




life.augmented

STM32U5 series

**The flagship of
ultra-low-power MCUs**





“ **If only** my smart watch
could last longer when I’m active

This is where we come in

STM32U5 increases battery
lifetime without impacting device
performance.



life.augmented



So many applications require more performance and longer lasting batteries



Industrial



Home appliances



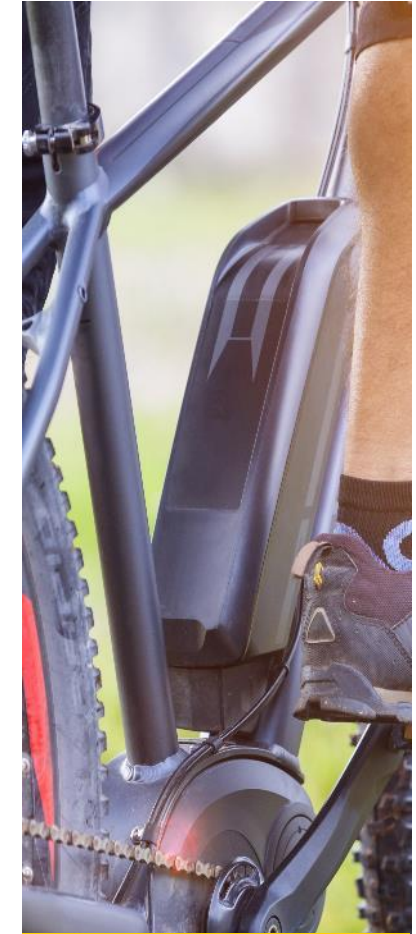
Point of sales



Wearables



Smart homes



e-bikes



The STM32 portfolio

Five product categories



Wireless
MCU

Short- and long-range connectivity



Ultra-low-power
MCU


32-bit general-purpose microcontrollers: from 75 to 3,360 CoreMark score



Mainstream
MCU



High-performance
MCU



Embedded
MPU

32- and 64-bit microprocessors



Enabling edge AI solutions



Scalable security

Saving energy while enabling outstanding graphics



STM32U5



High energy efficiency

Innovative power management features
LPBAM*, DMA and IP autonomous in LP mode

High integration

Up to 4 Mbytes of internal flash memory
Up to 3 Mbytes of RAM
USB HS with integrated PHY

Higher security and safety

AES and PKA, side attack resistant
ECC on flash memory and SRAM

Smoother graphics

Advanced graphics accelerators
(including NeoChrom and NeoChromVG GPUs)

Improved data storage

100 K cycles for 512 Kbytes of flash memory



STM32U5 efficiency proven by benchmarks

Best-in-class performance among 32-bit MCUs available on the market

ULPBENCH™
An EEMBC Benchmark

464 ULPMark-CP

True energy cost of deep-sleep modes

ULPBENCH™
An EEMBC Benchmark

125 ULPMark-PP

Common peripherals' energy impact on deep-sleep

ULPBENCH™
An EEMBC Benchmark

54 ULPMark-CM

Active power, using CoreMark as the workload

ULPBENCH™
An EEMBC Benchmark

137000 SecureMark-TLS

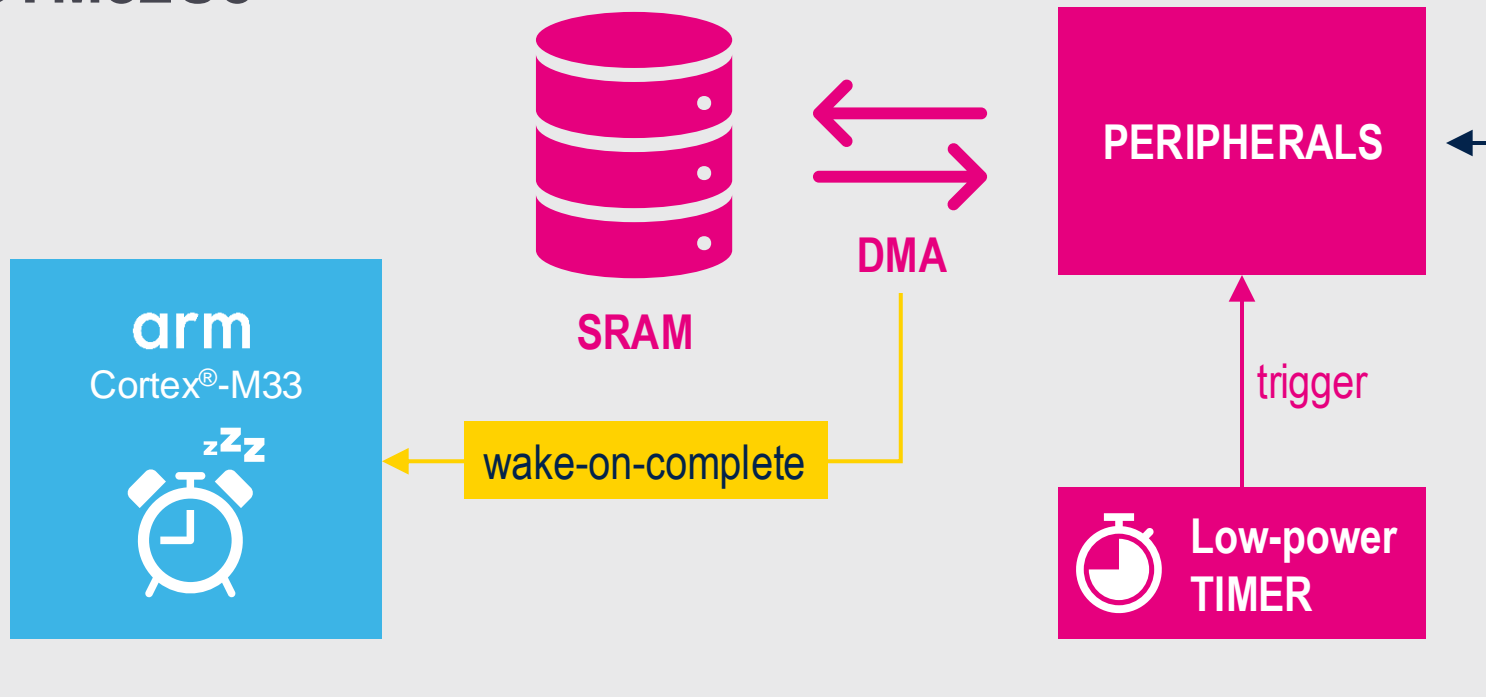
Efficiency of cryptographic processing solutions



Cut MCU power consumption by 90%*

Low power background autonomous mode (LPBAM)

STM32U5



Peripherals:

