicroelectronics
- STM32U5 blog articles

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Our technology starts with You

Find out more at www.st.com/STM32U5

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