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

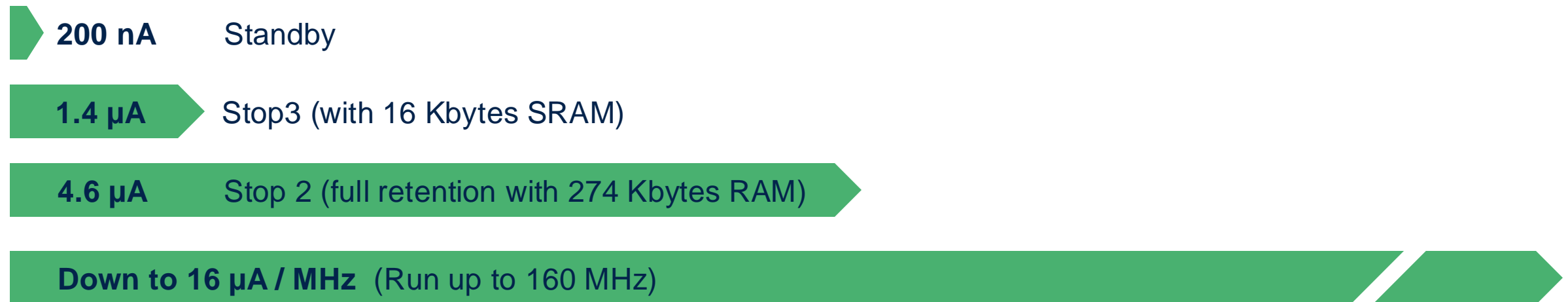


Extending battery life

Improved flexibility compared to previous STM32L product generations

- 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:



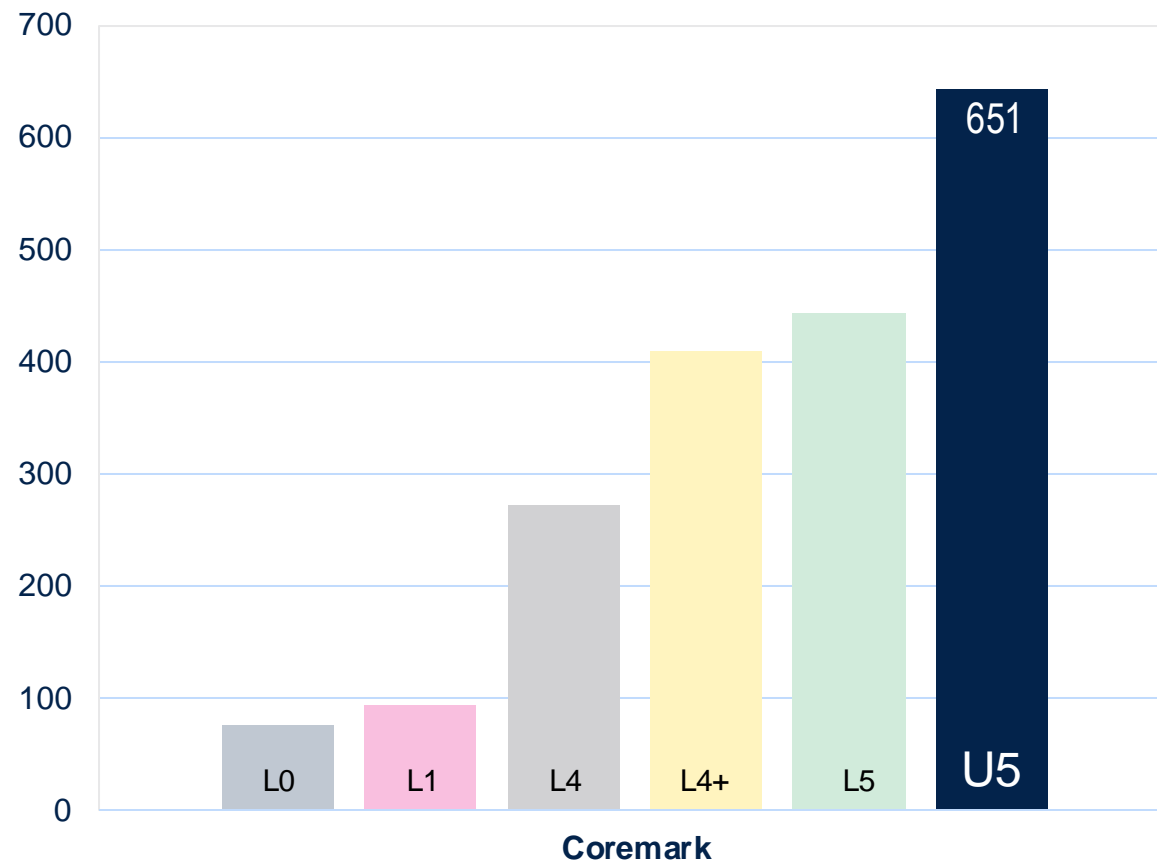


Unparalleled performance for an ultra-low-power MCU

STM32U5

- 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)

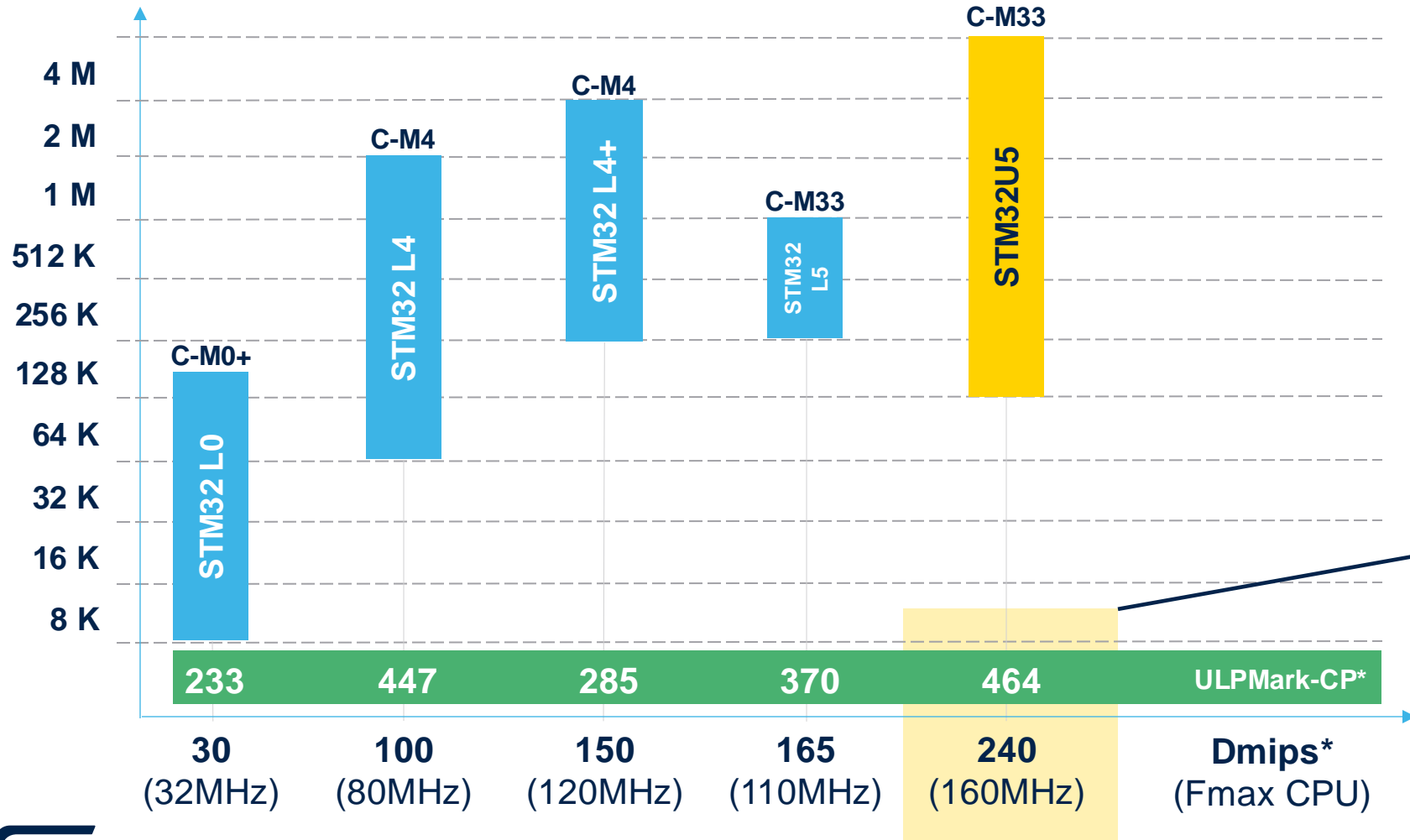
STM32 ULP





STM32U5, the flagship of STM32 ULP series

Memory size (bytes)



STM32U5



Highest DMIPS
Best ULP

**the higher the better*





Enhanced security

Extensive functionalities to protect your assets

Isolation	Cryptography	Security assurance level	
TrustZone® Secure Peripherals Secure DMA	Side channel AES, PKA Additional AES, PKA, SHA, TRNG CAVP certified CryptoLib	 psacertified™ level three	 SESIP™3 Target certifications
Lifecycle	Memory protections	Active tamper	Trust anchor
RDP: 4 protection level states Password based regression	OTP, HDP, WRP, RDP, MPU Ext. Flash encryption OTFDec Secure Debug	4x active pair of tamper pins. Volt. &Temp. monitoring (V_{BAT}) Total tamper I/Os: 8	TF-M, Secure Boot, Secure Firmware Install Hardware Unique Keys



STM32U5 portfolio brings you many design options

	STM32U535/545	STM32U575/585	STM32U595/5A5	STM32U599/U5A9	STM32U5F9/U5G9
Flash size	128 to 512 Kbytes	1 to 2 Mbytes	2 to 4 Mbytes	2 to 4 Mbytes	2 to 4 Mbytes
RAM size	274 Kbytes	786 Kbytes	2.5 Mbytes	2.5 Mbytes	3 Mbytes
USB	Full Speed	Full Speed + Power Delivery controller	High Speed + Power Delivery controller	High Speed + Power Delivery controller	High Speed + Power Delivery controller
ADC	1x ADC 12 bit 1x ADC 14 bit	1x ADC 12 bit 1x ADC 14 bit	1x ADC 12 bit 2x ADC 14 bit	1x ADC 12 bit 2x ADC 14 bit	1x ADC 12 bit 2x ADC 14 bit
Memory interface	SDIO 1x Octo SPI	SDIO, FSMC 2 x Octo SPI	SDIO, FSMC 2 x Octo SPI	SDIO, FSMC 2 x Octo SPI, 1x HSPI	SDIO, FSMC 2 x Octo SPI, 1x HSPI
JPEG Codec	-	-	-	-	Yes
Display interface	SPI	SPI, Parallel 8080	SPI, Parallel 8080	RGB, MIPI DSI	RGB, MIPI DSI
Graphics accelerators	-	Chrom-ART	-	 Chrom-ART	 Vector graphics Chrom-ART
Packages	From 48 to 100 pins	From 48 to 169 pins	From 64 to 169 pins	From 100 to 216 pins	From 100 to 216 pins



Run an MPU-like GUI on a single microcontroller

- Keep **two frame buffers** inside the MCU (up to 3 Mbytes of SRAM)
- Address **small applications** thanks to 100- to 216-pin packages (LQFP 100, LQFP 144, BGA144, and more)
- High level of integration reduces the need for external components

Software tools

TouchGFX graphic framework to offer an outstanding UX

[Read the blog to know more](#)



TouchGFX

Development tools for graphics

[STM32U5A9J-DK](#)
[STM32U5G9J-DK1](#)



[Watch the video](#)

[STM32U5G9J-DK2](#)



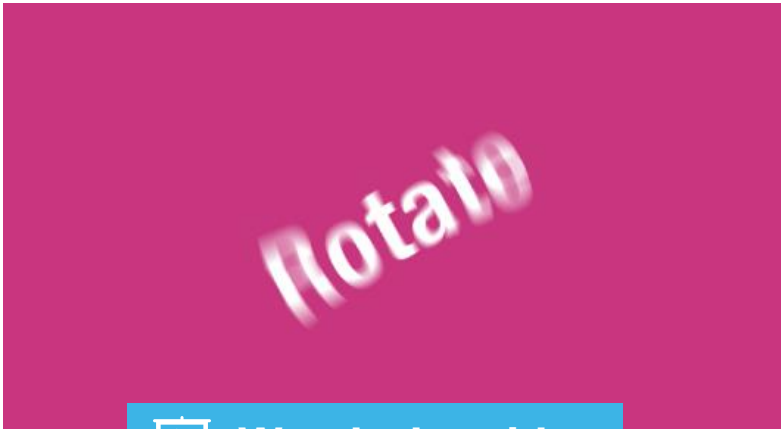
[Watch the video](#)



Smother and richer graphics with NeoChrom GPU



Watch the video



Watch the video

NeoChrom GPU

NeoChrom GPU offloads the CPU from the graphic computations, freeing up the memory and boosting performance.

Fully supported in the [X-CUBE-TOUCHGFX](#)

Enabling outstanding graphics on STM32, such as:

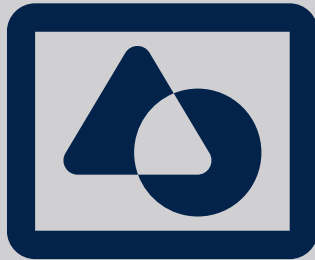
- Simple & advanced drawing
- 2D Copy
- Alpha blending
- Color format conversion
- Scaling, Rotation
- Perspective correct texture mapping
- Image format compression



Vector graphics

Vector graphics with NeoChromVG GPU

Scalable vector graphics (SVG)



- To gain nice dynamic effects
- To save flash memory

Fonts



- Drawing and manipulating characters and text-strings
- To enable dynamic graphics effects
- To save flash memory

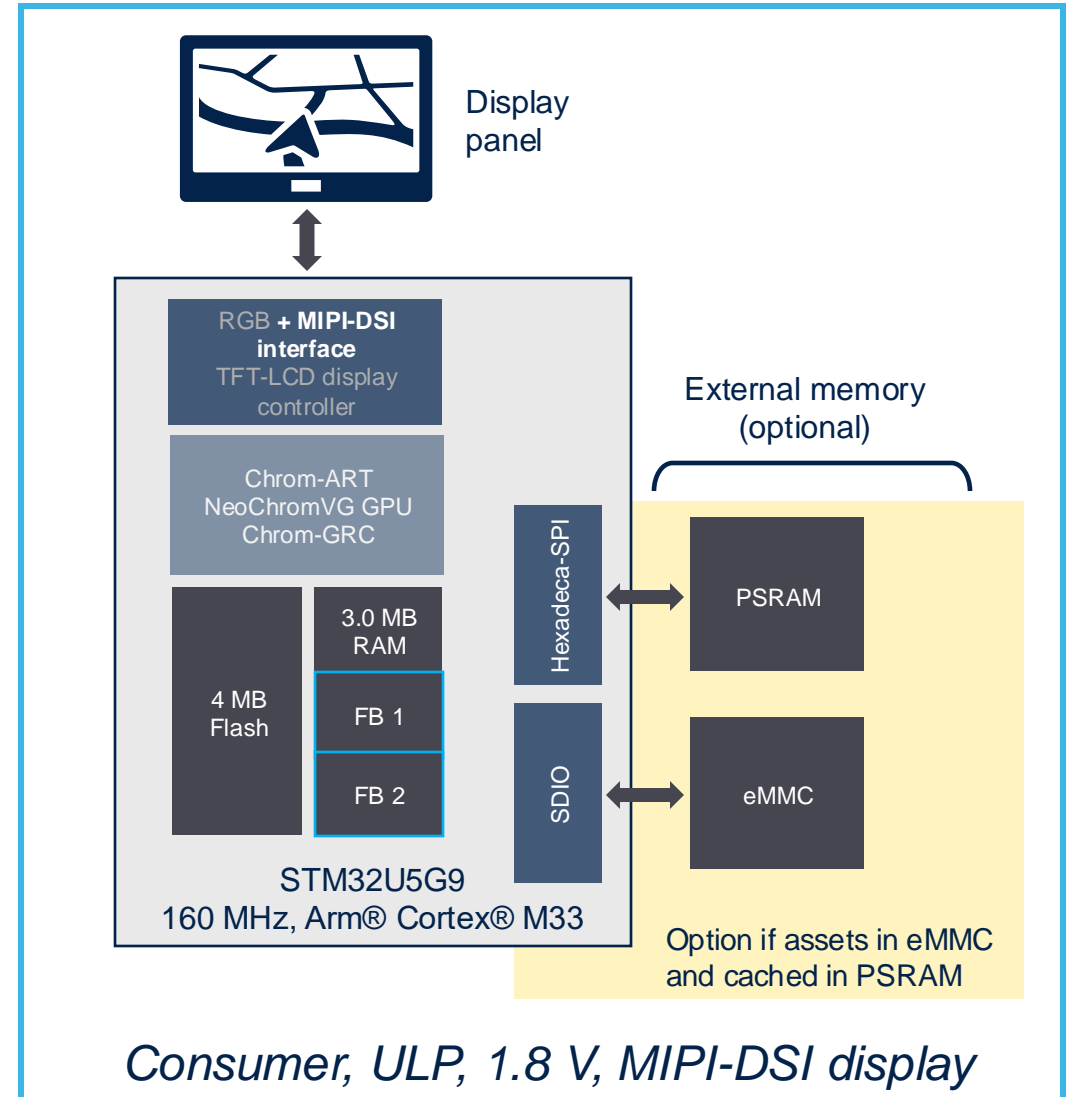
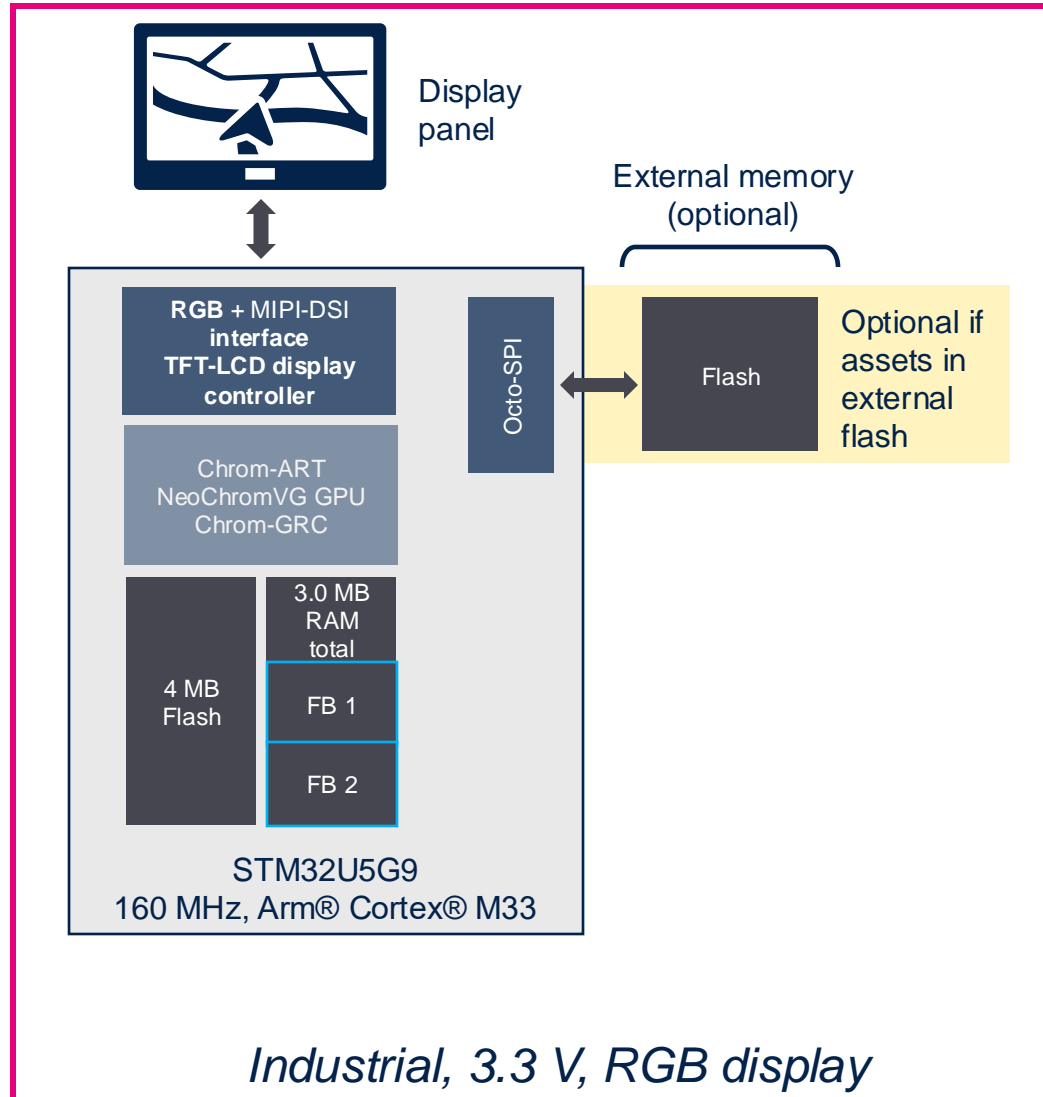
Map



Vector graphics are required to make map navigation possible (big and dynamic maps, zooming)

[Read the blog](#) 

Hardware setup - STM32U5G9 lines





STM32U5 offers high integration

Parallel Interface

FSMC 8-/16-bit
(TFT-LCD, SRAM, NOR,
NAND)

Display

MIPI-DSI 2 Lane 500Mps
TFT-LCD Controller

JPEG CODEC

Timers

19 timers including:
2 x 16-bit advanced motor
control timers
4 x ULP timers
5 x 16-bit-timers
4 x 32-bit timers
GFX timer

I/Os

Touch-sensing controller
Camera Interface

Cortex-M33
160 MHz
FPU
MPU
TrustZone®
ETM

NeoChrom
GPU
Vector graphics

LPDMA

FMAC

CORDIC

ART
Accelerator™

Up to
4 Mbytes Flash
Dual Bank

3 Mbytes RAM

Connectivity

USB HS+PHY OTG +PD,
2x SD/SDIO/MMC, 3x SPI,
6x I2C, 1x CAN FD,
2x Octo SPI (100MHz),
1x Hexa SPI (160MHz),
6x USART + 1x ULP UART

Digital

AES (256-bit), SHA-1, SHA-
256, TRNG, PKA, 2x SAI,
MDF, ADF

Analog

2x 14-bit ADC 2MSPS,
1x 12-bit ADC 2MSPS
2x DAC,
2x comparators, 2x op amps
1x temperature sensor

Numerous integrated peripherals

Advanced graphics

More embedded memory

STM32U5 development ecosystem



STM32 development tools

Speed up evaluation, prototyping, and design with hardware tools



*\$348



*\$65



*\$89



*\$23



Evaluation board

STM32U5 full feature
evaluation

[STM32U575I-EV](#)

Discovery kit for IoT node

Direct connection to cloud
services

[B-U585I-IOT02A](#)

Discovery kits for graphics

[STM32U5A9J-DK](#)

[STM32U5G9J-DK1](#)

[STM32U5G9J-DK2](#)



Watch the video

STM32 Nucleo

Affordable and quick prototyping

[NUCLEO-U575ZI-Q](#)

[NUCLEO-U5A5ZJ-Q](#)

[NUCLEO-U545RE-Q](#)

*Recommended Resale Price (RRP), starting from



STM32Cube framework

Helping developers release their creativity

Comprehensive offer helping you accelerate your development

Focus on quality, compatibility and stability

Documentation, trainings and worldwide support channels



Applicative reference implementations

Extension libraries and AI toolkit

 Hardware	 Embedded SDK	 Development tool kit	 Development resources
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STM32Cube framework

Tools and software supporting you during all your design steps

MCU, boards
and SW
selection

HW and SW
Configuration

Application Development and debug

Code and HW
options
programming

Run-time
application
monitoring



STM32
Finder



STM32
CubeMX



STM32
CubeMCU Packages



STM32
CubeExpansion



STM32
CubeIDE



STM32
CubeProgrammer



STM32
CubeMonitor

Verticals and
Partners solutions

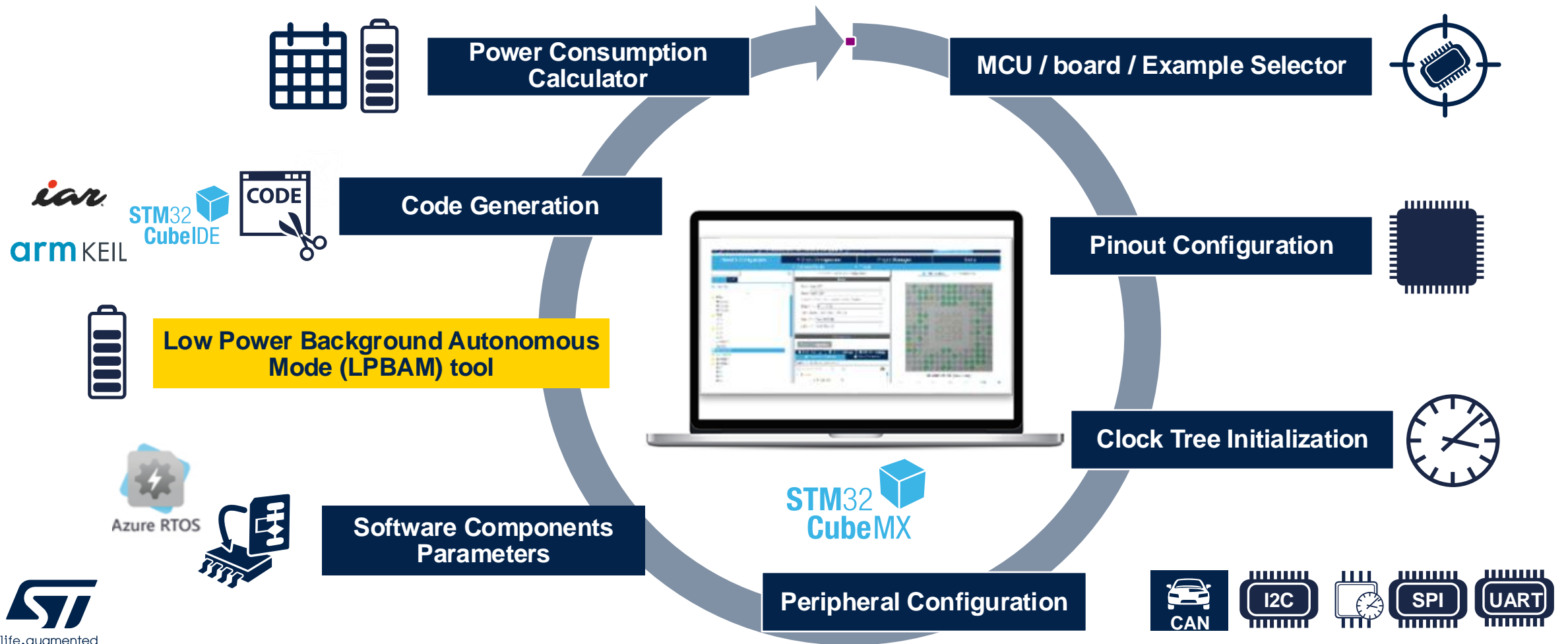
IDEs from Partners

Programmiers from Partners

Worldwide support channels



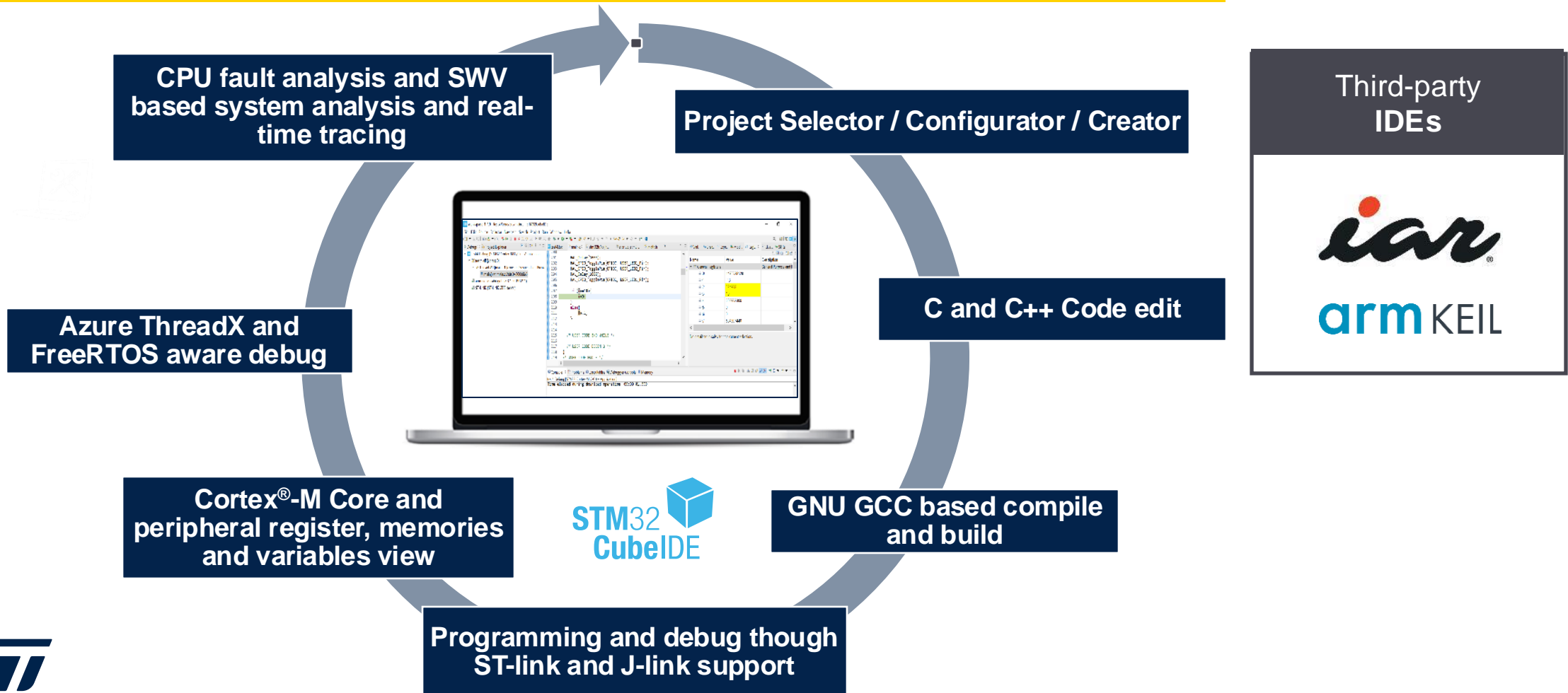
Easily and quickly create and initialize your project



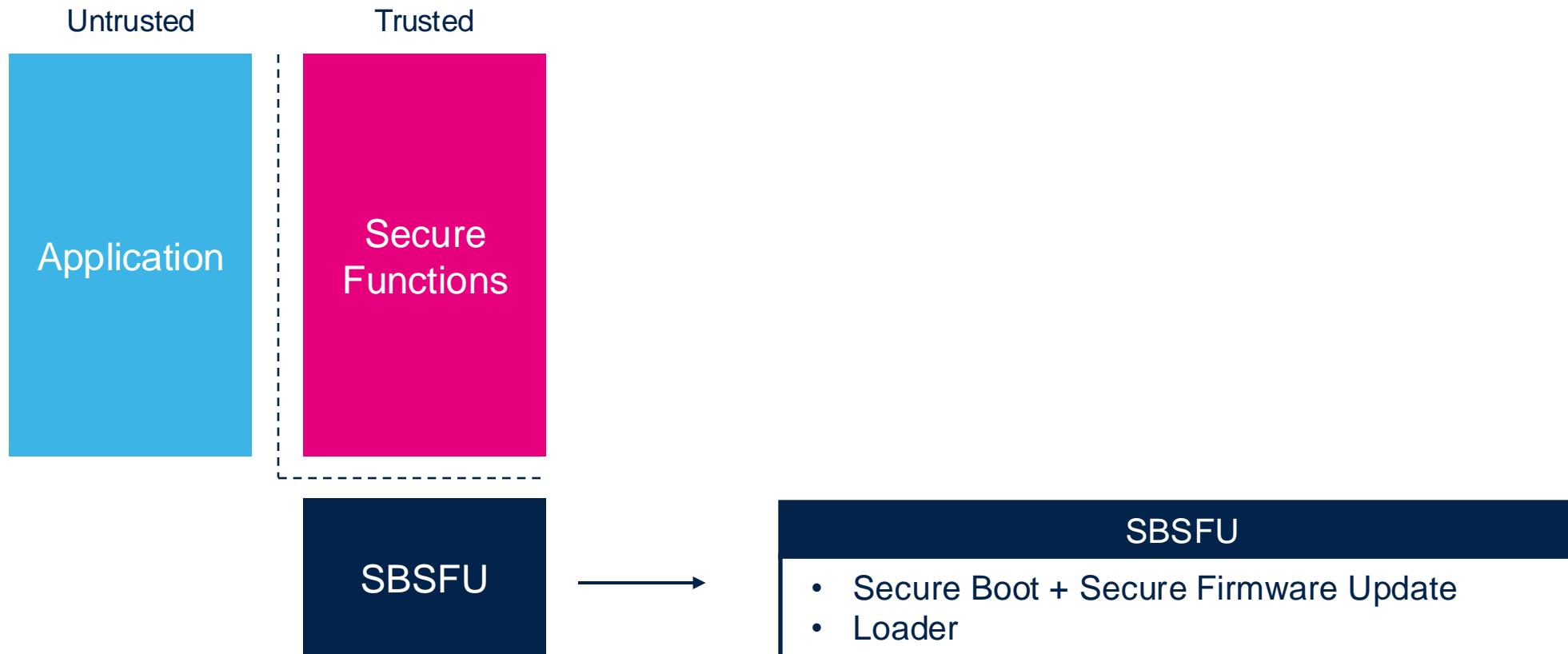


STM32CubeIDE and third-party IDEs

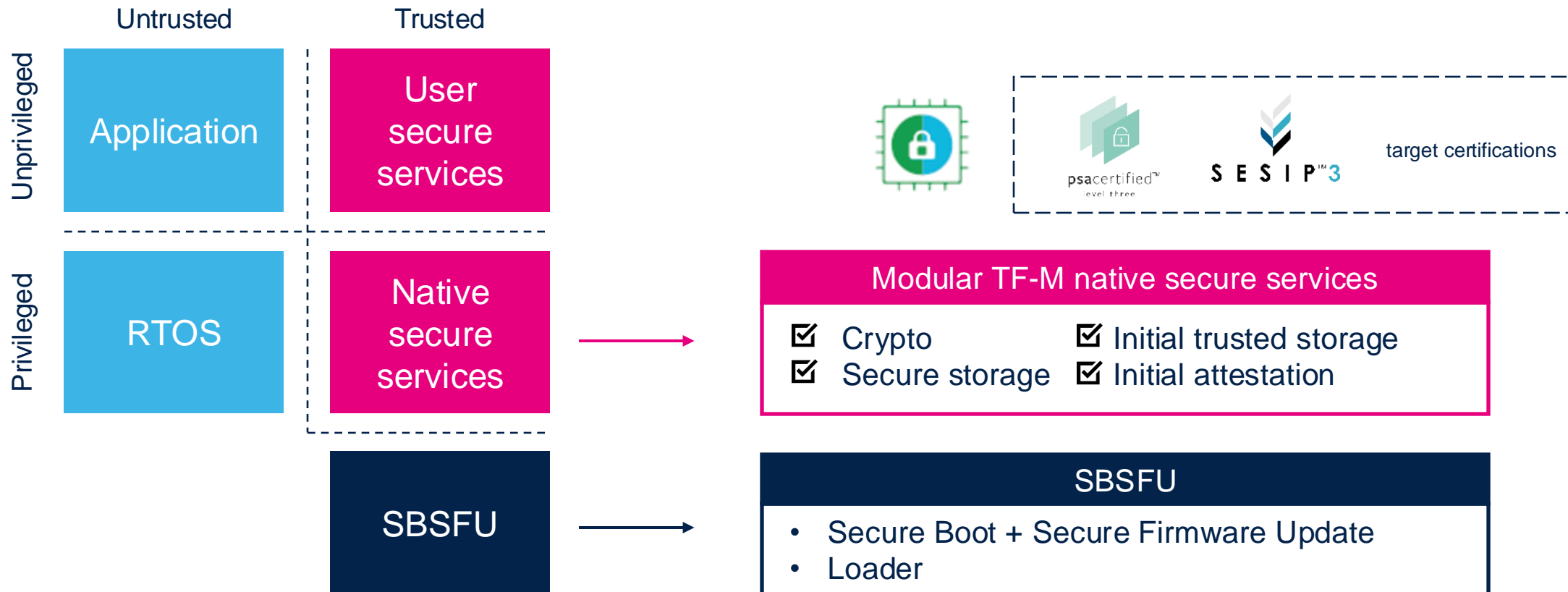
Simplify and accelerate your application development



Reference code for PSA immutable Root of Trust

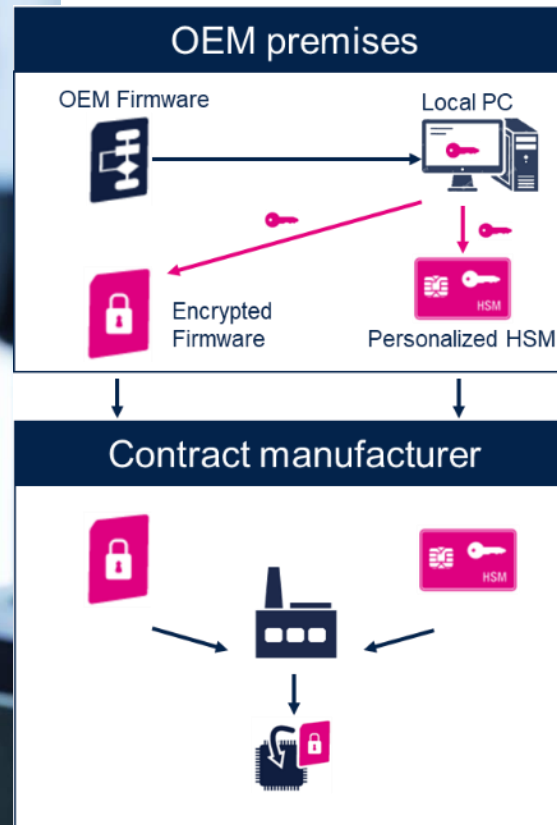


Scalable reference code framework leveraging STM32U5 security features



Secure your production flow with Secure Firmware Install (SFI)

Protect application firmware at the contract manufacturer



End-to-End security programming

Complete toolset to encrypt OEM binaries with the [STM32 Trusted Package Creator](#) software

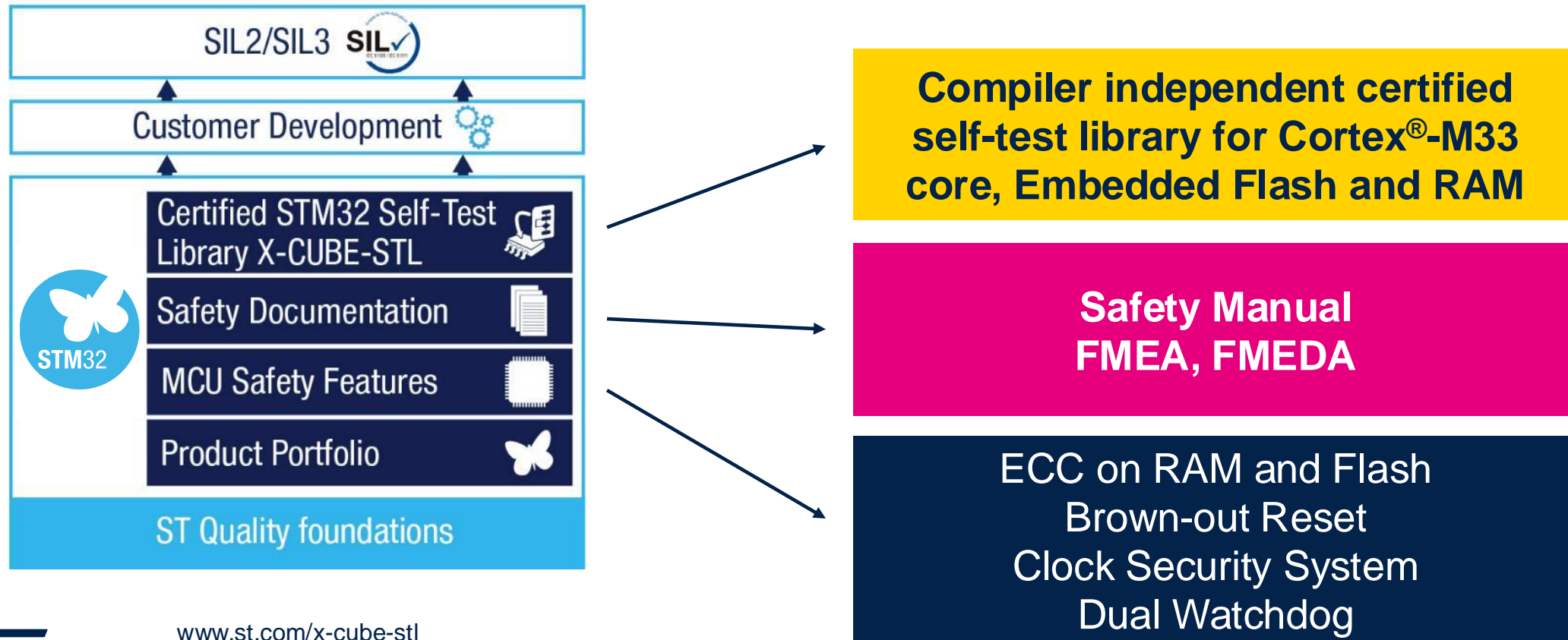
Securely flash the STM32 with licenses from a [STM32HSM](#) at the programming partner location

Control the [number of devices](#) programmed with the firmware



SIL functional safety package for STM32

Reduce time and cost of your IEC 61508 certified system

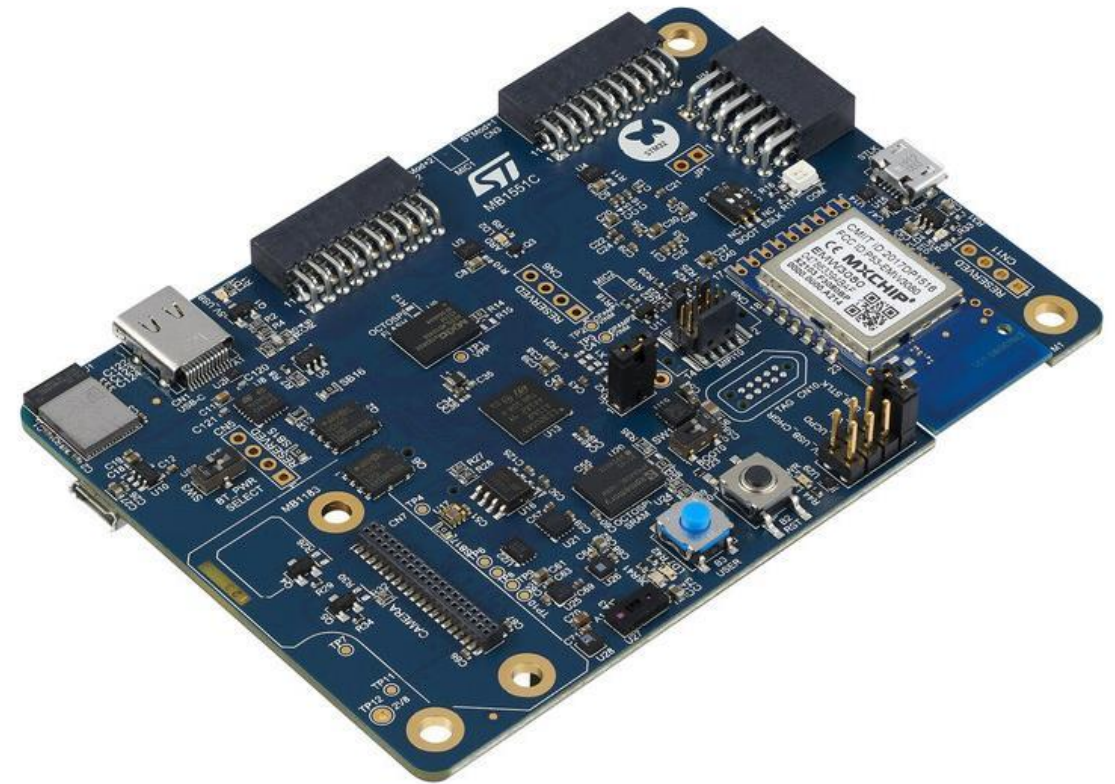




STM32U5 in open-source frameworks

STM32U5 is ready for community contribution

arm
MBED





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

STM32
CubeExpansion

X-CUBE-Azure

B-U585I-IOT02A

Visualization of real sensor data

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

Based on Azure RTOS software components

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



AWS IoT Platform Qualified for AWS IoT Core

Reference implementation supporting AWS IoT Services



B-U585I-IOT02A



STM32
CubeExpansion

X-CUBE-AWS

AWS-Qualified FreeRTOS
reference integration

Leveraging Arm® Trusted Firmware-M (TF-M)

FreeRTOS LTS open-source middleware

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

Releasing your creativity



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[community.st.com](#)



[www.st.com/STM32U5](#)



[wiki.st.com/stm32mcu](#)



[github.com/stm32-hotspot](#)



[STM32U5 blog articles](#)



[STM32 MCU Developer Zone](#)



Our technology starts with You



Find out more at www.st.com/STM32U5

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